The Demand for Government Housing: Evidence from Lotteries for 200,000 Homes in Ethiopia

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Abstract

The economic case for state intervention in housing depends on two factors: the willingness to pay of intended beneficiaries relative to production costs, and possible externalities generated by moving households to new housing. I study the demand for and impact of government housing built mostly on the outskirts of Addis Ababa, Ethiopia, targeting a large population residing in slums. A large-scale housing lottery randomly assigned applicants to various locations. Combining eight years of household survey data with rental, construction cost, and land-market data, I show that willingness to pay exceeds the cost of construction for a large share of the city's slum residents. There is no evidence of negative effects of moving on labor market, education, and consumption that would imply externalities or mistakes by movers. Social networks, community outcomes, and neighborhood amenities initially worsen but significantly improve after 8 years. These results vary by housing location, suggesting a weaker case for building government housing in central areas compared to the outskirts.

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1 Introduction

Poor housing conditions in cities of developing countries present an important global challenge. In Addis Ababa, Ethiopia, over 70% of households live in homes with mud or wood floors. Governments employ a variety of policy responses aimed at improving housing conditions for the poor. The development of new-build formal housing by the state is an enduringly popular policy because of the extraordinary scale at which they deliver high-quality housing, which is then usually given away or sold to applicant households.[1] But standard economics suggests that government involvement in supplying housing is likely to be inefficient. Arguably, by choosing to live in slums in the city center, poor households reveal a preference for central locations over improved housing on the outskirts of cities, where government housing is usually built (Glaeser and Gyourko, 2008; Glaeser, 2011). After all, the private market does not generally build high-quality housing in these peripheral locations. If so, willingness to pay for government housing will be below the costs of building it for the vast majority of its intended beneficiaries. Government planners may also inefficiently build too much, in unsuitable locations, or at inappropriate quality levels. But another view holds that if the state faces a different supply curve for housing, then the market-provided level may be inefficient (Marx et al., 2013; Collier and Venables, 2014), in which case the state may be able to improve welfare by meeting a previously unmet demand.[2]

Measuring the demand for government housing is challenging. Ideally, one would observe take-up of housing among a representative population randomly asked to pay different prices, including the unsubsidized market rate or the marginal cost of producing this housing.[3] This is rarely possible because governments fix rents, and prevent resale and subletting. Also, housing is rarely allocated randomly, so those who take it up are not at all representative. This paper exploits a lottery for state-supplied housing where winners own their homes but can rent them out freely, allowing me to characterize the market price and to compare that to the cost of construction to the state. I then estimate the share of lottery winners, who are representative of a large share of the population, that move into their units at this market price, which they forgo if they choose not to rent it out. This reveals the preference of households for owner-occupied housing. But revealed preference alone may be misleading (Finkelstein and Hendren, 2020). Moving further from the city may negatively affect households in a way that they do not anticipate, or may generate important externalities, for example though severing of social networks, dislocation from labor market access, or creation of low-social capital neighbourhoods. The lottery allows me to test for such effects.

Specifically, I study a large-scale housing lottery in Addis Ababa. I collect detailed panel survey data on a random sample of households entered into this lottery, following up with them 3 and 8 years after they won. Recipients win the chance to buy a new house at a subsidized rate, are allowed to rent it freely on the private market, but cannot sell

[1] The largest housing programs in the world are in Brazil and South Africa (three and four million houses, respectively). There are similar programs in Mexico, Chile, India, and Nigeria. See Table A1.

[2] Appendix A3 presents correlational evidence for this view: rather than rising with household wealth and with GDP per capita, housing quality in African cities remains stubbornly low.

[3] See, for example, Lee et al. (2020) for such an exercise with household demand for electricity.

for five years.[4] Using random variation in the location of the housing households won, I characterise the demand for and effect of government housing at different locations across the city and at two different time periods. This allows me to understand the relative returns to building government housing in the centre versus the outskirts. Multiple rounds of data and later lotteries enable me to causally disentangle the effects of winning for households that move into their units and those that do not.

The paper proceeds in three main steps. First, in Section 4, I characterize market prices and construction costs of government housing at four different main locations. Estimating these costs in developing countries is challenging. I use government financial data, land auction prices to impute the cost of building on government land, along with household survey data to estimate maintenance and rental transaction costs. I also collect a large dataset of market rent from three time periods. My analysis shows that rents exceed production costs on average, using a simple internal rate of return calculation (although returns vary by location and are slightly negative for housing near the center). This suggests modest but positive social returns: the demand for housing exceeds its cost of supply, with over 200,000 units built, suggesting that formal housing was under-provided prior to the state's intervention.[5] However, this willingness to pay is associated with the marginal tenant of public housing, who may be drawn from the wealthier segment of the population with a higher willingness to pay.

To understand how broad this demand is, in the second main step (Section 5) I examine the housing choices of lottery applicants. Lottery applicants represent roughly 70% of all households in the city, minimizing concerns about selection bias. I find that about 50% of lottery winners move into their new government homes when they get the chance, a rate that remains constant after 8 years, at the implicit price given by the rent they would have earned, identified in the first section. This indicates a broad demand for owner-occupied formal housing among households who would otherwise reside in slums, and at a price above cost. I present several pieces of evidence that these changes in housing consumption are due to preferences for housing quality over location, rather than the large permanent income effect induced by winning housing at subsidized sale price (Andersen et al., 2023). I estimate the determinants of moving into housing, the effects of housing on income and non-housing consumption, and housing consumption Engel curves.[6] All results suggest that wealth doesn't play a role. Instead, winning the lottery leads households to trade housing quality for location almost one-to-one in market-value terms, an effect driven entirely by moving to government housing.

Third, Section 6 of the paper, presents the effects of winning the lotteries. Steps 1 and 2 suggest the state construction of housing is socially beneficial because WTP exceeds its cost for so many households if there are no negative externalities (Banerjee et al., 2024). But government housing programs have long been hypothesized to hurt labor market

[4]This ability to rent freely is unique to my study, unlike other programs where subsidies or free housing are conditioned on moving in decisions, as seen in rental schemes in Europe and the US (Van Dijk, 2019) or ownership schemes in Brazil (Belchior et al., 2023)

[5]Glaeser et al. (2005) argue that the private supply of building height is inefficient based on the same price to cost calculation in Manhattan. In this paper, I do not take a stand on the reasons that improved housing might be under supplied.

[6]Lottery winners also invest in amenities like showers, glass windows, and tiling, increasing their housing consumption value by 10% relative to the state-provided level.

outcomes and create high-poverty neighborhoods that negatively effect human capital, which in turn could imply fiscal externalities. One potential cost of moving to more peripheral areas is that households lose access to important networks that supported their livelihoods. Households may not anticipate these costs, which may invalidate the assumptions of revealed preference. I estimate the effects of winning condominiums on employment, social outcomes, neighborhood conditions, human capital, and well-being, after both 3 and 8 years. To separately identify the effects of winning the lottery on those that move and those that do not in the first endline, I define a group of 'movers' in the control group based on whether they moved into their government houses if they won a lottery after the first endline, as revealed in the second endline. These later movers then provide a counterfactual for households who moved at the time of the first endline. Under certain reasonable assumptions, this separately identifies the effect of moving from the wealth effect of winning.[7] I find no effect of the lottery on non-housing consumption, employment, income, or education, nor for winners or movers separately. Although commuting times are higher, movers are well-connected to jobs via private minibuses, while others find employment at the new sites.[8]

Three years after moving, households report weaker local social networks and felt a lack of support, although their satisfaction with these networks remains unchanged. After 8 years, these negative effects largely diminished, and social lives improved in many ways. Most notably, respondents experience persistently reduced conflict with neighbors and increased, though not significantly, satisfaction with their social lives. Participation in community groups is significantly higher in the new areas. Neighborhood amenities and public goods show a reversal of fortune: after 3 years in government housing, local outcomes worsen for some outcomes. However, after 8 years, access to public goods is unaffected, amenities are better, crime rates are lower, and overall neighborhood satisfaction is dramatically higher.

Finally, I turn to heterogeneity by randomly allocated site. Households receiving housing in central locations– closer to their original homes– are more likely to rent out their units, due to significantly higher market rents compared to peripheral units. They experience smaller improvements in housing quality as a result, and reduce their labor supply, suggesting an income effect due to the significantly more valuable housing they won. Since subsidies for these central locations are much larger (they pay the same cost but receive a more valuable house), building government housing in the center appears less cost effective for improving housing for this population.

The primary contribution of my paper is documenting substantial demand for Ethiopia's large-scale housing project. Over half of the households move in and stay despite significant opportunity costs, thus improving their living standards without notable reductions in employment, neighborhood quality, or social life. There is little evidence on the demand for public housing in any setting.[9] Studies from developing countries have only

[7] I show that the observables predicting the decision to move in are very similar across lotteries.

[8] For example, there is no long-term effect on the likelihood of winners (and movers) working close to home, despite differences in their distance from central areas.

[9] The conventional wisdom is that housing markets are relatively efficient in developing countries, making it unlikely that government's can build efficiently. Collinson et al. (2015) writes "the belief that government-supported housing programs are needed to address supply-side problems and stimulate housing production has also waned over time". See Apgar (1990) for an alternative viewpoint, and

indirectly considered household demand for government housing, often reporting surprisingly low take-up rates, most notably in Barnhardt et al. (2017). Previous studies focused on programs where households lost access to rental or ownership subsidies if they did not occupy the home (see also Belchior et al. (2023) for the Brazilian case), indicating a willingness to pay only well below the market rate even if they *did* move in. In contrast, my findings show that a large number of households are willing to pay a price above the cost of production. The relative demand for the Ethiopian program may be attributable to its scale: the density of the new neighborhoods may foster new employment opportunities, the formation of dense networks and communities, and the viability of regular private transport connections. I provide support for these mechanisms. Households that move are able to establish networks locally, build new communities, work close to home in new sites, and commute quickly and easily to the city center via private minibuses.[10]

Second, I contribute to the literature on the effects of winning and moving to government housing. Many studies have focused on how winning housing affects employment rates, with results showing increases (Franklin, 2020; Kumar, 2021), decreases (especially in developed countries) (Picarelli, 2019; Jacob and Ludwig, 2012; Alzúa et al., 2016; Van Dijk, 2019), and no change (Barnhardt et al., 2017; Belchior et al., 2023; Armentano et al., 2024). I find no effect on employment, despite longer commute times, suggesting that households adjust to their new locations. Like Belchior et al. (2023), I identify differential treatment effects by randomly assigned housing location. Unlike their findings, I find no evidence that moving to the outskirts of the city negatively affects labor market outcomes, relative to central areas. This difference could be because the Ethiopian program allows renting out homes, preventing suboptimal moves for households that would be negatively affected, and because Addis Ababa's outskirts are relatively well connected to the center.

Positive effects on neighbourhood quality and null effects on children's outcomes contrasts with evidence suggesting that public housing leads to poor neighbourhood outcomes for children (Chyn, 2018; Chetty et al., 2016; Currie and Yelowitz, 2000; Chetty and Hendren, 2018), including when it induces moves to the edge of cities (Rojas Ampuero, 2022) but not near city centers (Camacho et al., 2022).[11] Previous studies examine changes due to moves to government housing built in pre-existing neighborhoods. I provide novel evidence on the types of neighborhoods that emerge endogenously in government housing sites, by studying a program creating entirely new neighborhoods (this is often the case with large-scale programs).

My study incorporates several features that improve identification compared to existing papers. By using later-lottery movers, I separately identify effects for movers and non-movers, overcoming a common selection challenge in this literature. I have a baseline survey demonstrating balance across a wide range of time-varying outcomes. Tracking households since baseline yields high response rates (92% after 3 years and 87% after

Van Ommeren et al. (2016) whose estimated WTP for applicants to public housing programs exceeds the costs of production.

[10]The results on social networks contrast with Barnhardt et al. (2017), where recipients struggled to recover from network loss. This discrepancy could be due to the smaller scale of that program or its specific target population of self-employed women.

[11]A very recent paper emulates my design without a baseline to study the effects of the same Ethiopian housing program on educational enrollment over a similar time frame (Agness and Getahun, 2024).

8), reducing concerns about differential attrition. Primary data collection provides an unusually detailed view of changes induced by winning government housing, including outcomes not often directly studied: consumption, amenity, community, human capital, and social outcomes.

Third, I contribute to the literature on the economics of slums.[12] One view is that living in a slum simply represents the optimal outcome for poor households that must trade off housing quality and space against location and other consumption needs (Glaeser, 2011). But a growing number of papers suggest that market and regulatory failures constrain formal supply and therefore leave households in slums (Marx et al., 2013). Devoto et al. (2012) show that households in slums exhibit willingness to pay for tapped water in their homes, when given access to credit to finance these investments. Michaels et al. (2021) show that improved urban planning and serviced plots can unleash large investments in improved housing. Low levels of housing investment in slums have been linked to a lack of property rights (Galiani and Schargrodsky, 2010; Collin et al., 2015), and a lack of access to finance for fixed investments (McIntosh et al., 2011). My results suggest that slums are sub-optimal outcomes for a substantial fraction of households, who would pay to trade away their central locations for improved housing if they have the opportunity. My results are consistent with the view that that poorly functioning housing and land markets are why cities in Africa have such high numbers of people living in slums (Collier and Venables, 2014).[13]

2 Context and data

2.1 Context

Housing in Addis Ababa and Other African Cities: According to UN-Habitat, a household is considered to live in a slum if it has overcrowded spaces, uses informal building materials, lacks access to tapped water and decent sanitation, or lacks secure tenure. This issue is widespread in large African cities, where more than 50% of households live in slums by this definition.

In Appendix A3, I present novel descriptive results on how housing conditions vary with household wealth in large African cities. I correlate housing quality with household consumption estimates for six large African cities, including Addis Ababa, showing that housing quality improves surprisingly little with household wealth. Cross-country regressions indicate that the share of urban households living in slums decreases with GDP per capita globally, but this relationship is surprisingly weak in Africa, particularly in 2014. The persistence of slums, even among relatively affluent households, suggests that this issue stems not just from low incomes but from deeper, structural problems in

[12] A growing literature looks at how slums are affected by neighbourhood-level programs such as infrastructure, planning and slum-upgrading (Michaels et al., 2021; McIntosh et al., 2017; Harari and Wong, 2018; Gechter and Tsivanidis, 2023). For other perspectives on slums see Montgomery and Hewett (2005); Brueckner and Selod (2009); Glaeser (2014); Cavalcanti et al. (2013); Lall et al. (2007); Henderson et al. (2016) and Cai et al. (2018)

[13] It is also thought that slums impose negative externalities on neighbouring residents to the city, which may be one of the motivations for building new housing further out. Assessing this claim is beyond the scope of this paper.

urbanization.

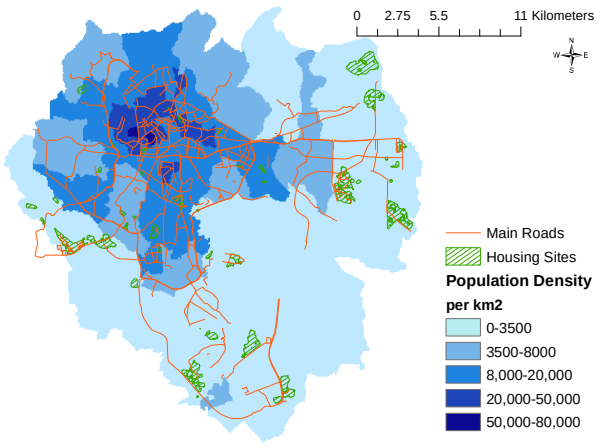
Addis Ababa, with its rapid urbanization and aging informal housing stock, exemplifies the global problem of poor housing conditions. The city's population was 3.2 million in 2014 and is expected to double in the next 25 years (Davison, 2014). Depending on the definition, between 67% and 90% of households live in slums.

Regarding tenure, about a third of households in Addis Ababa rent their informal homes from private landlords. A third of households in Addis Ababa (slightly fewer in my sample) rent *kebele* housing units owned by the local government. This housing stock is entirely informal and predominantly located in the city center. Households living in these units pay either nothing or a nominal fee, which is about 1% of the estimated market rent. When households in my study move into government-built housing, they lose these substantial rent subsidies.[14] While nearly 30% of households in Addis Ababa own their homes, they are largely absent from lottery applicants the program excludes applicants who already own a home. Instead, private renters are over-presented among program applicants.

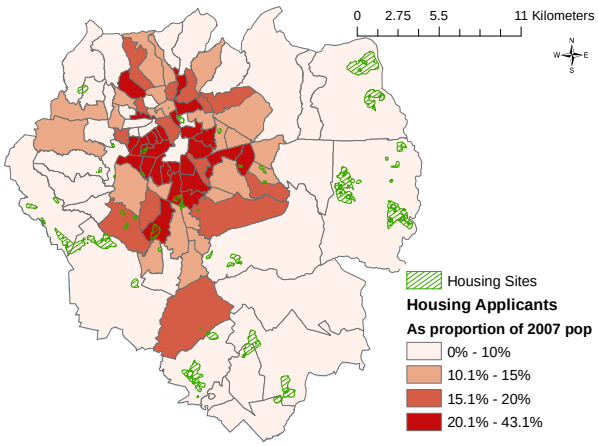
The condominium housing program: The state outsources the construction of new formal housing apartments to private firms, focusing on peripheral land to minimize costs. The largest site houses over 60,000 residents in 500 blocks, located predominantly over 15 kilometers from the city center, as shown in Figure 1. The most remote site in the south of the city is 25km away by road. These developments came with essential infrastructure like roads, sewers, and water.

Figure 1: **Addis Ababa population and housing sites**

(a) Housing sites are located on the very outskirts.



(b) Applicants mostly live in the city centre



Housing units, housed in 5-storey walk-ups with 20-30 units each, are pictured in Figure A1 in the appendix. Equipped with basic utilities and facilities, households personalize their spaces and collaboratively maintain public areas. The program's scale ensures high population densities akin to slums. Ground-floor commercial units are sold

[14]From the state's perspective, allowing households to live rent-free on prime state-owned land in the city center is costly. Thus, when the program induces households to move out of *kebele* housing, it may help recover program costs.

at market rates to offset costs. Units vary from studio apartments ($32m^2$) to 1-, 2-, or 3-bedroom options (51, 75, or $100m^2$), with the majority (approximately 70%) being 1- or 2-bedroom . These are very large homes, by the city's standards. Using cadastral surveys collected by the city government, I find that the size of city-centre informal housing units, many of which are occupied by multiple households, varies between $15m^2$ and $45m^2$.

Sales prices are subsidized, with the average household paying around $10,000, implying a subsidy of 50% on the construction cost (Section 4 contains a detailed discussion on costs). Winning households must make a 20% down-payment and sign a mortgage for the remainder, payable over 15 years at 9.5% per annum through the Commercial Bank of Ethiopia. Surprisingly, after 8 years, most households have completely paid off these mortgages. While renting out units is allowed, resale is restricted for five years.

Housing lotteries: The state allocates new housing through a computerized lottery from a pool of wait-listed applicants. Eligibility for the wait list requires only that the applicant not own property and have resided in Addis Ababa for six months. Applicants must save monthly in a dedicated account for the down-payment if they win. The savings requirement was $318 (on average, across housing types) about three times the average monthly mortgage repayment. Prior to the 10th round lottery, the wait list was updated and consolidated by the government, with households that were no longer eligible or interested being removed from the list. Similarly households that had not met the savings threshold at the lottery's time were excluded. I acquired the list of households that was entered into the 10th round lottery from the housing administration.

The 10th round lottery, the focus of this paper, awarded 34,000 apartments in 2015, the largest allocation to date. This lottery marked a significant expansion in state-built housing, primarily on the city's outskirts. Over 700,000 households were registered, but eligibility was limited to 130,000 early registrants, from whom my sample is drawn. The lottery favored female applicants and government employees.[15] Winners were randomly assigned to one of the 34,000 apartments, with 97% allocated to ten main sites (Table A2). Winners (or their renting tenants) began occupying the houses from the 10th lottery in early 2016. There were a number of lotteries after the 10th round, for which households that did not win the 10th round (and therefore include my control group) were eligible: Round 11 in 2016, round 12 in 2018, round 13 in 2020, and round 14 in 2022.

2.2 Data

Table 1 provides an overview of the data collection relative to the key events in the program. The result of this section describes each component of the data collection in more detail.

[15] 30% of beneficiaries were randomly selected from female applicants, 20% from public employees, and the rest from the remaining pool. This resulted in a 37% winning chance for women, 21% for men, and 42% for public employees.

Table 1: Timeline of Events for Research Study

Date	Event
April 2015	Round 10 lottery results announced
May 2015	Baseline survey
August 2016	Homes are occupied (average)
2016	Round 11 lottery results announced
December 2018	Supplementary condominium market survey I
January 2018	First endline survey
July 2019	Supplementary condominium market survey II
2018	Round 12 lottery results announced
2020	Round 13 lottery results announced
2022	Round 14 lottery results announced
January 2024	Second Endline Survey

2.2.1 Main representative panel

My primary sample comes from government administrative records of households that had applied and were eligible for the housing scheme.[16] I match this pool of applicants to the list of winners of the March 2015 lottery. Fewer than 30% of households in the pool of eligible applicants received a house in the lottery of 2015. Therefore, to maximize power, I drew my sample immediately after the lottery was run, allowing me to oversample from the pool of households who won the lottery so that my sample is split equally between winners and losers. In addition, the government conditioned winning probabilities on household characteristics in the administrative data. In particular, female applicants and applicants employed in the public sector were prioritized. To ensure each household in the study had the same ex ante odds of winning the lottery, I divided the treatment and control households into strata with identical administrative characteristics. I then draw my sample from those strata equally across winners and losers of the lottery..

The baseline was conducted in May 2015. The only available information by which to contact applicants was a single phone number in the administrative data.[17] It was impossible to track households when their numbers had become dormant or been disconnected. In total, 82% of listed households were reached. Inactive phone numbers account almost all (75%) of the non-response in the construction of the baseline sample. Importantly, whether a household had an inactive phone number was not affected by whether a household had won the lottery. This is unsurprising, as the phone numbers had been updated *before* the lottery was conducted. Lottery winners were no more likely to respond than non-winners. In total, the survey team reached 783 lottery winners and 781 non-winners, with a total baseline sample size of 1564.

The first endline survey was conducted from December to 2017 to February 2018, at

[16]These lists came from the Ministry of Urban Development and Housing of the Government of Ethiopia.

[17]In very few cases administrative data on household addresses as also useful, but without a consistent address system in use in Addis Ababa, the house numbers provided by the administration were not usable for tracking.

which time households that moved into the units have lived in the housing for roughly 18 months, on average.[18] The second endline was conducted from November 2023 to January 2024, more than 8 years after the 10th round lottery and nearly 7 years after the homes were occupied. Qualitative interviews were also conducted with a small sample of households early in 2018.

Attrition: The survey team were able to contact 91.18% of the sample at the first endline. Tables A6 and A7 shows the determinants of attrition. Attrition is uncorrelated with winning the lottery, and relatively few covariates predict attrition.[19] At the second endline, I am able to interview 87.6% of households.

Sample balance: I find clear evidence that the housing lottery is fair. I conduct balance tests, shown in Table A3. The results are similar with and without conditioning on the administrative outcomes on which randomization was conditioned. I conduct a joint F-test of the predictive power of fourteen main survey outcomes, in addition to administrative outcomes. I fail to reject that the coefficients of the effect on winning the lottery of my list of covariates are jointly equal to zero.

Who applies for the program? Government administrative records suggest that over 700,000 individuals registered for the housing scheme as a whole. Projections from the 2007 Census forward to 2015 suggest that there are a little over a million households in the city as a whole. I estimate that between 50% and 70% of households in the city have applied for the program.[20] The sheer size of the pool of applicants from which I draw my sample mitigates concerns that my results apply only to a highly selected group of households, although I would still be cautious about extrapolating my results to non-applicants. Panel B of Figure 1 shows where the applicant households come from: they are overwhelmingly drawn from the city center of the city, where slums and government-owned slums, in particular, are located.

Applicants live in very poor housing conditions and are overwhelmingly poor. I estimate that only 2.6% of lottery applicants in my sample live in a home that matches the basic construction quality of government-provided units. Eligibility criteria for the program screen out the wealthiest households: only households who do not own a home can apply. Table A4 compares my sample of applicants to representative data from the Household Consumption and Expenditure Survey (HCES) conducted in 2011.[21] While households in my sample are slightly more likely to have durable housing materials (notably, hard floors), their homes are considerably more over-crowded, and have similar levels of access to private toilets and improved water. A similar proportion live in slums, according to the standard UN definition. Figure A4 shows that the distribution

[18] I track only the sample of households found at the baseline survey, having been convinced that the winning and losing samples are comparable since the lottery is fair and that non-response at the baseline was not affected by winning the lottery.

[19] For the first endline, the joint F-test on the effect of a large set covariates on attrition is not significant. To address concerns about differing attrition patterns between treatment and control groups, I interact treatment with baseline covariates and conduct a joint F-test. The results show no evidence of differential attrition predictors in the treatment group (p=0.859).

[20] I am grateful to Pascaline Dupas and Marcel Fafchamps, who provided me with findings from a survey of the peripheral neighbourhoods of Addis Ababa, showing that roughly 48% of households surveyed were registered for the program. This is consistent with my findings, since I find that a higher proportion of households in the central parts of the city are registered, relative to the outskirts.

[21] Conducted by the Ethiopian Statistical Agency (CSA/ESS).

of household expenditure per adult equivalent is comparable, but to the left of that in representative data: applicants are not overwhelmingly wealthy.[22]

2.2.2 Supplementary survey data from central winners

Since almost all of my representative sample won housing far from the city center, I am underpowered to test the effects of winning a house closer to the city center in that sample. I draw an additional sample specifically from those sites closer to the city center, which is used only for the estimation of heterogeneous treatment effects. For the first endline, this includes 99 additional households randomly sampled from these more central sites, while for the second endline, I include another 126 households to improve the precision of my estimates for this group.

2.2.3 Condominium market-rent survey data

I conduct a separate survey of the housing rental market in the Condominiums in late 2017 and mid-2019. A high proportion of households live in their own housing units, and those that rent out reported their monthly rental earnings imprecisely, which makes my main evaluation panel a poor dataset for studying the market for condominiums. Instead, I interview a large number of *renters* (not necessarily winners or applicants to the condominium scheme) but living in the same housing blocks and sites as my evaluation sample, at two time periods. I observe the basic demographic profile of the renting households, their assessment of the home amenities, and the rent that they pay monthly to live there. I use this data to estimate the value of condominium housing and perform hedonic regressions of condominium housing value to impute housing consumption for owner-occupiers. Observing this rental market over two periods also allows me to plot the trajectory of housing values after the period of my main endline survey.[23]

2.2.4 Secondary data

Administrative and cost data: The Addis Ababa Housing Development Administration Agency provided detailed cost data for the housing built for the 10th round lotteries in 2015. This data came from the project accounts directly, and provided a breakdown of the different types of costs in the delivery of housing, including construction, administrative, compensation (for farmers living on the land) and estimated land costs. For my analysis, I assume constant construction and other costs across different sites, but weight the costs for different sizes of housing units according to the total floor space per unit. A key parameter that comes from this data is the estimate of 3821 Birr (or $137.55 in 2015) per square meter of constructed floor space.

I acquired building shapefiles for all planned condominium housing sites in the city. I use these shapfiles to extract key location data for each housing block, including distance from the city, distance from the boundary of housing site, distance from roads and the

[22] Winners who rent out their units almost always do so to a household that is wealthier than them.

[23] I did not collect this market data in 2023/24, but used the observed rental income data of owner-renters to impute increases in rental values from 2017-2019 to 2023.

size and layout of the block. All of these variable are used in hedonic regressions of housing value in condominiums units.

Land auction data: To estimate the cost to the government of delivering housing I need to estimate the value of the land at the time that it was constructed. This is challenging in a setting where all land is officially owned by the government, including the land used for the construction of the condominiums. The governments' own estimates of the value of the land are unreliable (and also do not vary across sites, which is crucial for my analysis). I leverage data that comes from auctions run by The Addis Ababa City Administration since 2012. These were second-price auctions for plots of undeveloped land zoned for specific purposes, run from 2012 to 2016. The data includes the first- and second- prices offered, the location of the plots, date of auction and the zoning category. I use this to estimate the value of land on which condominiums were built, by matching auction price data from the years in which projects broke ground based on the woreda (administrative district) in which the housing was built.

3 Empirical strategy

I estimate the intent-to-treat (ITT) effect of winning government housing through a lottery. Due to the 97% take-up rate, this estimator is very close to the average treatment effect of subsidized home-ownership. Equation 1 estimates the intent-to-treat effect β_1 of winning the lottery (T_i^{10}) on outcome y_i. I control for a set of household baseline characteristics x_{i0} in all specifications, as well the baseline outcome of interest $y_{i,pre}$ in all regressions.[24] For each wave of endline data I estimate:

$$y_i = \beta_0 + \beta_1 \mathtt{T}_i^{10} + \alpha y_{i,pre} + \delta x_{i,pre} + \mu_i. \tag{1}$$

Some households have won lotteries subsequent to the 10th, in rounds 11, 12, 13 and 14 (see Table 1). Although households had won their houses through the 11th round just before my first endline survey, most had not moved in by then. Since their outcomes may have been confounded by this I include a dummy for winning the 11th round lottery $\mathtt{T}_i^{11}$ but do not report the result. The main results are robust to not including that control. For my second endline in 2024, I control for having won any of the subsequent three lotteries, as well as all strata of the administrative variables on which randomization was predicated, because the differential probability of winning across strata varies from lottery to lottery as the length of the waiting list in each category changes.[25] Table A8 shows that the lotteries do not affect household consumption, ruling out that this is driving my main results.

[24] I include in x_{i0} all variables from the administrative data used by the government to stratify the lottery: the gender of the applicant, whether the household head works for the government, type of housing unit applied for (studio, 1-, 2- or 3- bedrooms).

[25] In appendix tables, I test for the effect of winning a early lottery $\mathtt{T}_i^{10,11,12}$ and show that the results are similar to those for the 10th round alone.

3.1 Differential effects by moving into government housing

To isolate the effect of moving into government housing from simply winning a house, I need to account for potential unobservable differences between households that move and those that do not. To do this, I use lotteries conducted after my first endline, along with data –from my second endline– on whether the winners of these later lotteries moved into their units. I define *movers* as households that move into their condominium 2-3 years after winning a lottery, regardless of which lottery they won. This allows me to identify future *movers* within the "control" group. I can then estimate the effects at the first endline (only) of winning the 10th round lottery, interacted with the time-invariant *movers* status, using the following specification:

$$y_i = \beta_0 + \beta_1 \mathtt{T}_i^{10}\mathtt{M}_i + \beta_2 \mathtt{T}_i^{10}\mathtt{S}_i + \beta_3 \mathtt{M}_i + \beta_4 \mathtt{T}_i^{12,13} + \alpha y_{i,pre} + \delta x_{i,pre} + \mu_i. \tag{2}$$

where $\mathtt{M}_i$ is defined in the following way: i) for 10th round winners, a dummy indicating whether they moved into their unit by the first endline, ii) for 12th and 13th round winners, a dummy indicating whether they moved into their units by the second endline, and iii) zero for households who did not win in round 10, 12 or 13.[26] $\mathtt{S}_i$ (*stayers*) indicates that the household won the 10th, 12th, or 13th round lottery without moving in. I then test and report for equality of β_1 and β_2.[27]

Here β_1 and β_2 causally identify the effect of winning the 10th lottery for households who move and do not move, respectively, under the assumption that the forces driving the decision to move in are the same across different lottery rounds.[28] The difference between β_1 and β_2 gives the effect of moving into condominiums for those that win, under the assumption that the effects of winning the lottery (independent of moving) are the same for movers and non-movers. These assumptions are reasonable given that housing built under later lotteries was built in similar locations to the 10th round, and I measure the decision to move into houses around 2-3 years after they had the opportunity to move, for both rounds. Overall rates of moving in are statistically similar across the rounds of lotteries.[29] In Table A21, I provide empirical support for this assumption by failing to reject a joint-test of the hypothesis that the observables driving occupation in the 10th round lotteries are different for the occupation of later lotteries.[30]

I cannot replicate this strategy for my second endline data, as I do not yet know who in the control group would move if they won an even later lottery. Therefore, the

[26] I exclude winners of round 11 from this definition because they had won the lotteries (and some moved in) at the time of the first endline, and rounds 14 because they had not had the chance to move in by the time of the second endline since their homes had only been available for a few months. I include dummies for having won these lotteries throughout. My main results are also robust to including 14th round movers in the definition of $\mathtt{M}_i$.

[27] Note that because different households attrit from each endline, the union of the two endlines required to estimate Equation 2 yields a smaller sample size than in other specifications.

[28] This approach is similar to one used in Franklin et al. (2024) to separately identify the effects of public works on eligible and ineligible households, also by using eligibility status from later rounds of data collection to define the relevant control group.

[29] See Table A5 for a breakdown of the occupation rates for each lottery at the two endlines.

[30] Specifically, using just 10th and later round lottery winners, I run a regression of whether they moved into their units 3 years after winning, respectively, on a set of baseline covariates and their interactions. I then test for the joint significance of those interactions.

paper will say less about the effects of moving for this group and focus more on IT estimates. I can, however, control for observables that determine the decisions to move in, by estimating the following equation:

$$y_i = \beta_0 + \beta_1 \mathtt{T}_i^{10} \mathtt{M}_i + \beta_2 \mathtt{T}_i^{10} \mathtt{S}_i + \alpha y_{i,pre} + \delta x_{i,pre}^{ml} + \mu_i. \tag{3}$$

where now $\mathtt{M}_i^{10}$ and $\mathtt{S}_i^{10}$ are defined only for households who moved after winning in the 10th round. I can no longer use later winners as the counterfactual for this group because by the second endline they have already been living there for 2-3 years and may have experienced the same effects of moving. Instead, I follow (Belloni et al., 2014) by using a first-stage lasso regression to select baseline variables that predict the decision to move in and include those as controls in $x_{i,0}^{ml}$. I can also estimate Equation in first difference by $y_i - y_{i,pre}$ to provide further evidence that results are not driven by composition of household who chose to move. When I estimate equation 3 on the first endline data the results are similar to those from equation 2, suggesting that controlling for observables is an effective way to control for selection bias.

3.2 Heterogeneous effects by site location

I want to separately estimate the effects of winning government housing in different sites at varying distances from the city centre. My main results above use data representative of the average 10th round lottery winner. 95% of these winning households received housing on the very outskirts of the city, and so the main results are reasonably interpreted as the effects of housing very far away. I use my additional data on households randomly sampled from those that won housing in more central city sites, specifically, 0 and 4 kilometres, and between 6 and 12 kilometres from the city centre by road. Adding these additional households to the sample, I estimate differential treatment effects by the randomly assigned distance of the housing unit from the centre, following Equation 1.

$$y_i = \beta_0 + \beta_1 \mathtt{T}_i^{\{0,4\}} + \beta_2 \mathtt{T}_i^{\{6,12\}} + \beta_3 \mathtt{T}_i^{\{15,20\}} + \beta_4 \mathtt{T}_i^{\{20,25\}} + \alpha y_{i,pre} + \delta x_{i,0} + \mu_i. \tag{4}$$

$\mathtt{T}_i^{\{d_1,d_2\}}$ indicates that a household won a house in a site where d_1 (d_2) is minimum (maximum) distance of that site from the center *by road*.

3.3 Measuring housing consumption

A key outcome of interest for this study is housing consumption. For private renters, this is reflected by their monthly rent, but my data includes two groups of households for whom I do not observe housing consumption directly. Some households (22% at baseline) live in "kebele housing," a type of government-owned, slum-quality housing rented at nominal amounts, which do not reflect market value. Similarly, condominium owners pay no rent but repay government-set mortgages that do not reflect actual housing values.

I estimate hedonic models to impute housing consumption for all households and decompose it into physical and location components. I estimate two separate models: one

for the low-quality housing market in Addis Ababa, where there is overlap in the quality and location of kebele and privately-rented stock, and another for the condominium market using data on rents paid by tenants (outlined in Section 2.2.3). For each housing type $k \in c, n$, I estimate:

$$r^k = \alpha^k + \eta^k L^k + \lambda^k P^k + \epsilon^k \tag{5}$$

where r^k is the *log* monthly rent for housing type k, L is a vector of housing location characteristics, and P represents physical housing attributes. The key assumption is the additive separability of the hedonic equation components. I use these models to impute housing consumption levels for all households, separately for kebele occupants and non-condominium owners ($\hat{r}^n$) and condominium owners ($\hat{r}^c$).[31]

Next, I want a money-metric to understand how households trade off consumption of housing location quality with "physical" housing quality, if at all: a decomposition of location and physical components that is comparable across the private and condominium models. For privately rented housing, I predict the location and physical share using an imputation from the relevant model parameters. For condominium housing, mostly on the outskirts, I observe some overlap in quality distribution with the private sample, but almost none in the location distribution. I impute the value of condominium housing as if built at the average private market location using private market model parameters.[32] The physical value of condominiums is the difference between this counterfactual central value and the average location value estimated for privately rented housing. Then the location value of condominium housing is the total market value $\hat{r}^c$ minus this imputed physical value. Appendix Section A2 describes this approach in detail. At endline, housing consumption comprises 42% of total consumption. Implied total housing consumption in condominiums and central informal housing is similar. For non-condominium households, location comprises just over half of housing consumption, while in condominiums, it is closer to 10%. I perform a similar exercise using baseline data to infer location and physical quality preferences at baseline.

4 The market for government housing

The relationship between the willingness to pay (WTP) of the marginal consumer and the costs of production is directly informative of the welfare effects of producing government housing. The subsidized price at which the state sold the housing to owners is not directly relevant to this calculation. Two counterfactual pricing policies illustrate this point: On one hand, the state could have given the homes away for free. In this case, the relevant measure is the marginal value of public funds (MVPF) for an in-kind transfer, which is the ratio of WTP to cost (Finkelstein and Hendren, 2020). In other words, do households value the in-kind transfer more than the cost of delivering it? On the other hand, the state could have built the housing and then sold or rented it out at market

[31] Table A9 shows the results of the hedonic model for condominium houses in my sample.

[32] I estimate that condominiums would rent for 50% more than the average private unit if built at the average location of private housing.

rates, acting like a property developer. Here, the relevant consideration is the financial rate of return to the state: would the state have made a profit on the unit?

In both scenarios, the calculation is the same: the ratio of WTP (revealed by market prices) to the total cost of production to the state. Detailed monthly rent data reveals WTP. My challenge lies in comparing these rents to the full, upfront costs borne by the government, some years before the housing went on the market. I consider whether the government, acting like a developer, would have made a return on its investment by renting out the housing at market price, using a simple internal rate of return (IRR) calculation. For now, I assume there are no fiscal externalities resulting from state production of housing, an assumption I return to in my analysis of the treatment effects of government housing on labour supply and social outcomes. Instead I focus only on the direct costs of producing the housing, as described in more detail below.

Table 2 summarises the data used for these calculations, for the average housing built under the scheme, as well for each location of housing site. Panel A describes the different housing sites, Panel B presents the total construction costs, Panel C the cash flows resulting to owners of housing, and in Panel D I estimate IRR rates of return to the development of the housing.[33] Throughout, I use conservative assumptions to give lower bound on the returns to government housing.

4.1 Calculating cost and revenues

The costs and revenues associated with the housing project are derived from various data sources. Appendix A3 provides a very detailed account of how each of these values were calculated and the assumptions underlying those calculations. Construction costs are estimated using government data, including land auction prices and total construction budgets, divided by housing floor space to determine per unit costs. These estimates are adjusted for location, with central sites having higher land values. In my analysis, I use the average per-unit cost calculated from the data. Given that there are likely some economies of scale in the production of housing, these are a lower bound estimate of the marginal cost.[34] Investments and upkeep costs are derived from housing survey data and include expenses for finishing and maintaining the units in both endlines. Rents are estimated from data on rents reported by *tenants* and owners in rental market surveys from 2017, 2019, and 2023, deflated to 2017 values. I account for rental market frictions by calculating brokerage fees paid on rental units. Finally, home value estimates for 2024 are based on sale data from the second endline, using a model to predict values and estimate a rent-to-value ratio for imputation.

[33] Table A12 shows the breakdown by housing unit size. For all calculations, I separately estimate costs and values at the location-unit type level (for example, 1-bedroom households in the Site 16km from the city centre) and then aggregate up to the site, type or aggregate level by using the true share of units in each type across the entire project, as opposed to just in my evaluation sample.

[34] There is a view that economies of scale or limited and that these average costs are likely to fairly close to the marginal costs. See Eriksen and Orlando (2022) or discussion here.

Table 2: Estimated internal rates of return, all types by site (2017 USD)

	All sites	Group 1	Group 2	Group 3	Group 4
Panel A: Site Descriptions					
Distance (driving)		0-4km	6-12km	15-20km	20-25km
Population density (2007)		19974.69	2119.82	1138.94	218.80
Winners 10th round	32020	928	3,862	17,287	9,943
Share of all winners	100.00%	2.90%	12.06%	53.99%	31.05%
Subsidised sale price	10,376	10,376	10,376	10,376	10,376
Panel B: Government construction costs					
Land cost per unit	9,659.8	68,692.4	16,839.0	7,163.3	5,702.1
Construction cost per unit	12,719.1	12,719.1	12,719.1	12,719.1	12,719.1
Total cost per unit	22,378.9	81,411.5	29,558.1	19,882.4	18,421.2
Panel C: Owners costs and earnings					
Initial investment	815.9	815.9	815.9	815.9	815.9
Initial maintenance	93.5	93.5	93.5	93.5	93.5
Final maintenance	83.8	83.8	83.8	83.8	83.8
Rent 2017	1,098.8	2,643.5	1,399.4	1,121.5	798.5
Rent 2019	1,299.9	2,637.4	1,394.5	1,294.7	1,147.5
Rent 2024	1,314.7	2,622.4	1,382.1	1,320.7	1,156.1
Sale Price Est	27,037.6	53,929.0	28,423.7	27,160.6	23,775.4
Panel D: IRR Calculations					
Sale at est. value	0.0527	-0.0072	0.0293	0.0659	0.0592
No sale	0.0500	-0.0067	0.0284	0.0624	0.0562
Sale at cost	0.0348	0.0215	0.0288	0.0388	0.0363
Sale at land value	-0.0141	0.0108	-0.0068	-0.0168	-0.0280

Note: See text in Section 4.1 for details of calculations. All costs, prices and revenues are deflated or inflated to 2017 Ethiopian Birr and then converted to USD at the average exchange rate in 2017. Flows are presented in annual terms throughout. For example, households spent an average of 93.5 USD per year on maintenance in 2017.

4.2 Internal rates of return

Equipped with the full stream of incomes and costs for each period (all deflated to 2017 USD), including the initial costs of construction, upkeep costs, and rental frictions, I calculate the Internal Rates of Return (IRR) to government housing. These returns are calculated from the perspective of a hypothetical government developer, who had developed and rented out or sold the units at their market rate.[35] These estimates are undiscounted and I do not adjust for implied opportunity costs of capital.

I calculate these as rates of return from the point at which development began, in 2013, until the period of the second endline, 2024, making a number of different assumptions about the asset is priced in the final period. (i) For my preferred specification I use the estimated sale value in 2024, (ii) in case my sale value estimates are inaccurate, I do not assume that the unit is sold but rather than the revenue and income streams remain as they are in 2024 in perpetuity. (iii) I assume that the housing unit is sold at the total deflated cost of *constructing* the housing unit in 2013. (iv) In my very lower-bound scenario, I assume that the housing is sold after 11 years at the cost of *land* on which it

[35]Of course, the state did not reap these IRRs directly: housing units were sold to households at a subsidized rates, after which they could rent out the unit or consume the implied housing value and therefore reap the returns.

was built at 2013 real prices adjusted very conservatively by 3% growth per year.

The calculations are shown in Panel D. The estimated rates of return are positive on average for all methods except my lower-bound scenario. This hides substantial heterogeneity. For the most central sites, IRRs are negative if they were housing were to be sold at current market values or priced based on current rents. This suggests that building government housing is a misallocation of this valuable land. If the units were sold at the original cost of the land, the estimated returns would be more favourable. By contrast, building housing on more remote land significantly uplifts land values in those areas. IRRs are positive at current market values for the other groups of sites. For sites built right on the edge of current extent of the site, the average IRR is 6.59%, and for sites built even further away the return is slightly lower at 5.92%.

On average, the calculated IRR for government housing is 5.27%. The WTP at the current margin, is higher than the costs of suppling it, if not by very much. The demand curve appears to sit above the supply curve, at the single point that I observe them: with 200,000 units built. While I make no claims that investment in government housing is the best use of goverrnment funds in a marginal value of public funds sense (Finkelstein and Hendren, 2020), these positive returns suggest that we can at least rule out strongly distortionary effects of the state's intervention in the supply of housing.

These estimates are likely a very lower-bound guide to the welfare effects of government housing: my approach only considers the consequences of government housing at the current margin, after 200,000 units have been delivered. The willingness to pay of non-marginal consumers of government housing is presumably higher. Unfortunately, I lack a method to estimate the slope of the demand curve, which is necessary to recover the total consumer surplus for the government's intervention.

5 Revealed preference for improved housing

5.1 Occupation rates

Table 3 describes the proportion of lottery winners who moved into their homes across the four different groups of housing sites, and at each time period. Column 1 represents the average occupation rates for the representative sample of lottery winners.[36] Occupying a unit that one owns reveals a different willingness to pay than the price that renters pay in Table 2. First, owners pay an implicitly lower price because they don't have to pay brokers or other costs of renting that might be baked into market rents. To account for this, I include these rental market frictions on the cost side of my IRR calculations in Table 2. Second, there may be some particular amenity value of living in one's own home, relative to a rental. In this sense, I identify demand for *owner-occupied* housing at the market price.

I find that approximately 52% of households move into their units when they have the chance, and this proportion remains remarkably stable over eight years. In the first endline (2018), some units were still not available for occupation due to delays in

[36]Note that the number of observations in Columns 2-5 do not add up exactly to the number in Column 1, because Columns 2 and 3 contain oversampled households from the more central sites that are not included in the representative sample.

Table 3: Occupation rates and condominium status by site

	(1) **Representative Sample**	(2) **0-4 km**	(3) **6-12 km**	(4) **15-20 km**	(5) **20-25 km**
Panel A: First Endline (2018)					
Lives in condominium	0.46	0.32	0.40	0.48	0.42
In process of moving in	0.04	0.00	0.00	0.03	0.06
Rented out	0.39	0.69	0.48	0.39	0.37
Sold	0.02	0.01	0.00	0.02	0.03
Unoccupied or not bought	0.11	0.00	0.04	0.09	0.17
Lives in condominium (cond. on available)	0.52	0.32	0.42	0.53	0.51
Ever moved in (cond. on available)	0.55	0.35	0.44	0.56	0.55
Observations	715	108	50	423	233
Panel B: Second Endline (2024)					
Lives in condominium	0.51	0.42	0.41	0.51	0.52
In process of moving in	0.01	0.01	0.00	0.01	0.00
Rented out	0.32	0.44	0.35	0.30	0.34
Sold	0.15	0.15	0.12	0.15	0.16
Unoccupied or not bought	0.03	0.01	0.05	0.03	0.02
Lives in condominium (cond. on available)	0.52	0.41	0.42	0.52	0.52
Ever moved in (cond. on available)	0.67	0.52	0.51	0.67	0.68
Observations	676	162	114	402	223

handing them over to owners or delays in renovations.[37] In total, 46% of winners lived in their units, rising to 52% of those whose homes were available for occupation. Selling the units was very rare at this point, as it was officially illegal.

By the second endline, the rate of occupation remains almost identical, at 52%. The occupiers are not always the same people. In all, 67% of households lived in their units at some point over the last 8 years. By 2024, selling the units had been legal for approximately 3 years, and 20% of units had been sold. These were mostly units that were rented out in 2018.

5.2 Effects on household housing and consumption

To understand the trade-offs facing households who win government housing, I study the effects of winning the lottery and of moving into condominiums on housing consumption, at both endlines. Table 4 shows that winning housing dramatically increases the quality of housing by 0.65 standard deviations while it increases household distance from the city center by almost 100%. The results are remarkably similar six years later, suggesting that the control group are not catching up in housing quality. Table A13 provides detail on the subcomponents of the housing index and the effects of winning the lottery on each.

[37] These delays were particularly prevalent in Group 4 — a site about a 25 km drive from the center — which was the last to be constructed, and fully 17% of units were not occupied in 2018.

Table 4: Effects of winning the lottery and moving house on consumption, housing, and location

	2018 Endline			2024 Endline			
Outcome	N (1)	Control mean (2)	ITT Lottery (3)	N (4)	Control mean (5)	ITT Lottery (6)	Diff pval (7)
Housing quality index	1,426	0.000	0.680*** [0.053]	1,370	0.056	0.672*** [0.088]	0.907
Distance from city centre	1,426	5.403	4.381*** [0.261]	1,370	6.441	4.274*** [0.290]	0.790
Housing consumption	1,426	77.828	2.545 [1.824]	1,370	90.319	20.752*** [3.994]	0.000
Transport expenditure	1,426	12.262	3.086*** [0.761]	1,370	14.440	2.637 [1.908]	0.849
All other consumption	1,426	142.199	3.874 [4.834]	1,370	137.497	7.885 [8.717]	0.437
Non-housing Asset index	1,352	0.064	-0.068 [0.055]	1,370	-0.039	0.024 [0.028]	0.261

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. I show the results separately for the 2018 and 2024 endlines (one regression for each endline, per outcome). "ITT Lottery" identifies the parameter of interest, with the relevant SE of the estimate shown in square brackets below. Column 7 provides the p-value for a test of equality of the coefficient between the 2018 and 2024 endlines. This is estimated using a saturated regression combining both endlines and including interactions between all covariates and an "endline" dummy. "All other consumption" is the aggregate of a full consumption module *less* transport and housing consumption. All monetary values are given as monthly 2017 USD.

What do these dramatic changes in location and housing imply for aggregate household consumption? Notably, my estimates of the market value of housing consumption (using hedonic regressions outlined in 3.3) are unaffected by winning the lottery, suggesting that the market value of slum housing in the centre is similar to a condominium further away, at least at the time of the first endline. This implies a budget neutral trade of location for better housing quality. Six years later the effect on the market value of housing consumption is larger, reflecting the fact that market rents in condominiums grew faster than other forms of housing (as discussed in 4). Predictably, moving further away increases expenditure on transport by the equivalent of $3 a month, although not that this a much smaller increase implied by the distance of the moves that households makes. This is plausibly because the costs (and we will see, time taken) through the outskirts are much lower than travelling through the more congested central areas of the city. Notably, other forms of consumption (excluding housing and transport) and household wealth are unaffected by winning the lotteries, even eight years later. The coefficient is positive and comparable to an increase of about 3% of total consumption (adding housing and non-housing consumption together) but is not significant. Including measures of housing implies that total household consumption increases by 11%, 8 years after winning the lottery, but was not changed in the short-run.

These results are driven entirely by households who move into their housing units.

Table A22 shows the results for mover households and non-mover households separately, using Specification 2. This specification uses households who did not win condominiums at the first endline but would win condominiums in later lotteries and move into them, as a counterfactual for winning households that had moved by the time of the first endline. Non-moving households exhibit housing consumption that is indistinguishable from the control group, suggesting that any wealth effects induced by winning the lottery are not causing households who do not move to improve their housing. Instead, all of the effects are driven by households that move into the condominiums that they won. The results are similar when I use Equation 3, which controls for the observables determining the occupation decision to address selection on observables, suggesting that selection on unobservables is not a significant concern. I use Equation 3 to estimate the effects of moving versus staying for the second endline and also find very similar results: changes in location, housing quality, and consumption are driven by households that move (see Table A27). Particularly striking is that for households that did not move into their units, total consumption and housing consumption are not significantly different from households that did not win any lottery.

5.3 Drivers of housing occupation

I hypothesize that housing choices among private renters at baseline reveal the strength of preferences for housing quality and location. Given that moving to condominiums usually involves relocating much further from the city centre while gaining a nicer home, one would expect households to make decisions based on these trade-offs. If living in condominiums is more expensive or if richer households have a stronger preference for housing quality over location, we should also expect richer households to move in. Based on these hypotheses, Table 5 shows how baseline income, wealth, housing quality, and location predict whether households move into their units for households that were private renters at baseline.[38]

The results are consistent with preferences for housing quality over location, not income or wealth, driving the decision to move in. Households further from the city center or with better housing quality at baseline are more likely to move in, while income and wealth have no effect. The total estimated baseline housing consumption positively predicts moving in. When I decompose housing consumption into location and a housing quality components (using an hedonic regression model described in Section 3.3) I find that physical quality positively predicts moving in, while a higher level of location consumption negatively predicts moving in. Thus, preferences for better housing revealed in baseline consumption decisions are the key determinant of moving in, while baseline income and wealth have no effect.

Strength of social networks are not predictive but households that are members of existing community groups (*iddirs*) are less likely to move. *ddirs* are traditionally community-based mutual aid association, but have come to perform a wider array of functions, particularly in urban Ethiopia. My results suggest that access to these groups

[38]I also control for additional variables selected using a lasso regression trained on a larger set of predictors (the results of which are presented in the Appendix, Table A20). All non-binary right-hand side variables are standardized.

Table 5: Baseline predictors of housing occupation for private renters (Endline 1)

	(1)	(2)	(3)	(4)	(5)
	Dep Variable: Lottery winner lives in their condominium.				
Household income	0.000904	-0.00669	-0.0263	-0.0110	-0.0241
	(0.0292)	(0.0309)	(0.0325)	(0.0311)	(0.0323)
Wealth (index)	0.0348	0.0252	0.0180	0.0306	0.0182
	(0.0380)	(0.0395)	(0.0394)	(0.0381)	(0.0392)
Social ties	-0.0254	-0.0269	-0.0283	-0.0243	-0.0269
	(0.0248)	(0.0252)	(0.0253)	(0.0251)	(0.0252)
Community group	-0.0433*	-0.0359	-0.0310	-0.0388	-0.0341
	(0.0243)	(0.0275)	(0.0278)	(0.0248)	(0.0276)
Travel time to centre	0.0580***	0.0521**			
	(0.0208)	(0.0215)			
Physical housing quality	0.0174**	0.0181**			
	(0.00735)	(0.00775)			
Total housing consumption			0.0994***		
			(0.0341)		
Housing consumption (location)				-0.0450*	-0.0425*
				(0.0238)	(0.0239)
Housing consumption (physical)				0.0934***	0.0998***
				(0.0331)	(0.0340)
Observations	420	420	420	420	420
R-squared	0.0600	0.0790	0.0670	0.0620	0.0790
Lasso controls	No	Yes	Yes	No	Yes
Condo Site FE	Yes	Yes	Yes	Yes	Yes

Note: Each column shows the results for a regression, for condominium owners, of whether the live in the condominium that they own, on a set of baseline covariates. All right hand side variables are normalised to have mean zero and standard deviation one to make them easier to interpret. Social ties is a measure of the total number of other people that they household head speaks to on a regular basis. Housing consumption variables (included location and physical, respectively) are imputed for baseline housing choices, using the method outlined in Section 3.3. In some specifications I control for additional predictors of whether the household moves in, selected from the non-zero parameters in a separate lasso regression.

is a stronger pull factor towards origin communities than broader social networks.[39]

The results in Table 5 come from households that were privately renting a baseline, under the assumption that housing consumption decisions would not reveal preferences for households that were either in government-owned slum housing because they had little choice of their location or housing type. I replicate the results for all households in the appendix (Table A17), where I find the same broad pattern of results but with the effects of baseline housing choices attenuated due to the inclusion of those households.[40]

[39] Although participation in an *iddir* may be correlated with other things, such as length of time living in a neighbourhood, I find that this variable survives the inclusive of other controls and is always selected by lasso regressions.

[40] I also replicate the results for the second endline in Table A19 and the results are similar (in particular, physical housing consumption at baseline predicts moving in).

5.4 Evidence for preferences over income effects

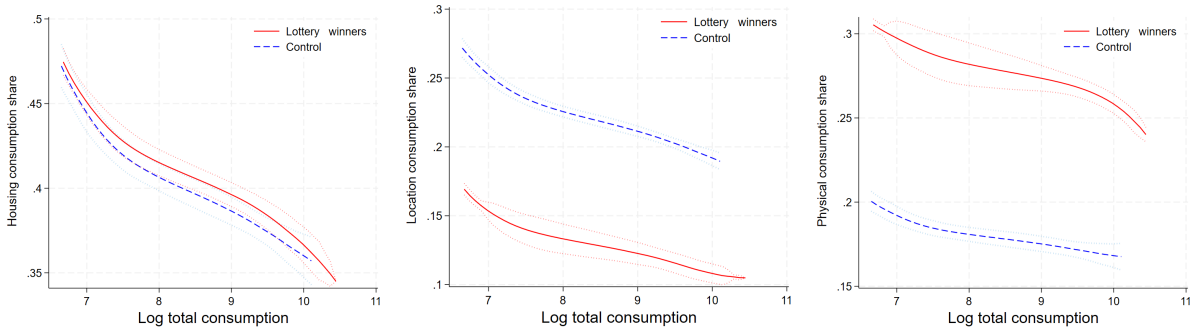
These results are consistent with the lottery providing access to higher quality formal housing that was not previously accessible to winners before they moved. Households with a higher revealed preference for formal housing over location move, while households who value their original location more do not.

An alternative explanation is that households who won the lottery experience increases in permanent income due to the wealth effects from winning the lotteries, which induce changes in housing consumption consistent with movements along household Engel curves. We should then expect households who did not move to also increase their housing consumption accordingly. The results in Table A22 show that consumption did not change for households that chose not to move. And it is baseline preferences, not baseline wealth that predicts whether households move in. Still, it is possible that households that moved would not have done so without the positive wealth shock provided by winning the lottery.

I present several pieces of evidence against this interpretation. The most striking result is that Table 4 shows no change in non-housing consumption or asset ownership as a result of winning the lottery. Table A22 shows that this is the case for both movers and non-movers. If permanent income effects were driving improved housing conditions, one would expect other forms of consumption to increase together with housing. Instead, the evidence suggests that households who move into their condominiums trade housing quality for location, with total consumption more or less unchanged.

I formalise this intuition by estimating housing Engel curves. Figure 2 shows non-parametric regressions of housing consumption shares $\hat{r}^k/y$ on $\ln(y)$, where $\hat{r}^k$ is imputed housing consumption for a household living in housing type k using my hedonic model in Section 3.3, and y is total household consumption (which includes all other measured household expenditures plus $\hat{r}^k$).[41] In Table 6 I show parametric estimates of the Engel elasticity also controlling for household covariates and baseline housing consumption shares. I then use my decomposition from Section 3.3 of housing expenditure into physical (housing quality) and location components.

Figure 2: Engel curves for housing consumption



A) Total housing share B) Location share C) Physical share

I find that, in the control group, housing shares fall with total consumption, including

[41] The results are similar when I use log household income instead of consumption (see Figure A6).

consumption shares of both location and physical quality. This suggests a pure wealth shock should reduce housing expenditure shares. On the contrary, I find a small insignificant increase in housing shares at the endline among lottery winners, and equal but opposite shifts in the shares spent on consumption on location (downwards) and on physical quality (upwards) of approximately 8 percent points (or 45%), respectively. See Figure 2 and Table 6. In other words the results are consistent with shifts in housing Engel curves, rather than moves along them. Shifts in these Engel curves are mostly parallel. The results are similar when I put measures of total household income including rent income on the right hand side (Figure A6). Finally, I run this Engel curve analysis separately for households that move (compared to households that will move in the control group) and non-movers, in Figures A7 and A8. The results confirm that the shifts in Engel curves are driven entirely by households that move, with no discernible difference for households who experienced the wealth shock but did not move. At the time of the first endline, housing consumption and location decisions for non-movers look indistinguishable from non-movers in the control group.[42]

Table 6: Engel curves: effects on housing consumption shares

	(1)	(2)	(3)	(4)	(5)	(6)
	Housing shares of consumption					
	All	Location	Physical	All	Location	Physical
Won Housing Lottery	0.010	-0.088***	0.098***	0.143	-0.250**	0.394***
	(0.006)	(0.006)	(0.006)	(0.102)	(0.100)	(0.099)
Log Total Consumption	-0.185***	-0.114***	-0.071***	-0.178***	-0.123***	-0.054***
	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)	(0.009)
Won * Log(Tcons)				-0.016	0.019	-0.035***
				(0.012)	(0.012)	(0.012)
Baseline housing share	0.190***	0.121***	0.069***	0.190***	0.121***	0.069***
	(0.027)	(0.027)	(0.026)	(0.027)	(0.027)	(0.026)
Observations	1,426	1,426	1,426	1,426	1,426	1,426
R-squared	0.417	0.297	0.247	0.417	0.298	0.252
Control mean	0.4031	0.1956	0.2075	0.4031	0.1956	0.2075

Note: This table estimates Engel curves for housing consumption shares. The dependent variable "All" is the share of total imputed housing consumption using an hedonic model. "Location" and "Physical" are the decomposed version of housing consumption into location and physical quality using the same model. I regress these consumption shares on the log of total consumption (all other consumption plus imputed housing consumption) and whether the household won the housing lottery.

Another piece of evidence comes from changes to household income and liquidity. Although the transfer of a condominium presents a significant wealth transfer to winning households, this asset is illiquid in the short term and financed by mortgages with high repayment rates (Table A11). When households take possession of their houses, they generally have lower net housing income–mortgage repayments exceed the average rental

[42] As we would anticipate, housing consumption and location decisions between movers and non-movers in the control group do look very different. Movers spend a smaller share of consumption on housing quality and less on location.

income plus rent savings for condominium-occupiers. Households have significantly lower cash savings and considerable debt, both from outstanding mortgages and other loans needed for down payments. By contrast, after 8 years, 60% of households have paid off their mortgages completely and some 20% have sold it. Many do so while remaining in considerable debt from other sources, suggesting that many may have taken informal loans to quickly pay off their government mortgages. These results do not align with the idea of cash-rich households choosing to consume more housing, especially in 2018 when income (net of housing costs) is negatively affected. Therefore, the lack of change in total household consumption at the first endline is not surprising. After all, lottery winners are not increasing housing consumption in market value terms. Instead, they are using the newly built housing to trade away the consumption of location for physical quality.

Complementary investments: Finally, I show that lottery winners improved and consumed a range of new housing amenities in their government homes. My main housing index (Table 4) includes measures of physical quality (e.g., concrete walls, piped water) that were all provided by the government. However, it misses amenities not provided by the state that lottery winners added to their homes such as tiling, showers, and internal doors. I find that winners invest roughly $2,000 USD, or 10% of the original construction cost, in these improvements relative to the control group , with larger effects for those who move into their units (Table A10).[43] Figure A5 details expenditures on upgrades, showing most investments are novel and are not present in non-condominium homes.

Table A30 shows that 8 years later, households who moved into their won condominiums have significantly improved housing conditions in an index only including these additional amenities not prodivded by the state.[44] For example, almost all condominium residents have installed showers, unlike less than half in slums, suggesting technological feasibility in formal environments. If winning the lottery boosted investment in these amenities through wealth effects we would expect that non-moving winners would also show increased investment in and consumption of these goods, which I do not find (Tables A10 and A30).

Two reasons might explain why households upgrade government-built units but not informal housing. First, security of tenure encourages investment without fear of losing it, as lottery winners report increased tenure security. Second, upgrades may complements with improved housing construction because improved housing reduces the cost of upgrades. For instance, plastering and painting a wood and mud house is costlier and harder to maintain, and installing a proper shower is nearly impossible without formal water connections. Thus, upgrades in informal houses offer lower amenity value per dollar compared to formal apartments. By providing formal homes, the state unleashes household demand for these amenities.

[43]Recall that these investments are included as costs in my IRR calculations, as they reflected in market rents.

[44]I collected detailed data on the consumption of these amenities in the second endline, but do not have this detail for all households in the first endline.

6 The impacts of winning and moving to housing

6.1 Labour market effects

I find no overall effect of winning the housing lottery on labour supply, both in the short and longer run. Table 7 presents the results at the household level for both endlines, while Table A14 presents the results at the individual level (Panel A shows the 2018 endline, Panel B the 2024 endline). Nothing is significant at the household level, nor are individual aggregates significantly affected at either endline.[45] I can certainly rule out large losses in earnings due to winning the housing lottery.

The individual-level results help to explain how households were able to move so much further from the city centre without hurting their labour market outcomes. After 3 years, I see that treated individuals are more likely to have switched their type of work (either from or to wage or self employment) and are more likely to work in a location that is close to one of the main new housing sites, and are less likely to work close to home. Their commuting times and costs are significantly higher. After 8 years, there is almost no effect on any individual labour market outcomes, including type of place of work, or mode of transport. Even total commuting costs are no higher on average, although commuting times are still 17% longer. The results suggest that households are able to adjust their employment habits – while also enduring slightly longer commutes– in the long run. They are no less likely to report working very close to home or even to walk to work after 8 years, suggesting that there are job opportunities in the new neighborhoods where housing was built.[46] This is confirmed qualitatively by the active labor markets that developed in condominium sites, with restaurants and services opening up in the commercial spaces reserved on the ground floor of condominium blocks. I find no effect on job quality in the long run.

In Table A23 I break down these results by households who moved into the condominiums that they won and those that did not, at endline 1, using specification 2.[47] I find no evidence that outcomes differ across households that move and those that did not, suggesting that there is a no separate effect of either moving to a new neighborhood or of winning the lottery itself.[48] By contrast, at the individual level, I confirm that it is households that moved into their housing at endline 1 that adjusted their labour supply to (i) commute for longer and (ii) work closer to the condominium sites (Table A25).

[45] I show sharpened q-values Benjamini et al. (2006) to account for multiple hypothesis testing.

[46] Very few lottery applicants have their own cars.

[47] Here the control group for households that move is the subgroup of non-winning households that will win a lottery after the first endline and will move into that condominium when they win.

[48] I find very similar results at the second endline (and again for the first endline) when I use my more correlational approach where I control for all baseline variables that predict whether households move into their condominiums, to control for selection on observables. These results are in Tables A28 and A29.

Table 7: Effects of winning the lottery on labour supply (comparing endlines 1 and 2)

Outcome	2018 Endline			2024 Endline			Diff
	N	Control mean	ITT Lottery	N	Control mean	ITT Lottery	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household labour market index	1,426	0.000	-0.042 [0.050]	1,370	-0.021	-0.037 [0.088]	0.931
Earnings per working age adult	1,426	85.436	0.632 [4.022]	1,370	67.472	4.309 [6.320]	0.727
Total employed per working age adult	1,415	0.670	-0.022 [0.016]	1,359	0.522	-0.024 [0.032]	0.780
Hours worked per working age adult	1,415	29.403	-1.167 [0.860]	1,359	25.145	-1.387 [1.730]	0.756

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. I show the results separately for the 2018 and 2024 endlines (one regression for each endline, per outcome). "ITT Lottery" identifies the parameter of interest, with the relevant SE of the estimate shown in square brackets below. Column 7 provides the p-value for a test of equality of the coefficient between the 2018 and 2024 endlines. This is estimated using a saturated regression combining both endlines and including interactions between all covariates and an "endline" dummy.

6.2 Social networks, community and neighborhood amenities

Table 8 presents the effects of housing lotteries on various quality-of-life outcomes for urban residents. Most housing sites were built on the city's outskirts, areas with little to no existing population before construction began. Therefore, the quality of these new neighborhoods is determined almost entirely by the new residents who moved in.

Consistent with other studies on programs relocating households, winning housing lotteries reduces the total size of social networks (measured by the number of people the respondent talks to more than once a week) by roughly 30%, driven by a loss of *local* neighborhood networks. This suggests that moving households lost friends that they used to interact with in old neighborhoods, but were also able to make some new friends locally. The first endline shows ambiguous effects of these net losses: respondents are less likely to turn to neighbors for advice and more likely to say they lacked friends to help them. However, they are also less likely to have arguments or conflicts with neighbors. Overall satisfaction with social lives is unaffected.

Households reported that life informal settlements involved considerable levels of conflict around the shared use of resources like toilets, cooking areas and other communal spaces. They attribute the fall in conflict to the fact that they no longer had to negotiate over the shared use of such spaces in government housing. They also report that neighbours in slums often asked for assistance, which could be a burden at times, and that they were happy to reduce those sorts of social ties when they moved out of the slums. In the data, I find that households not only reduce their overall social interactions but reduce their levels of economic interactions even within their remaining social network. That is, they reduce the number of other people they interact with on an economic basis by more than they reduce their total network size. In qualitative interviews households also report a value for the privacy that they enjoy in formal housing.

Table 8: Social and neighborhood outcomes

Outcome	2018 Endline				2024 Endline				Diff
		Control	ITT			Control	ITT		
	N	mean	Coef	SE	N	mean	Coef	SE	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Subjective wellbeing (ladder)	1,426	4.282	-0.056	0.141	1,370	4.231	0.488***	0.156	0.087
Social networks outcomes									
Total number of social ties	1,414	11.369	-2.271***	0.446	1,358	6.194	-1.098*	0.626	0.087
Social ties in local neighbourhood	1,425	6.551	-2.596***	0.649	1,370	3.456	-0.536*	0.321	0.015
Can turn to neighbours for advice	1,426	1.795	-0.197**	0.090	1,370	2.656	-0.054	0.056	0.298
Felt lonely	1,375	1.522	-0.072	0.050	876	2.021	-0.386***	0.120	0.003
Needed help and couldn't find with friends	1,375	1.652	0.195***	0.060	876	2.137	-0.456***	0.121	0.000
Satisfied with social life in neighbourhood (1/0)	1,426	0.806	0.005	0.020					
Satisfied with neighbours	1,426	3.296	-0.094**	0.038					
Satisfied with social life in general					1,370	3.237	0.075	0.066	
Satisfied with social life in neighbourhood					1,370	3.169	0.107	0.069	
Community outcomes									
Beliefs: neighbours' contribution to pub. goods	1,311	-0.020	0.072	0.057	876	0.072	-0.050	0.117	0.330
Arguments with neighbours	1,426	0.411	-0.124***	0.044	876	2.337	-0.231***	0.055	0.246
Household is a member of at least one iddir	1,426	0.546	0.124***	0.025	1,370	0.669	0.085**	0.039	0.489
Community meetings participation	1,426	0.369	0.108***	0.028	1,370	2.619	0.235***	0.081	0.083
Respondent has leadership role in community	1,426	0.036	0.013	0.011	1,370	0.006	-0.002	0.007	0.450
Public goods outcomes									
Index of public goods	1,426	-0.004	-0.223***	0.056	1,370	0.000	-0.114	0.086	0.246
Clinic/hospital quality	1,426	3.244	-0.148***	0.035	1,370	2.969	0.036	0.045	0.002
Primary school quality	1,426	3.061	-0.057*	0.030	1,370	2.944	-0.017	0.053	0.453
Public space quality					1,370	2.962	0.093*	0.048	
Amenities outcomes									
Index of neigbhourhood amenities	1,358	0.015	-0.234***	0.060	1,370	-0.000	0.194**	0.086	0.000
Neighbourhood has *less* smell of drains or sewerage	1,374	-0.007	0.104*	0.058	1,370	-0.000	0.331***	0.088	0.034
Neighbourhood has working streetlights	1,426	0.395	-0.132***	0.026	1,370	0.206	-0.005	0.033	0.006
Less debris/rubble lying around neighhbourhood	1,422	2.688	-0.286***	0.044	1,370	2.544	0.071	0.060	0.000
Condition of piping and sewerage system	1,362	-0.011	-0.037	0.061	1,370	0.000	0.167*	0.087	0.068
Feels safe at night	1,370	5.720	0.028	0.039	1,370	5.475	0.216**	0.085	0.025
Overall neighbourhood rating					1,370	5.356	0.408**	0.183	
Proud of neighbourhood					1,370	3.675	0.240***	0.088	
Preference to stay	1,426	2.764	-0.641***	0.079	1,370	3.481	0.267**	0.109	0.000

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. I show the results separately for the 2018 and 2024 endlines (one regression for each endline, per outcome). "ITT Lottery" identifies the parameter of interest, with the relevant SE of the estimate shown in square brackets below. Column 7 provides the p-value for a test of equality of the coefficient between the 2018 and 2024 endlines. This is estimated using a saturated regression combining both endlines and including interactions between all covariates and an "endline" dummy.

Eight years later, lottery winners still talk to fewer people overall, but arguments and conflicts with neighbors remain persistently lower. They are *less* likely to feel lonely or lack friendships.[49] The effects on satisfaction with social life are now positive; though not quite significant in the ITT they are significantly higher for households that moved into their units (see Table A32). These results suggest that households that moved experienced a long-term loss in their support networks but now benefit from less conflictual relationships with their neighbors. Qualitative interviews confirm that living in formal condominiums reduces conflicts over shared resources (such as toilets, cooking areas, and other communal spaces) common in informal settlements. Residents also appreciated the privacy of formal housing and were relieved to lessen the social obligations that came with slum living.

The effects of condominiums on community inclusion are strongly positive. Lottery winners, especially movers, are significantly more likely to join an *iddir* (community support group) and participate in community meetings, with movers often taking on leadership roles. These effects persist after 8 years. One of the strongest predictors of whether households moved was their original membership in an *iddir*; those not part of an *iddir* were more likely to move. Qualitative interviews conducted with households confirm what these results suggest: winners without prior *iddir* membership moved to new areas and formed new *iddirs* with other movers. If *iddir* membership in the old communities was somewhat exclusive, moving to a new neighborhood provided an opportunity to form more inclusive community associations.[50]

The effects of condominiums on access to public services and local amenities exhibit a reversal of fortune. In the short-run, lottery winners report significantly worse public goods (like schools and medical clinics). Eight years later, this effect has dissipated. Initially, after 2 years, lottery winners report lower scores on an index of neighborhood quality (including drains, sewerage, rubble, and debris). However, after 8 years, this reverses: now lottery winners live in significantly better neighborhoods and feel safer (from crime) at night. After eight years, winners report higher satisfaction and pride with their neighborhoods, and a stronger preference for continuing to living there. All of these results are driven by households that moved into their units, with negligible effects on those that didn't move (Table A32). These results plausibly correspond to improvements in neighborhood quality in condominium sites over time, as residents moved into their neighborhoods and the state improved access to public facilities that were initially not present. Overall subjective well-being (measured on a "ladder" from 1 to 10) is not affected in the short run, but 0.5SDs higher after 8 years.[51]

The differential effects by mover and non-mover households (Table A24) suggest that some social network outcomes are affected even among households that *do not* move, suggesting that winning the lottery itself may change social networks independently of

[49]These results from a smaller sample size because the outcome is missing for households who requested to respond to a shorter version of the questionnaire due time constraints on their side.

[50]Many households that moved reported that they were not in local risk-sharing groups in their old neighbourhoods because they were excluded from those groups. Moving to new neighbourhoods allowed them to more freely associate with their neighbours and set up risk-sharing groups on their own terms.

[51]The effects are bigger for households that move, though the difference relative to non-movers is not significant, in my correlation excercise using Equation 3.

relocation.[52] On the other hand, only moving households experience declines in arguments and increases in community group membership and participation. In the second endline, only households that move have higher satisfaction with their social lives.

6.3 Education outcomes

Moving to government housing in new neighborhoods could plausibly have affected respondents schooling outcomes through a number of channels. First, access to good quality schools have been worse for households that moved to condominium sites. The results suggest that this was true in the short run, but the difference dissipates eight years later. Second, formal housing might make studying easier, by providing a well lit, smoke free, and quieter environment, and improved the health of young people living there.[53] Third, social interactions may have been different, depending on the composition of the new neighborhoods and the way in which new housing might shape those interactions– for example, if crime is lower in formal housing, as Table 8 suggests that is in the long run, this could be correlated with a social environment that encourages higher attainment in school and less delinquency. Fourth, if winning a house increased household wealth, this could have resulted in increases in schooling expenditures (Kumar, 2021). Finally, moving house could cause disruptions to learning.

In Table 9 I report the results of individual regressions on education outcomes, including household controls and individual age and gender fixed effects.[54] These outcomes are reported by the head of household, including aspirations for that child's future education. The results show no evidence of affects – after eight years– of winning the housing lotteries on enrolment, attainment or final grades (from standardized high school test scores.) Households regressions show no changes in household expenditure on schooling and health outcomes for households that have been living in their homes from eight years. I look at how the effects differ by children in households that move and that do not move in A33 and find no evidence of heterogeneity between these two groups.

I do find evidence that moving housing can disrupt education in the short-run. In Table A34 I report the effects of winning the 13th round (who moved in in just the previous year) and 14th round (who were still in process of moving) lotteries relative to having never won a lottery. I find evidence of lower enrolment rates, possibly because of moving home disrupts schooling. The evidence from the 10th round suggests that these disruptive effects are short-lived.

[52] This is consistent with evidence in Andersen et al. (2023) that finds that this housing lottery changes household identity, which may cause them to interact less with households from their original neighbors.

[53] I collected detailed self-reported health outcomes in my first endline and found no evidence of significant changes in these outcomes due to winning the lottery. See Table A15 and A16 for adults and children, respectively.

[54] I did not collect detailed data on children's schooling outcomes in the first endline data. These educational outcomes are plausibly only affected after more than a year or two of living in government housing.

Table 9: Children and young adult education outcomes at Endline 2

Outcome	N	Control mean	ITT Estimate Lottery		Sharpened
	(1)	(2)	Coeff (3)	Std. Err. (4)	q-value (5)
Enrolled (all < 30)	1,898	0.643	-0.029	0.024	0.613
Enrolled (all < 18)	1,025	0.963	-0.014	0.018	0.689
Enrolled (primary age, < 15)	675	0.988	-0.015	0.014	0.613
Enrolled in highschool or higher (all $15 - 19$)	476	0.618	0.041	0.074	0.689
Enrolled in tertiary (all $19 - 24$)	498	0.238	-0.068	0.070	0.613
Enrolled in University (all $19 - 24$)	498	0.193	-0.119*	0.064	0.613
Completed highschool (all > 18)	665	0.722	0.031	0.056	0.689
Completed degree (all > 24)	257	0.591	-0.011	0.093	0.902
Completed or enrolled in highschool (all > 14)	1,141	0.767	-0.014	0.039	0.782
Grade in most recent year of school (all < 19)	733	79.591	1.523	1.458	0.613
Days absent from school in last 30 (all < 18)	993	0.867	-0.227	0.180	0.613
Aspires to tertiary education (all < 18)	1,025	0.969	0.010	0.015	0.689
Confidently aspires to tertiary education (all < 18)	1,025	0.891	0.049	0.031	0.613

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. I show the results for the 2024 endline for which I have detailed education data. "ITT Lottery" identifies the parameter of interest, with the relevant SE of the estimate shown in column 4. Column 5 shows sharpened q-values to correct for multiple hypothesis testing.

6.4 Heterogeneity by location of condominium sites

Next I look at heterogeneous effects of winning the lottery by the location of randomly assigned housing site. For the estimation of heterogeneous effects I use my sample of central sites described in 2.2.2 to increase the sample size for more central locations.[55] I use the identification strategy outlined in Section 3.2. Recall that households assigned to sites in the city centre paid the exact same price as those who won on the periphery, including the size of their down-payments and monthly mortgage repayments but won an asset considerably more valuable and costly to build.

Table 10 presents the ITT effects of being assigned to each group of sites after 2 (Panel A) and 8 years (Panel B). I present a selected set of outcomes to summarise the key outcomes. As expected, households who win housing in more remote sites live significantly further from the city than those who win in closer sites.[56]

The results show some clear evidence of differential treatment effects by distance of the randomly assigned site. Three striking results arise for households assigned to closest locations (between 0 and 4 kilometers from the city centre). First, the positive impacts on the housing quality index are muted for this group in the first endline are strongly attenuated, driven by the fact that these households are significantly less likely to move into their units. This difference has disappeared after 8 years, possibly reflecting the fact that difference in occupation rates have narrowed by that point.[57] Second, non-

[55] Only about 2% of households in the lottery won a house in the most central sites, and relatively few won in the "intermediate" distance (6-12km).

[56] Note that the dependent variable is the Euclidean distance of the household from the city, while sites are classified by the travel distance by road.

[57] It is also possible that households who won housing in central sites have used the income from

Table 10: Heterogeneity of treatment effects by randomly assigned site of condominium

Outcome	N	CM	Differential effects by km from City Centre 0-4	6-12	15-20	20-25	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: First Endline (2018)							
Housing quality index	1,525	-0.05	0.34***	0.48***	0.70***	0.57***	0.004
			(0.10)	(0.14)	(0.06)	(0.07)	
Distance from city centre	1,525	5.40	0.90	3.37***	4.31***	4.84***	0.000
			(0.55)	(0.77)	(0.32)	(0.39)	
All other consumption	1,525	142.20	3.60	9.91	10.48*	-8.61	0.053
			(9.71)	(13.18)	(5.52)	(6.68)	
Household labour market index	1,525	0.02	-0.17*	-0.02	0.02	-0.11	0.177
			(0.10)	(0.14)	(0.06)	(0.07)	
Earnings per working age adult	1,525	85.44	-27.53***	-5.54	5.27	-4.65	0.001
			(7.96)	(11.04)	(4.65)	(5.63)	
Total number of social ties	1,525	11.37	-3.27***	-1.39	-2.38***	-2.17***	0.484
			(0.83)	(1.15)	(0.48)	(0.58)	
Satisfied with social life in neigh.	1,525	0.81	0.02	-0.00	0.03	0.01	0.839
			(0.04)	(0.06)	(0.02)	(0.03)	
Panel B: Second Endline (2024)							
Housing quality index	1,597	0.29	0.62***	0.63***	0.66***	0.66***	0.978
			(0.11)	(0.13)	(0.09)	(0.10)	
Distance from city centre	1,597	6.07	0.96*	2.68***	3.87***	6.01***	0.000
			(0.50)	(0.57)	(0.41)	(0.45)	
All other consumption	1,597	143.20	33.89***	34.28***	9.29	7.37	0.022
			(11.79)	(13.26)	(9.31)	(10.27)	
Household labour market index	1,597	-0.02	-0.17	-0.07	0.04	-0.12	0.086
			(0.11)	(0.13)	(0.09)	(0.10)	
Earnings per working age adult	1,597	69.43	-14.97*	12.23	7.74	4.92	0.004
			(8.13)	(9.31)	(6.64)	(7.33)	
Total number of social ties	1,597	4.99	-3.38***	-1.08	-2.53***	1.65***	0.000
			(0.64)	(0.74)	(0.53)	(0.58)	
Satisfied with social life in neigh.	1,597	3.23	0.01	0.03	0.12	0.10	0.259
			(0.09)	(0.09)	(0.07)	(0.08)	

Note: Each row represents a regression of the named outcome on which housing site the household was assigned to, with non-lottery winners as the omitted category, as in specification 4. I show the results separately for the 2018 and 2024 endline data (one regression for each endline, per outcome) in Panels A and B, respectively. Columns 3 to 6 show the ITT effect of winning a government house in the distance band indicated in the column header. Column 7 provides the p-value for a joint test of equality of the four site-specific coefficients in Columns 3 to 6. "All other consumption" is the aggregate of a full consumption module *less* transport and housing consumption. All monetary values are given as monthly 2017 USD.

housing consumption is not significantly affected for any site-distance in the 2018 endline. However, by 2024, households who won housing in central locations exhibit increased non-housing consumption, likely due to the income effects of winning these more valuable housing units. Winners of homes further from the city centre do not experience these consumption affects. Third, I find that winning a central house depresses labour market outcomes both 2 and 8 years after the lottery. Households who win houses in the city centre have a standardized labour market index 0.33 standard deviations lower after 2 years and earn early 20% less 8 years later. There are no such effects on total earnings for housing further from the city centre, even though those sites are significantly further away from job opportunities in the city centre.[58]

Households that win units closest to the centre experience the largest reduction in the size of their social networks after 8 years, while those winning houses furthest away actually experience increases in their network size. I am not well powered to test for differences in outcomes between those that moved and those that don't for these smaller central sites, but these results at least contradict the view that moving households to more remote areas will hurt social networks relative to closer locations. Overall satisfaction with social networks is not correlated with the randomly assigned site.

7 Conclusion

This paper examines the case for state intervention in the supply of housing. First, my market analysis compares the willingness to pay of households to the costs of producing government housing. I find that the market value of the housing implied by the marginal consumer's WTP slightly exceeds the costs of producing it. This identifies demand for the program for the marginal renter of the housing. The second section uses winners of the lottery to test for how broad this demand for housing is. I find that half of lottery winners forgo this market rental income to live in their units, and argue that this is driven by household preferences rather than the income effects of the lotteries.

After considering the demand for housing, I turn to the intent-to-treat effects. These tell us that the assumptions behind revealed preference were not obviously violated: households did not experience measurable losses to their well-being that they might not have anticipated, including on earnings, employment, well-being, and various social outcomes. It also rules out important externalities of the program, which may affect the case for government housing directly if these imply fiscal externalities (for example by reducing taxation from formal employment). If anything, by creating neighborhoods with improved amenities and social outcomes, the program may be generating important positive externalities. Similarly, the improvement in living standards may eventually translate into important health and human capital benefits in the longer run, which may also generate such social gains. There may be other positive externalities of building so much new housing: for example, it could have lower equilibrium housing prices

renting out these very valuable units to upgrade their non-condominium housing.

[58]However, I do find that households who win further away see reductions in labour supply at the extensive margin, suggesting that these household optimise labour supply within the household, for example by the main breadwinner earning more, while other household members working less, leaving total earnings unaffected.

throughout the city, lowered density and congestion in slums in the centre, or allowed more households to move from rural areas to the city by providing more housing. Since identifying these effects is beyond the scope of this paper, my results remain a lower bound on the overall effects of the program.

My results raise the question of how the state was able to supply housing at a price below what consumers are willing to pay. Although the margins are small, my results suggest that a government selling this housing at market price would be making a small profit at the margin, even with over 200,000 units built. Yet the supply of such housing prior to the program was, and remains, almost non-existent. If the state's supply curve does indeed lie below the private sector curve, why? One obvious answer is that this is due to regulation of the government's making. Land markets in Ethiopia are highly regulated and the ability to buy and sell land is limited, as it is in many developing countries. This could compound existing market failures arising from land assembly problems that would make it impossible for a private developer to acquire a site large enough to build at sufficient scale (Brooks and Lutz, 2016). The state may also have other advantages due to its scale and financial position. My results suggest that the scale of government housing, built on new sites on the edge of the city, might be important to its success: the density of the sites allows for employment and regular transport links to pop up there.

If nothing else, my paper tells us something about where government housing should be built. Conventional wisdom, pointing to the potential dislocating effects of moving households further from the center, has often advocated for building closer to the center. By conducting my analysis separately for multiple locations across the city, I show that the costs of building on valuable land in the center are extremely high. While this is reflected in higher rents, the implied returns are lower than for other sites, and it also means that fewer of the intended beneficiaries actually move into their housing in the short run. Moreover, the large wealth effects induced by these transfers appear to reduce labor supply for winners of these central homes. While governments may have other reasons for building in central locations, it is not clear that this efficient from the perspective of the intended beneficiaries alone.

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Appendix: For Online Publication

Figure A1: Government housing in a new site 25kms from the centre. (photograph by Charlie Rosser)



A1 Slums, housing consumption and wealth in Africa

This section presents two pieces of correlational evidence consistent with the view that constraints on housing supply are trapping urban households in Africa in slums. I show that as households get richer in Addis Ababa and other large African cities, their housing quality does not improve as much as one would expect if housing were a normal good. Households seem to be able to afford more space in slum-like housing, but not to move up to formal housing (the type built by large government programs). Similarly, I show that the relationship between GDP per capita and the share of the urban population living in slums is considerably weaker in Africa than in Asia and Latin America: countries in Africa have gotten richer without seeing commensurate improvements in housing quality.

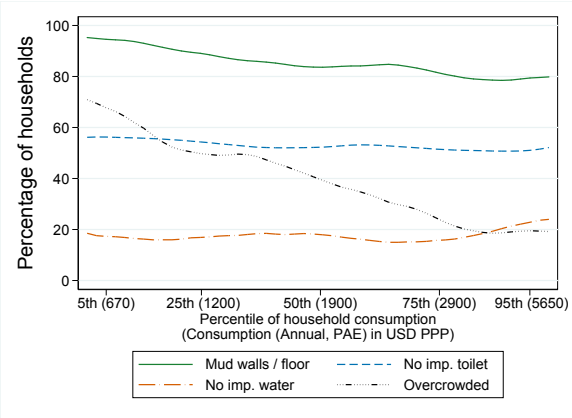
Housing quality relative to total expenditure in Addis Ababa

In Addis Ababa, slum housing is not only a problem of the very poor. Using representative household data, I plot four main deprivations of informal housing against household expenditure for Addis Ababa, and against household income for the primate cities of ten other African countries, in Panels A and B of Figure A2, respectively.[59]

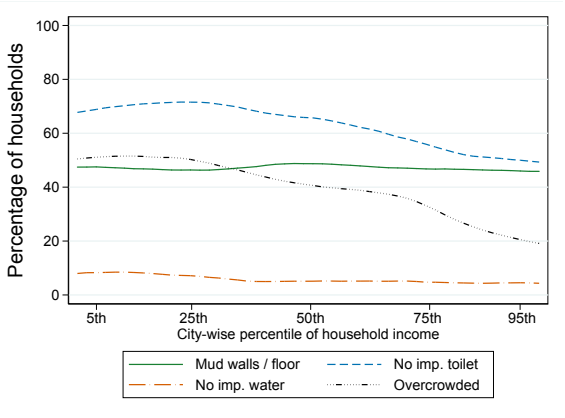
[59]For Addis, I use the 2011 Household Consumption and Expenditure Survey, which is a large representative survey used for national poverty assessments. For other cities, including Kampala, Blantyre, Dar-es-Salaam, and Accra, I use the most recent LSMS data. In each case, I normalize my outcome by the per adult equivalent household size.

Figure A2: **Household wealth and slums**

(a) Consumption & slums in Addis Ababa



(b) Income & slums in African primate cities



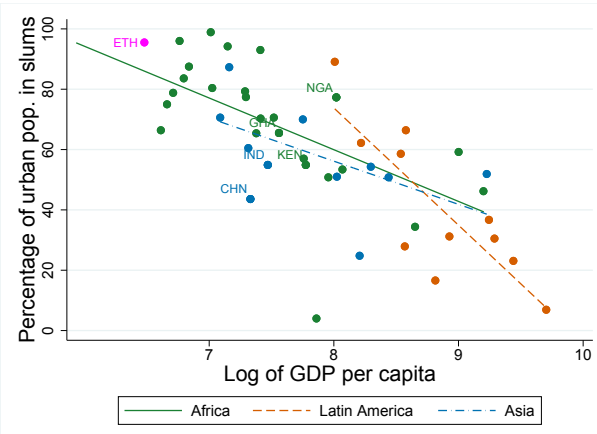
Even relatively wealthy households rarely live in homes with improved walls and floors, or improved sanitation and private improved water. By contrast, overcrowding declines rapidly with household wealth. Households seem to be able to move up to larger slum housing as they get richer, but not to make large fixed investments in home upgrades when they live in slums.

Cross-country correlations:

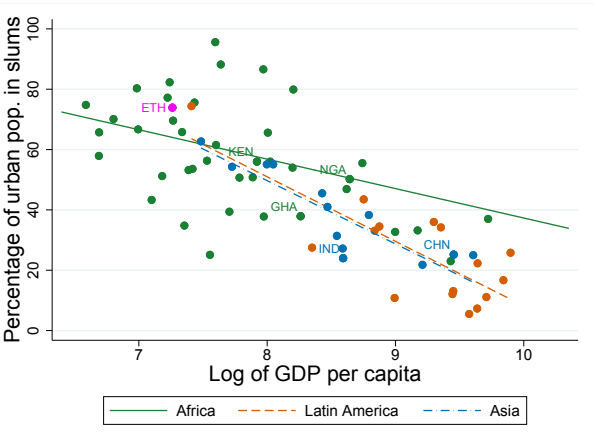
If slums will eventually go away with economic development, Africa is lagging behind the rest of the world. Rapid urbanization in Africa has meant that both the absolute number and the proportion of people living in slums have grown over time. This lack of progress on housing is perhaps symptomatic of the phenomenon of urbanization without industrialization said to be taking place in Africa (Gollin et al., 2016; Glaeser, 2014).

Figure A3: **GDP per capita and slums across developing countries**

(a) GDP and slums in 1990.



(b) GDP and slums in 2014.



Data comes from UN-HABITAT, Madison World Tables, and the World Bank. Calculations my own.

I relate GDP per capita to the proportion of urban households in slums in 1990 (Figure A3). The strong correlation suggests that slums would go away if Africa managed to

generate sufficient growth. Indeed, the proportion of urban households living in slums in Africa has fallen from roughly 70% to 60% between 1990 and 2014. However, the rate of progress has not been as fast as one would expect given the economic growth experienced over this period. The relationship between development and slum prevalence in 2014 is considerably weaker in Africa than it is in the rest of the developing world (Panel B of Figure A3): economic growth over the period 2005 to 2014 is not significantly correlated with changes in the urban population living in slums. Furthermore, rapid urbanization has meant that both the absolute number and the proportion of people living in slums have grown over time.

A2 Decomposition of housing value into physical and location components

For my large dataset of all condominiums from my market survey I estimate:

$$r^c = \alpha^c + \eta^c L^c + \lambda^c P^c + \epsilon^c$$

to predict total housing consumption for households living in condominiums that the own:

$$\hat{r^c} = \hat{\alpha}^c + \hat{\eta}^c L^c + \hat{\lambda}^c P^c$$

Then for privately rented (non condominium) units, I run:

$$r^n = \alpha^n + \eta^n L^n + \lambda^n P^n + \epsilon^n$$

And predict total consumption as well as decompositions in to the location and housing components. Here I make the somewhat arbitrary assumption that the intercept term loads disproportionately on the "location" component of total consumption. In practice, this implies that location values are slightly higher than physical values, on average, for non-condominium housing. This normalisation that has a very little influence; my results are very similar with different weights applied to location and physical quality, respectively.[60]

$$\hat{r^n} = \hat{\alpha}^n + \hat{\beta}^n L^n + \hat{\delta}^n P^n$$

$$\hat{l^n} = \hat{\alpha}^n * 2/3 + \hat{\beta}^n L^n$$

$$\hat{p^n} = \hat{\alpha}^n * 1/3 + \hat{\delta}^n L^p$$

Then for houses living in condominiums I estimate the predicted rent (using the parameters from the non-condominium market) had they been built at the average location $\bar{L}^n$ of non-condominium housing but with the same observed quality P^c:

$$r^{c*} = \alpha + \hat{\beta}^n \bar{L}^n + \hat{\delta}^n P^c$$

[60] My preferred normalisation is in line with the results from my condominium construction data that indicates that constructions costs are slightly more than location costs at sites a similar distance from the city to the average non-condominium unit (6-12km).

And use that and the average location value in non-condominium units $\bar{\hat{l}^n}$ to decompose the value of condominium units into their respective components. The physical component is therefore given by:

$$\hat{p^c} = r^{c*} - \overline{\hat{l}^n}$$

while the location component is:

$$\hat{l^c} = \hat{r}^c - \hat{p}^c$$

A3 Detailed Cost and Revenue Calculations

Construction costs: Land values are estimated using the data on land auctions from the time that the housing is developed. I estimate a regression model of land value using the auction price paid and a set of location and time variables, and then predict the market land value of the land used to develop the condominiums. As a result of differences in land values by location, the implied land costs are significantly higher in the central sites relative to those further away. I have land cost estimates provided to me by the government. For peripheral sites, these estimates are reasonable, albeit lower, compared to my auction data, but for centrally located sites, they are radical under-estimates.

For construction costs, I estimate the per square metre construction costs of the housing by using government data on the total construction budget divided by the total amount of housing floor space delivered by the project. This allows me to estimate construction costs by type, which I assume to be the same across sites. I assume that construction costs per unit are directly proportional to unit floor space. Cost estimation by unit size is more complicated. Since I have land and construction values as totals, I infer the per unit cost of construction based on the relative floor space of the different housing types. On average, land costs constitute just less than half of the costs of delivering each housing unit. This varies by location, with land costs making up more than 80

Houses are sold to lottery winners at (mortgaged) prices well below the price of construction, especially for very valuable centrally-located units, where lottery winners pay the same price as far less valuable houses much further away. Houses more than 25 km from the city center are sold at 55

Investments and upkeep: Households spend considerable amounts of money improving their units prior to being rented out. These improvements are reflected in the market value of these units. The units are sold mostly unfinished: concrete blocks with doors, plumbing and windows, but without tiles, kitchens, and bathroom amenities. I estimate the average cost of these final development costs, borne by owners. I use my primary survey data from 2017 and 2023 to estimate the costs of initially "finishing" the condominium units. I then also estimate monthly upkeep and maintenance costs from my data, interpolating between 2017 and 2023 to account for possible changes in the costs of upkeep over time. I assume that these investment and maintenance costs differ with the size of the condominium units but are constant at different locations.

Rent estimates: Using rich rental market survey data, I estimate the average rent

income values for 2017, 2019, and 2023.[61] To deflate 2023 housing values to 2017, I deflate by the increase in rents in non-condominium housing elsewhere in the city.[62] I then interpolate between these three time periods to determine the rent income flow for each time period since the housing was made available. As shown in Panel C, rents increase in real terms throughout the study period. Most of the increase, especially from 2017 to 2019, is driven by units in Group 4: this was a site that was relatively empty in 2017, and increased in population density quickly between 2017 and 2019. It is plausible that units became more valuable in that area as more households moved in.

Rental frictions: Renting out a housing unit involves costs that an owner-occupy does not have to pay. Although owner-occupiers do not pay these costs, an appropriate estimate of the return on investment for a developer renting out the unit should include those costs. Mortgage brokers in find a clients to rent out the units, screen them on behalf of the owners, and manage the recollection of monthly rent. They charge a fee to the owners I report the rent estimates amount above gross, including any payments that go to mortgage brokers. To estimate these costs, I use inteviews that I conducated with mortgage brokers in 2018. Brokers reported that the charged a fee of 10% of the first payment to the owner, and nothing after that. They varied on whether they charged 10% of 1, 2, or 3 months of rent. To be conservative, I assume that all brokers charged 10% on 3 months of rent. I also assume that, conservatively, that tenancy agreements lasted just 1 year each (although the data suggests that they tend to be considerably longer) such that these brokerage fees recur on an annual basis. In other words, brokerage frictions are 2.5% of gross rent annually.

Home value estimates: For some calculations, I use an estimate of the market value of homes in 2024 for IRR calculations. Here, I use relatively sparse data on respondents who have sold their units at the time of that survey in the last few years. I use a model of the predicted home values over the last few years, including a time trend and housing type fixed effects. I then use predicted sale values by type, aggregate up, and estimate an average rent-to-value ratio in 2024, which I find to be 20.5, which is not inconsistent with the real estate literature. I then use that ratio to impute home values for each site and type.

A4 Additional tables and figures

[61] For 2017 and 2019, I have enough granular data to do this for each site and pair. For 2023, my data is not granular enough, and I instead estimate a site-specific rate of (deflated) rent growth and apply that to all unit types.

[62] Deflating nominal income values from 2023 to 2017 prices is challenging due to the high inflation environment over those years, with the true rate of inflation over that period being disputed. This makes results using CPI deflators highly sensitive to the source of inflation data.

Table A1: Government housing programs providing fully formal housing units for free or subsidies rates for the urban poor/slum dwellers in low and middle income countries.

Country	Policy	Scale (Units)
Ethiopia	IHDP	200,000 units so far 947,376 registered
Angola	Meu Sonho, Minha Casa	1 million
Kenya	The Big Four Agenda	1 million by 2022
South Africa	RDP	4 million (est.) complete
Egypt	Social housing	1 million by 2020
Nigeria	Affordable housing program	1 million annually (aim)
Brazil	Minha Casa, Minha Vida	4.2 million
Mexico	Infonavit	4.3 million
Chile	MINVU	100,000 per year
Columbia		50,000 per year
rental programs:		
Algeria		3.8 million

This is an inexhaustive list based on my own research and reading of government reports.

Table A2: Housing sites and number of units awarded

Site	Number of Units	Distance (km)	Average rent
Yeka Abado	12501	19	92
Tulu Dimtu	12272	25	66
Yeka ayat	2865	17	95
Gelan	1272	18	*
Genet Menafesha	1212	15	85
Summit	750	15	*
Basha Wolde Chilot	535	2	170
Karakore	495	14	88
Lideta Redevelopmnt	393	3	170
Mekanisa Kotari	352	6	*
Jemo		10	105
Total (main 10 sites)	32647		
Total (all sites)	33585		

Figure A4: Kernel density: household consumption among housing applicants and representative data from the Ethiopian household consumption and expenditure survey (HCES) from 2011 and HCES from 2016

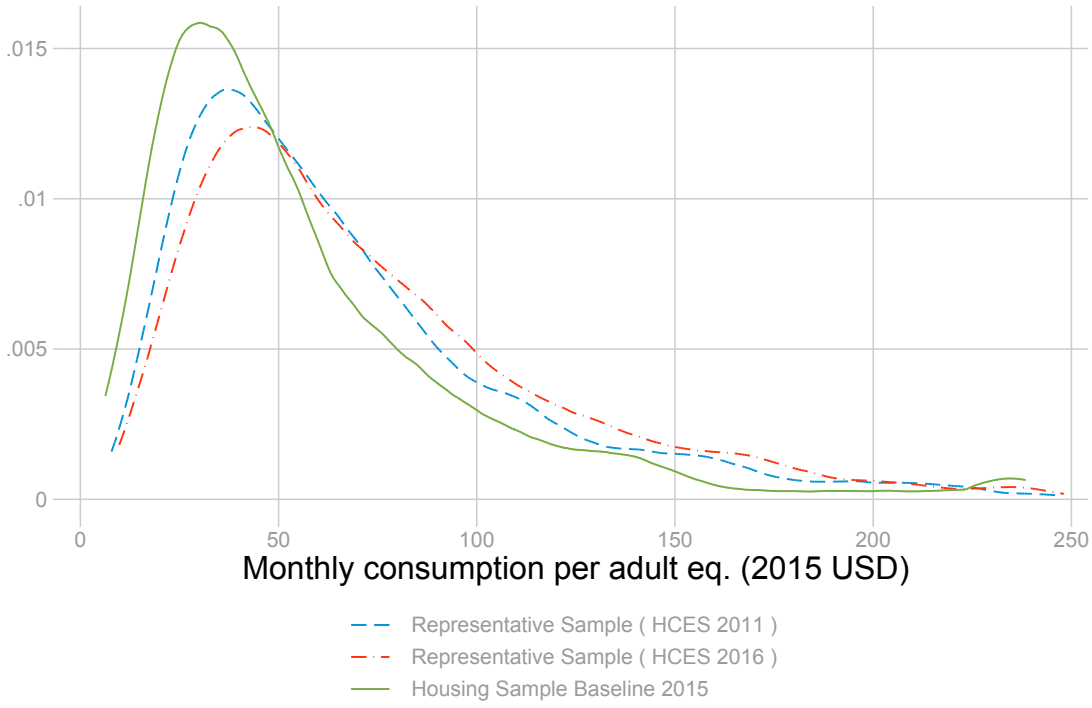


Table A3: Balance- treatment and control

Outcome	N	Control Mean	Std Dev.	Coeff	p (F-test)
Administrative data					
Scheme contributions (pre-lottery, 1000s ETB)	1564	11.23	11.26	-0.17	0.77
Female registered	1564	0.46	0.50	-0.01	0.76
Applied for 1-Bedroom	1564	0.12	0.32	-0.00	0.92
Survey data					
Household size	1564	3.52	1.93	-0.15	0.13
Number of children 6-18	1564	0.83	1.00	-0.07	0.15
Age of household head	1563	43.25	11.20	-0.38	0.51
Female household head	1563	0.36	0.48	-0.00	0.86
HH head migrant (born out of Addis)	1564	0.70	0.46	0.01	0.72
Number of working age members (16-64)	1564	2.47	1.44	-0.12	0.11
Tenure: rents on private market	1564	0.55	0.50	-0.03	0.22
Lives in slum (UN-Habitat)	1564	0.73	0.44	0.02	0.26
Housing assets index	1564	0.09	7.93	-0.50	0.21
Hours worked in last 7 days(per WA adult)	1552	32.92	19.51	-0.93	0.35
Earnings per working age adult (ETB, monthly)	1564	4223.71	3907.72	-221.76	0.26
Consumption per capita (monthly, ETB)	1564	1502.83	1257.31	-99.09	0.12

Joint F-test of predictive power: all above predictors on treatment status

Predictor variables	F-stat	p-value
All variables above	0.93	0.5812
All variables, partial F-test of survey outcomes	1.04	0.4132
Excluding administrative variables	0.94	0.5510

Table A4: How does the sample compare to the Addis Ababa population?

Outcome	Sample Means	
	Housing Sample (2015)	HCES (2011)
Household size given	3.52	3.98
HH member under 18	1.16	0.67
Female headed HH	0.36	0.40
Monthly consumption (per adult equivalent, 2015 ETB)	1,502.83	1,363.58
Growth adjusted consumption (2011-2015, 8% p.a.)	1,502.83	1,855.14
Household below urban poverty line as defined in 2011	0.22	0.22
Total number of working age adults in HH	2.47	2.88
Self employed members (per WA adult)	0.16	0.20
Wage employed members (per WA adult)	0.55	0.44
Household head age	43.25	43.88
Household head marital status	0.50	0.52
People per room	3.18	2.16
Floors made of hard/solid material	0.74	0.59
Cemented walls	0.24	0.15
Roof is mode of correguated iron sheet	0.87	0.92
HH has a private toilet	0.26	0.29
Access to improved sanitation facility	0.57	0.47
Tenure: lives free or owns home	0.19	0.38
Tenure: rents government owned home	0.26	0.31
Tenure: rents on private market	0.55	0.31
Total number of rooms in household	2.01	2.29
HH has access to an improved water source	0.90	0.82
HH owns a mobile/wireless phone	0.85	0.83
HH owns a commercial vehicle/car	0.09	0.02
Housing deprivations (UN definition, max=4)	1.23	1.30
Slum housing (UN definition using only floors)	0.73	0.70
Slum housing (UN definition with inadequates walls and floors)	0.87	0.89
Head education - highschool only	0.24	0.12
Head education - degree or diploma	0.34	0.29
N	1,564	3,741

Table A5: The different lottery rounds and occupancy shares at each endline

Lottery	Year homes available	Moved by 2018	Moved in 2024
10	2016	0.4112	0.5104
11	2017	0.1729	0.4662
12	2020	0	0.5000
13	2022	0	0.4343
14	2023	0	0.1681

Table A6: Predictors of attrition (first endline)

	Attrition and non-response			
	Only Treatment		All Covariates	
Dependent Variable: No-response or refused	Coeff	Std. error	Coeff	Std. error
	(1)	(2)	(3)	(4)
Won Housing Lottery	-0.016	0.012	-0.005	0.016
Household size			-0.006	0.007
Number female members			0.007	0.009
b_any_children			-0.032	0.018*
Age of household head			0.001	0.001
Female household head			-0.013	0.016
HH head migrant (born out of Addis)			0.006	0.017
Won 11th Round Condominium			-0.010	0.025
Years living in current home			-0.000	0.000
Tenure: lives free or owns home			0.000	0.000
Tenure: rents government owned home			-0.032	0.022
Tenure: rents on private market			-0.020	0.023
Housing quality index			0.001	0.002
Lives in slum (UN-Habitat)			0.002	0.019
Housing assets index			-0.005	0.008
Housing assets index			-0.005	0.008
Number of close social ties (hh head)			-0.000	0.001
Head finished highschool			0.033	0.020
Head completed tertiary education			-0.009	0.019
Head ethnicity: amhara			-0.023	0.015
Head religion: orthodox			-0.010	0.020
Working members (per WA adult)			-0.013	0.024
Earnings per working age adult (ETB, monthly)			0.000	0.000*
Total consumption (pae, monthly USD 1000s)			0.000	0.000
P-value of F-test	0.1919		0.2432	
N	2,275		1,539	

Note: This table estimates the effect of winning the housing lottery and other baseline covariates on the probability of not responding to or refusing participation in the endline survey.

Table A7: Predictors of attrition (second endline)

Dependent Variable: No-response or refused	Only Treatment		All Covariates	
	Coeff	Std. error	Coeff	Std. error
	(1)	(2)	(3)	(4)
Won Housing Lottery	0.026	0.017	0.020	0.018
Household size			0.001	0.009
Number female members			-0.005	0.011
Any children in the household			-0.028	0.020
Age of household head			-0.001	0.001
Female household head			0.026	0.020
HH head migrant (born out of Addis)			-0.034	0.021
Won 11th Round Condominium			-0.031	0.027
Years living in current home			0.000	0.000
Tenure: lives free or owns home			0.000	0.000
Tenure: rents government owned home			-0.035	0.029
Tenure: rents on private market			-0.052	0.026**
Housing quality index			0.006	0.003*
Lives in slum (UN-Habitat)			0.001	0.023
Housing assets index			-0.003	0.010
Housing assets index			-0.003	0.010
Number of close social ties (hh head)			-0.000	0.001
Head finished highschool			-0.050	0.021**
Head completed tertiary education			-0.033	0.023
Head ethnicity: amhara			0.010	0.018
Head religion: orthodox			-0.017	0.022
Working members (per WA adult)			0.021	0.028
Earnings per working age adult (ETB, monthly)			0.000	0.000
Total consumption (pae, monthly USD 1000s)			0.000	0.000
P-value of F-test	0.1252		0.0631	
N	1,566		1,539	

Note: This table estimates the effect of winning the housing lottery and other baseline covariates on the probability of not responding to or refusing participation in the endline survey.

Table A8: Effects of the lottery on household composition

Outcome	Control mean (1)	ITT Estimate Lottery N (2)	Coeff (3)	Std. Err. (4)	Adj q-value (5)
Current household size	3.886	1,426	-0.062	0.075	0.964
Current number of working age adults	3.052	1,426	-0.041	0.051	0.964
Number of newly joined members (incl. births)	0.650	1,426	-0.003	0.058	0.964
Number of newly joined adult members	0.401	1,426	-0.013	0.043	0.964
Original members who left the household	0.529	1,426	0.052	0.051	0.964
Origianl members who remained in household	3.132	1,426	-0.007	0.057	0.964

Note: This table shows the ITT results of winning the 10th round lottery on endline household composition. The results presented are estimated using specification 1.

Table A9: Predicted apartment rent using apartment location and amenities (in USD pm)

Outcome: rent	Coefficent	(SE)
Floor (level)	-1.878***	(0.381)
Studio	-59.45***	(1.739)
1- Bed	-34.71***	(1.490)
3- Bed	33.78***	(2.740)
Site FE 1	-40.02***	(1.565)
Site FE 2	-28.77***	(1.896)
Site FE 4	-46.03***	(2.545)
Site FE 5	-26.60***	(3.077)
Block has communal slaughter area	4.039***	(1.236)
Block has shop space	2.462*	(1.317)
Distance from roads	-6.591***	(0.107)
Basic quality of finishing (baseline index)	1.442**	(0.637)
Observations	1,406	
R-squared	0.851	

Note: This table shows results of the hedonic regression of predicted condominium rent using the unit characteristics, including the floor numbe, access to amenities and distance of roads. I also measure the quality of the finishing of the block at baseline using direct observation by data collectors.

Table A10: Effect on total housing investment, other assets and liabilities (Endline 1) .

			ITT	By Moving Decision		
Outcome	N	Control mean	Lottery	Moved	Stayed	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Complementary housing investment	1,426	90.62	1,562.22***	1,802.51***	1,377.48***	0.00
			(75.34)	(116.17)	(84.67)	
Household duarable purchases	1,426	50.67	121.71***	270.28***	7.48	0.00
			(23.77)	(46.22)	(14.86)	
Total savings	1,426	1,815.28	-1,065.02***	-1,169.24***	-984.89***	0.09
			(96.54)	(114.97)	(107.62)	
Total remaining mortgages	1,426	253.33	4,129.34***	4,507.28***	3,838.78***	0.01
			(148.93)	(203.90)	(186.88)	
Total loans (excluding mortgages)	1,426	120.06	269.34***	232.09***	297.99***	0.43
			(54.58)	(68.62)	(68.66)	

Note: This table estimates the effect of winning the housing lottery on housing investment and household finances. Column (3) shows the *intent-to-treat* estimate of winning the lottery on household. Row (1) shows the effect on all household investment in housing upgrades over the 24 months before the endline, covering the period of time in which lottery winners would have been investing in their new condominiums.

Figure A5: **Detail on amenity upgrades made to condominium houses**

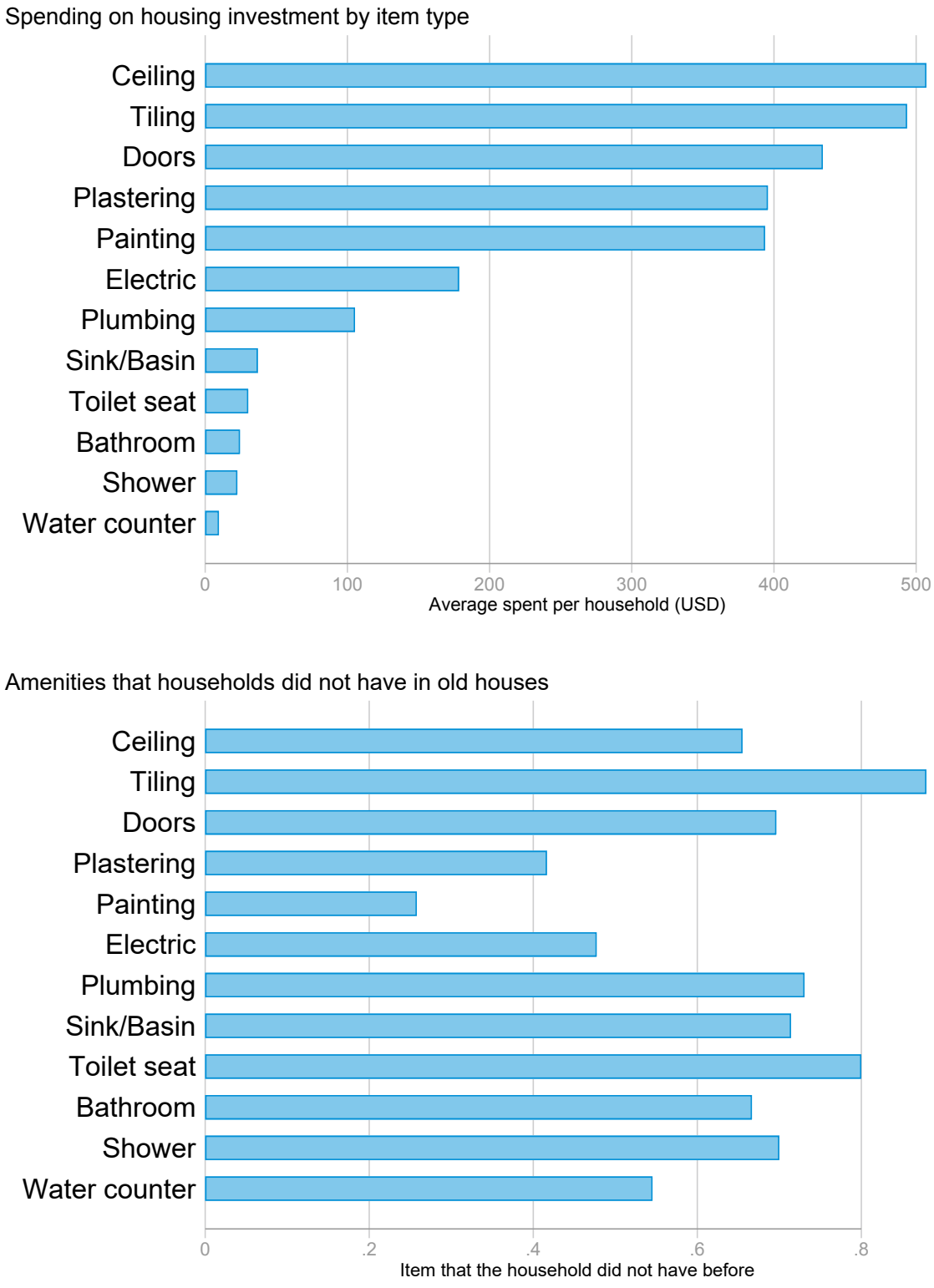


Table A11: Effects of winning the lottery on household finances and income

	2018 Endline			2024 Endline			
Outcome	N	Control mean	ITT Lottery	N	Control mean	ITT Lottery	Diff pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rent payments	1,426	48.250	-20.844***	1,370	40.153	-7.358	0.028
			[2.658]			[4.916]	
Mortgage repayments	1,426	3.450	76.678***				
			[2.486]				
Rent income	1,426	2.936	32.937***	1,370	4.926	36.567***	0.462
			[2.031]			[3.202]	
Net housing cash	1,426	-49.131	-20.473***				
			[2.934]				
Income from earnings	1,426	222.405	3.940	1,370	145.838	16.980	0.411
			[10.062]			[12.414]	
Income from other sources	1,426	180.112	6.575	1,370	15.029	1.398	1.000
			[29.595]			[2.822]	
Total income	1,426	352.203	-7.424	1,370	165.793	54.791***	0.133
			[30.062]			[12.587]	
Total savings	1,426	1,815.279	-1,081.458***	1,370	588.210	-102.150	0.000
			[96.647]			[95.422]	
Remaining mortgage debt	1,426	253.329	4,118.617***	1,370	142.308	-117.484*	0.000
			[146.143]			[65.872]	
Remaining other debt	1,426	120.055	264.456***	1,370	62.790	206.776***	0.569
			[54.090]			[61.431]	

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. I show the results separately for the 2018 and 2024 endlines (one regression for each endline, per outcome). "ITT Lottery" identifies the parameter of interest, with the relevant SE of the estimate shown in square brackets below. Column 7 provides the p-value for a test of equality of the coefficient between the 2018 and 2024 endlines. This is estimated using a saturated regression combining both endlines and interactions between all covariates and an "endline" dummy. **Net housing income** is a calculated monthly as: rental income - mortgage repayment - rent paid. Rental income includes possible rents from condominiums if they are rented out. I do not calculate this in the second endline as most households have paid off their mortgages.

Figure A6: Engel curves in household income (i) Total housing share (ii) Housing location (iii) Housing quality

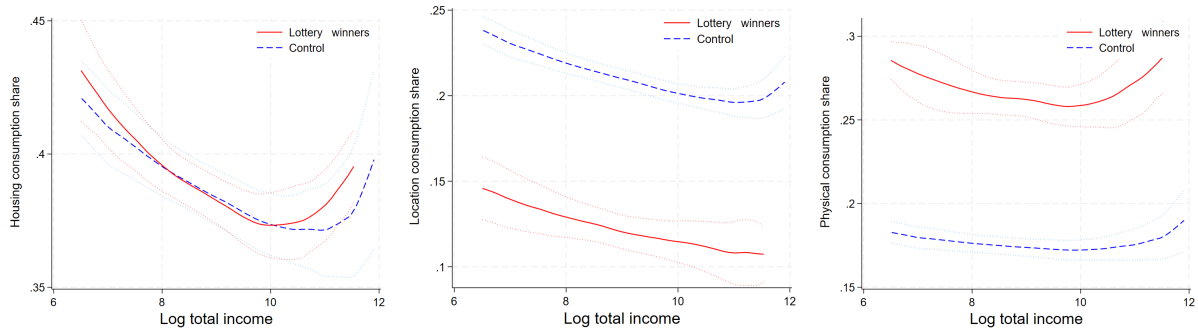


Figure A7: Engel curves using household consumption – MOVERS only (i) Total housing share (ii) Housing location (iii) Housing quality

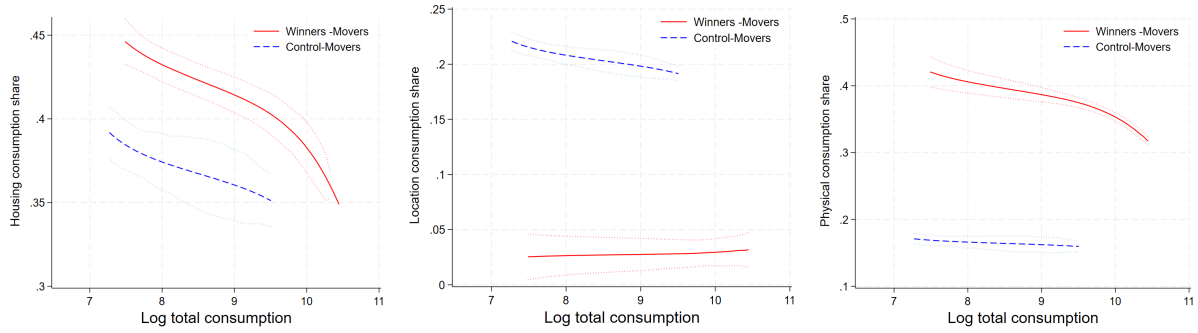
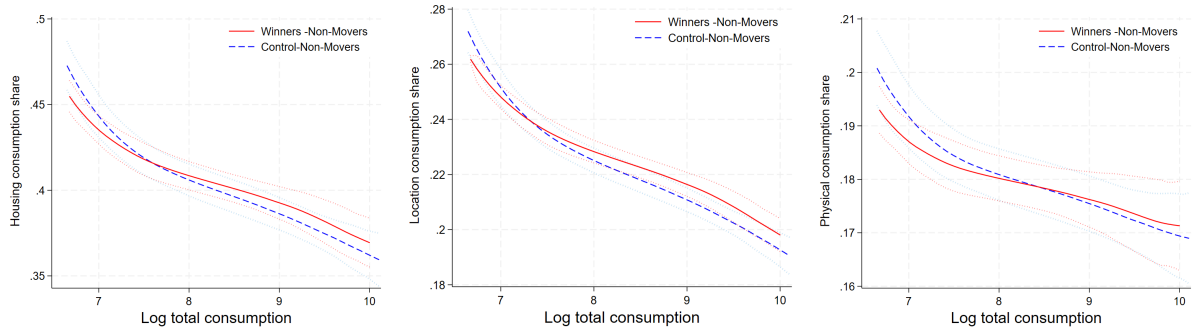


Figure A8: Engel curves using household consumption – NON-MOVERS only (i) Total housing share (ii) Housing location (iii) Housing quality



A4.1 Internal rates of return: detail by types and sites

Table A12: Estimated internal rates of return, all sites by type

	All sites - studio	All sites - 1 bed	All sites - 2 bed	All sites - 3 bed	All sites and types
Land cost per unit	5,355	8,460.9	12,429	16,547	9,659.8
Construction cost per unit	7,051	11,140.5	16,365	21,788	12,719.1
Total cost per unit	12,406	19,601.4	28,794	38,335	22,378.9
Initial investment	274	624.5	1,188	1,799	815.9
Initial maintenance	22	76.2	160	160	93.5
Final maintenance	51	74.5	99	148	83.8
Rent 2017	721	987.6	1,359	1,696	1,098.8
Rent 2019	923	1,209.5	1,549	1,833	1,299.9
Rent 2024	854	1,179.2	1,626	2,053	1,314.7
Sale Price Est	21,356	24,514.2	26,343	47,903	27,037.6
Sale at est. value	0.0919	0.0583	0.0284	0.0472	0.0527
No sale	0.0817	0.0577	0.0403	0.0260	0.0500
Sale at cost	0.0482	0.0378	0.0309	0.0266	0.0348
Sale at land value	0.0056	-0.0096	-0.0198	-0.0263	-0.0141

Note: See text in Section 4.1 for details of calculations. All costs, prices and revenues are deflated or inflated to 2017 Ethiopian Birr and then converted to USD at the average exchange rate in 2017. Flows are presented in annual terms throughout. For example, households spent an average of 93.5 USD per year on maintenance in 2017. This table shows figures for different housing types (number of bedrooms) aggregated across housing sites.

Table A13: Effects of winning the lottery and moving house housing - subcomponents

Outcome	2018 Endline N (1)	2018 Endline Control mean (2)	2018 Endline ITT Lottery (3)	2024 Endline N (4)	2024 Endline Control mean (5)	2024 Endline ITT Lottery (6)	Diff pval (7)
Housing quality index	1,426	0.000	0.680*** [0.053]	1,370	0.056	0.672*** [0.088]	0.907
Formal wall	1,426	0.288	0.315*** [0.025]	1,370	0.350	0.229*** [0.042]	0.088
Formal floor	1,426	0.780	0.092*** [0.020]	1,370	0.838	0.075** [0.030]	0.777
Private formal water source	1,426	0.406	0.214*** [0.026]	1,370	0.756	0.045 [0.038]	0.000
Improved toilet (shared < 5 others)	1,426	0.218	0.326*** [0.025]	1,370	0.381	0.247*** [0.043]	0.133
Cooks with electricity	1,426	0.769	0.056*** [0.020]	1,370	0.856	0.057* [0.030]	0.892
Cooks indoors	1,426	0.846	0.040** [0.017]	1,370	0.531	0.032* [0.019]	0.608
Number of people per room	1,426	3.970	-0.422*** [0.116]	1,370	4.481	-0.516*** [0.198]	0.825

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. I show the results separately for the 2018 and 2024 endlines (one regression for each endline, per outcome). "ITT Lottery" identifies the parameter of interest, with the relevant SE of the estimate shown in square brackets below. Column 7 provides the p-value for a test of equality of the coefficient between the 2018 and 2024 endlines. This is estimated using a saturated regression combining both endlines and interactions between all covariates and an "endline" dummy.

A4.2 Individual labour market outcomes

Table A14: Individual labor

Outcome	N	Control mean	ITT Estimate Lottery Coeff	Std. Err.	q-value
	(1)	(2)	(3)	(4)	(5)
Panel A: First Endline (2018)					
Did any work in the last 7 days	3,711	0.627	-0.021	0.015	0.379
Wage-employed work in the last 7 days	3,711	0.446	-0.007	0.016	0.794
Self-employed work in the last 7 days	3,711	0.119	-0.006	0.011	0.794
Individual monthly earnings (USD)	3,711	83.424	1.075	3.355	0.815
Individual hours worked in the last 7 days	3,711	29.677	-0.999	0.777	0.379
Permanent work	3,711	0.294	0.014	0.013	0.515
White collar-work	3,711	0.195	0.026**	0.012	0.123
Permament white-collar work	3,711	0.323	0.019	0.014	0.379
Switched between self/wage employment	1,631	0.098	0.034*	0.018	0.161
Switched occupations (40 main occupations)	1,507	0.491	0.005	0.027	0.856
Works in areas near housing sites	3,711	0.066	0.043***	0.011	0.001
Works close to home	3,711	0.047	-0.026***	0.008	0.004
Works in own home	2,249	0.058	0.003	0.010	0.815
Commute time (cond)	2,249	61.491	18.376***	2.872	0.001
Commute cost (cond)	2,317	9.239	3.894***	0.817	0.001
Factory job	3,711	0.009	-0.002	0.004	0.794
Construction job	3,711	0.079	0.005	0.010	0.794
Panel B: Second Endline (2024)					
Did any work in the last 7 days	3,493	0.438	-0.025	0.026	0.796
Wage-employed work in the last 7 days	3,493	0.343	-0.046*	0.026	0.664
Self-employed work in the last 7 days	3,493	0.094	0.020	0.018	0.721
Total earnings in the last month	3,493	61.961	0.894	5.547	0.929
Individual hours worked in the last 7 days	3,493	20.570	-1.030	1.350	0.840
Permanent work	3,493	0.257	-0.039	0.024	0.664
White-collar work	3,493	0.162	-0.005	0.018	0.929
Permament white-collar work	3,493	0.265	-0.037	0.025	0.664
Switched between self/wage employment	1,220	0.280	0.057	0.049	0.721
Switched occupations	775	0.552	-0.036	0.061	0.840
Works in areas near housing sites	3,493	0.048	0.009	0.012	0.840
Works close to home	3,493	0.049	-0.015	0.013	0.721
Works in own home	3,493	0.009	0.000	0.006	0.929
Commute time (cond)	978	42.491	6.888*	4.094	0.664
Commute cost (cond)	1,735	5.722	-1.037	1.789	0.840
Takes a minibus to work	3,493	0.066	-0.005	0.016	0.929
Walks to work	3,493	0.051	-0.008	0.014	0.840
Factory job	3,493	0.004	0.001	0.006	0.929
Construction job	3,493	0.020	-0.003	0.007	0.840

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. I show the results separately for the 2018 and 2024 endlines in Panel A and Panel, respectively. Column 5 shows an sharpened q-value to control the false discovery rate.

Table A15: Individual health – all adults- endline 1

Outcome	N	Control mean	ITT Estimate Lottery Coeff	Std. Err.	Sharpened q-value
	(1)	(2)	(3)	(4)	(5)
Health condition index	5,379	0.011	-0.040	0.033	0.661
Malaria	5,379	0.002	-0.001	0.001	0.834
Diarrhea	5,379	0.008	-0.004	0.002	0.612
Physical	5,379	0.011	0.004	0.004	0.661
Dental	5,379	0.004	0.002	0.002	0.793
Eye	5,379	0.008	0.001	0.003	0.834
Skin	5,379	0.004	-0.002	0.002	0.774
Asthma	5,379	0.008	-0.005**	0.002	0.564
ENT	5,379	0.009	0.004	0.004	0.661
Tuberculosis	5,379	0.001	-0.002**	0.001	0.564
HighBloodPressure	5,379	0.011	0.002	0.003	0.795
Diabetes	5,379	0.008	0.005	0.003	0.612
HeartProblems	5,379	0.003	0.001	0.002	0.834
Commoncold	5,379	0.044	0.007	0.008	0.774
Typhoid	5,379	0.007	-0.001	0.003	0.834
Back pain	5,379	0.009	0.003	0.003	0.774
Goiter	5,379	0.001	-0.001	0.001	0.661
Jardia	5,379	0.002	-0.002	0.001	0.612
Kidney infection	5,379	0.008	0.000	0.003	0.999
Other	5,379	0.026	0.000	0.005	0.980
Ilness prevent normal activities	5,202	0.085	0.002	0.010	0.926
Ilness prevent activities (employed)	2,302	0.092	-0.005	0.013	0.834
Ilness prevent activities (working age)	3,620	0.086	-0.004	0.011	0.834
Sought health care (condition on sickness)	903	0.857	-0.021	0.030	0.795

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. Column 5 shows an sharpened q-value to control the false discovery rate.

Table A16: Individual health –children - endline 1

Outcome	N	Control mean	ITT Estimate Lottery Coeff	Std. Err.	Sharpened q-value
	(1)	(2)	(3)	(4)	(5)
Health condition index	1,849	-0.086	-0.063	0.044	0.493
Malaria	1,849	0.001	-0.002	0.002	0.509
Diarrhea	1,849	0.012	-0.008	0.005	0.493
Physical	1,849	0.005	0.000	0.003	0.988
Dental	1,849	0.005	-0.005	0.003	0.493
Eye	1,849	0.002	0.003	0.003	0.509
Skin	1,849	0.005	-0.002	0.004	0.683
Asthma	1,849	0.004	-0.005**	0.003	0.493
ENT	1,849	0.011	0.006	0.008	0.599
Tuberculosis	1,849	0.000	0.000	0.000	0.509
HighBloodPressure	1,849	0.000	0.000	0.000	0.493
Diabetes	1,849	0.001	-0.001	0.001	0.606
HeartProblems	1,849	0.003	-0.004	0.003	0.509
Commoncold	1,849	0.075	0.011	0.017	0.509
Typhoid	1,849	0.002	0.004	0.004	0.493
Back pain	1,849	0.000	0.000	0.000	0.511
Goiter	1,849	0.000	0.000	0.000	0.606
Jardia	1,849	0.002	-0.001	0.001	0.745
Kidney infection	1,849	0.000	0.002	0.002	0.493
Other	1,849	0.016	-0.006	0.006	
Ilness prevent normal activities	1,796	0.069	0.010	0.015	
Ilness prevent activities (employed)	56	0.000	0.000	0.000	
Ilness prevent activities (working age)	349	0.035	0.008	0.022	
Sought health care (condition on sickness)	261	0.808	-0.086	0.063	

Note: Each row represents a regression of the named outcome on whether the household won the lottery using the ANCOVA specification in Equation 1. Column 5 shows an sharpened q-value to control the false discovery rate.

A4.3 Predictors of moving in

Table A17: Determinants of housing occupation all households at endline 1

	(1)	(2)	(3)	(4)	(5)
	Dep Variable: Lottery winner lives in their condominium.				
Household income	-0.00904	-0.0187	-0.0240	-0.0106	-0.0239
	(0.0193)	(0.0206)	(0.0210)	(0.0200)	(0.0211)
Wealth (index)	-0.00769	-0.00490	-0.00794	-0.00909	-0.00794
	(0.0221)	(0.0228)	(0.0230)	(0.0226)	(0.0231)
Social ties	0.00528	0.00615	0.00631	0.00391	0.00631
	(0.0167)	(0.0167)	(0.0168)	(0.0169)	(0.0168)
Community group	-0.0481***	-0.0242	-0.0254	-0.0513***	-0.0254
	(0.0170)	(0.0196)	(0.0197)	(0.0172)	(0.0197)
Travel time to centre	0.0530***	0.0412**			
	(0.0164)	(0.0167)			
Physical housing qual	0.00731	0.00818			
	(0.00547)	(0.00570)			
Total housing cons.			0.0316		
			(0.0220)		
Housing cons.-location				-0.00703	0.00286
				(0.0171)	(0.0176)
Housing cons.- physical				0.0263	0.0316
				(0.0216)	(0.0220)
Observations	775	775	775	775	775
R-squared	0.0320	0.0540	0.0460	0.0220	0.0460
Lasso controls	No	Yes	Yes	No	Yes
Condo Site FE	Yes	Yes	Yes	Yes	Yes

Note: Each column shows the results for a regression, for condominium owners, of whether the live in the condominium that they own, on a set of baseline covariates. All right hand side variables are normalised to have mean zero and standard deviation one to make them easier to interpret. Social ties is a measure of the total number of other people that they household head speaks to on a regular basis. Housing consumption variables (included location and physical, respectively) are imputed for baseline housing choices, using the method outlined in Section 3.3. In some specifications I control for additional predictors of whether the household moves in, selected from the non-zero parameters in a separate lasso regression.

Table A18: Determinants of housing occupation all households at endline 2

	(1)	(2)	(3)	(4)	(5)
	incondo	incondo	incondo	incondo	incondo
Household income	-0.029	-0.034	-0.034	-0.035	-0.027
	(0.0213)	(0.0242)	(0.0244)	(0.0245)	(0.0218)
Wealth (index)	0.009	-0.001	-0.001	-0.002	0.008
	(0.0239)	(0.0239)	(0.0241)	(0.0242)	(0.0242)
Social ties	-0.005	-0.001	-0.001	-0.001	-0.006
	(0.0184)	(0.0184)	(0.0185)	(0.0185)	(0.0185)
Community group	-0.018	-0.0508**	-0.0537**	-0.0537**	-0.021
	(0.0189)	(0.0209)	(0.0209)	(0.0209)	(0.0189)
Travel time to centre	0.022	0.023			
	(0.0178)	(0.0178)			
Index of physical housing quality	0.0116*	0.007			
	(0.00620)	(0.00632)			
Housing consumption total			0.015		
			(0.0242)		
Housing location cons				0.015	0.015
				(0.0190)	(0.0190)
Housing physical cons				0.015	0.028
				(0.0243)	(0.0238)
Observations	669.000	669.000	669.000	669.000	669.000
R-squared	0.025	0.051	0.047	0.047	0.019

Note: Each column shows the results for a regression, for condominium owners, of whether the live in the condominium that they own, on a set of baseline covariates. All right hand side variables are normalised to have mean zero and standard deviation one to make them easier to interpret. Social ties is a measure of the total number of other people that they household head speaks to on a regular basis. Housing consumption variables (included location and physical, respectively) are imputed for baseline housing choices, using the method outlined in Section 3.3. In some specifications I control for additional predictors of whether the household moves in, selected from the non-zero parameters in a separate lasso regression.

Table A19: Determinants of housing occupation private renters at endline 2

	(1)	(2)	(3)	(4)	(5)
	Dep Variable: Lottery winner lives in their condominium.				
Household income	-0.019	-0.042	-0.058	-0.060	-0.042
	(0.0314)	(0.0364)	(0.0371)	(0.0372)	(0.0329)
Wealth (index)	-0.013	-0.022	-0.019	-0.019	-0.008
	(0.0403)	(0.0402)	(0.0397)	(0.0397)	(0.0397)
Social ties	-0.042	-0.043	-0.043	-0.043	-0.042
	(0.0267)	(0.0267)	(0.0266)	(0.0266)	(0.0266)
Community group	-0.024	-0.0492*	-0.043	-0.042	-0.013
	(0.0259)	(0.0287)	(0.0288)	(0.0288)	(0.0259)
Travel time to centre	-0.014	-0.012			
	(0.0218)	(0.0218)			
Index of physical housing quality	0.0283***	0.0225***			
	(0.00809)	(0.00835)			
Housing consumption total			0.114***		
			(0.0360)		
Housing location cons				0.029	0.021
				(0.0255)	(0.0255)
Housing physical cons				0.114***	0.140***
				(0.0362)	(0.0353)
Observations	372.000	372.000	372.000	372.000	372.000
R-squared	0.066	0.098	0.105	0.106	0.075

Note: Each column shows the results for a regression, for condominium owners, of whether the live in the condominium that they own, on a set of baseline covariates. All right hand side variables are normalised to have mean zero and standard deviation one to make them easier to interpret. Social ties is a measure of the total number of other people that they household head speaks to on a regular basis. Housing consumption variables (included location and physical, respectively) are imputed for baseline housing choices, using the method outlined in Section 3.3. In some specifications I control for additional predictors of whether the household moves in, selected from the non-zero parameters in a separate lasso regression.

Table A20: Lasso estimates of the predictors of moving in (first endline)

	(1) incondo	(2) incondo	(3) incondo
Member of an iddir	-0.0171	-0.0219	
Time to city centre	0.0247	0.0389	
Head ethnicity: amhara	0.0119	0.0218	0.0169
Head completed tertiary education	0.00196		0.00943
Tenure: rents on private market	0.0109	0.0946	0.0276
Household size		-0.000722	-0.00237
Tenure: rents government owned home		0.0878	
Moved in last 5 years			0.00494
Preference to stay in neighbhourhood			-0.000634
b_index_class			-0.00186
Observations	783	783	783

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

Note: Table shows the non-zero coefficients selected from a lasso regression of whether a household lives in the condominium they own, on a wide range of baseline covariates. Column (1) presents the results from a lasso regression using a simple cross-validation procedure. Column 2 applies an adaptive CV procedure. Column 3 uses adaptive CV, but excludes from the model the variables that I use in my main model. It is the covariates selected from column (3) that I use as controls in my main model (eg. Table A17).

Table A21: Test for differential drivers of moving in between 10th and later lotteries

	(1) In condo	(2) In condo
10th round	-0.0433	
	(0.0340)	
*Interactions: 10th round*covariate:*		
Household income		-0.0380
		(0.0388)
Wealth (index)		0.00474
		(0.0428)
Social ties		-0.0294
		(0.0327)
Community group		0.00655
		(0.0363)
Travel time to centre		0.0847**
		(0.0350)
Physical housing qual		-0.00712
		(0.0113)
Condo won: 1-bed		-0.0805
		(0.0616)
Condo won: 2-bed		-0.0825
		(0.0800)
Condo won: 3-bed		0.254
		(0.520)
Head ethnicity: amhara		0.0145
		(0.0333)
Moved in last 5 years		0.00319
		(0.0366)
Preference to stay in neighbhourhood		-0.0484
		(0.0336)
Head completed tertiary education		0.0329
		(0.0341)
Household size		0.00835
		(0.0384)
Class identification index		-0.0791**
		(0.0384)
Tenure: rents on private market		0.0648
		(0.0753)
Observations	1,067	1,055
R-squared	0.002	0.050
F-stat		1.143
P-val		0.310

Note: This table tests for differences in the correlates of moving into condominiums between the 10th round and later lottery rounds. Column 1 shows that 10th round lottery winners are not significantkly more or less likely to move into their units relative to later winners, at the same time (2-3 years) after they won them. Column 2 tests for the effects of interactions between winning the 10th round lottery and the probability that a household moves into their condominium, controlling for all (non-interacted) variables (coefficients not shown).

A4.4 Main results by moving in status (using specification 2) for Endline 1 only

Table A22: Effects of winning the lottery on movers and non-movers: consumption, housing, and location. Endline 1

			ITT	By Moving Decision		
Outcome	N	Control mean	Lottery	Mover	Stayer	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Housing quality index	1,290	-0.05	0.61***	1.43***	-0.07	0.00
			(0.07)	(0.11)	(0.07)	
Distance from city centre	1,290	5.40	4.28***	8.97***	0.48	0.00
			(0.30)	(0.35)	(0.35)	
Housing consumption	1,290	81.96	0.53	5.67	-2.45	0.19
			(3.48)	(6.22)	(4.07)	
Transport expenditure	1,290	12.26	3.39***	8.32***	0.02	0.00
			(1.09)	(2.03)	(1.13)	
Consumption (no housing & transport)	1,290	142.20	-0.44	-13.50	-8.24	0.67
			(6.73)	(13.07)	(6.97)	
Non-housing Asset index	1,228	0.06	-0.04	0.18	-0.12	0.02
			(0.08)	(0.14)	(0.09)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 2 to separately identify these groups, using movers from later lottery rounds for those that moved in after the first round. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A23: Effects of winning the lottery on movers and non-movers: labour market outcomes. Endline 1

			ITT	By Moving Decision		
Outcome	N	Control mean	Lottery	Mover	Stayer	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Household labour market index	1,290	0.02	-0.07	-0.03	-0.03	0.97
			(0.07)	(0.13)	(0.08)	
Earnings per working age adult	1,290	85.44	-1.88	1.27	-2.13	0.74
			(5.74)	(10.84)	(6.14)	
Total employed per working age adult	1,280	0.67	-0.02	-0.00	-0.01	0.85
			(0.02)	(0.04)	(0.02)	
Hours worked per working age adult	1,280	29.40	-1.20	-1.09	-0.01	0.61
			(1.18)	(2.20)	(1.33)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 2 to separately identify these groups, using movers from later lottery rounds for those that moved in after the first round. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A24: Effects of winning the lottery on movers and non-movers: consumption, housing, and location. Endline 1

Outcome	N	Control mean	ITT	By Moving Decision		
			Lottery	Mover	Stayer	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Subjective wellbeing (ladder)	1,287	4.28	-0.07	-0.19	-0.16	0.90
			(0.13)	(0.26)	(0.14)	
Total number of social ties	1,279	11.37	-3.27***	-4.07***	-3.41***	0.56
			(0.68)	(1.26)	(0.72)	
Social ties in local neighbourhood	1,289	6.55	-3.62***	-3.87***	-3.31***	0.39
			(1.16)	(1.35)	(1.13)	
Can turn to neighbours for advice	1,227	1.80	-0.26**	-0.33	-0.24*	0.70
			(0.12)	(0.26)	(0.13)	
Felt lonely	1,246	1.52	-0.07	-0.03	-0.07	0.80
			(0.07)	(0.14)	(0.07)	
Needed help and couldn't find with friends	1,246	1.65	0.15*	0.09	0.20**	0.46
			(0.08)	(0.15)	(0.09)	
Satisfied with social life in neighbourhood (1/0)	1,290	0.81	-0.02	-0.11*	0.02	0.03
			(0.03)	(0.06)	(0.03)	
Satisfied with neighbours	1,290	3.30	-0.06	-0.14	-0.02	0.24
			(0.05)	(0.10)	(0.06)	
Beliefs: neighbours' contribution to pub. goods	1,099	-0.02	0.05	0.12	0.03	0.55
			(0.08)	(0.16)	(0.09)	
Arguments with neighbours	1,227	0.41	-0.11*	-0.29**	-0.08	0.11
			(0.06)	(0.14)	(0.07)	
Household is a member of at least one iddir	1,290	0.55	0.13***	0.30***	0.04	0.00
			(0.03)	(0.07)	(0.04)	
Community meetings participation	1,290	0.37	0.10***	0.33***	-0.04	0.00
			(0.04)	(0.07)	(0.04)	
Respondent has leadership role in community	1,290	0.04	0.02	0.06*	-0.00	0.04
			(0.02)	(0.03)	(0.02)	
Index of public goods	1,290	-0.00	-0.21***	-0.28*	-0.11	0.24
			(0.08)	(0.16)	(0.09)	
Clinic/hospital quality	1,290	3.24	-0.15***	-0.23**	-0.08	0.11
			(0.05)	(0.10)	(0.05)	
Primary school quality	1,290	3.06	-0.05	-0.04	-0.02	0.83
			(0.04)	(0.08)	(0.05)	
Index of neigbhourhood amenities	1,231	0.02	-0.21***	-0.68***	0.14*	0.00
			(0.08)	(0.15)	(0.08)	
Neighbourhood has *less* smell of drains or sewerage	1,245	-0.01	0.07	-0.01	0.11	0.41
			(0.08)	(0.16)	(0.08)	
Neighbourhood has working streetlights	1,290	0.40	-0.12***	-0.37***	0.02	0.00
			(0.04)	(0.07)	(0.04)	
Less debris/rubble lying around neighhbourhood	1,287	2.69	-0.24***	-0.51***	0.04	0.00
			(0.06)	(0.11)	(0.06)	
Condition of piping and sewerage system	1,235	-0.01	-0.01	-0.17	0.13	0.05
			(0.08)	(0.16)	(0.09)	
Feels safe at night	1,244	5.72	0.07	-0.02	0.06	0.44
			(0.06)	(0.10)	(0.06)	
Preference to stay	1,290	3.24	0.56***	1.20***	0.11	0.00
			(0.11)	(0.22)	(0.12)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 2 to separately identify these groups, using movers from later lottery rounds for those that moved in after the first round. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A25: Effects of winning the lottery on movers and non-movers: individual labour. Endline 1

Outcome	Control mean (1)	ITT Lottery (2)	By Moving Decision Moved (3)	Stayed (4)	Equality pval (5)
Individual monthly earnings (USD)	82.075	-0.495	-1.144	-0.397	0.92
		(4.476)	(8.220)	(4.747)	
Individual hours worked in the last 7 days	29.817	-1.255	-2.491	-0.139	0.22
		(1.006)	(1.982)	(1.114)	
Did any work in the last 7 days	0.633	-0.022	-0.043	-0.005	0.29
		(0.019)	(0.037)	(0.020)	
White collar-work	0.186	0.004	-0.044	0.001	0.14
		(0.016)	(0.031)	(0.017)	
Switched between self/wage employment	0.102	0.051**	0.044	0.057**	0.76
		(0.023)	(0.043)	(0.026)	
Switched occupations (40 main occupations)	0.479	0.025	0.077	0.003	0.29
		(0.037)	(0.072)	(0.041)	
Works in areas near housing sites	0.070	0.026**	0.047**	0.007	0.08
		(0.013)	(0.024)	(0.014)	
Works within walking distance of home	0.291	-0.047*	-0.034	-0.013	0.65
		(0.026)	(0.047)	(0.029)	
Works in own home	0.058	0.017	0.026	0.015	0.67
		(0.012)	(0.026)	(0.013)	
Time on all domestic tasks (daily)	3.331	-0.167	-0.196	-0.136	0.80
		(0.118)	(0.248)	(0.129)	
Time commuting to work (daily)	38.493	8.773***	18.017***	-2.922	0.00
		(2.402)	(4.559)	(2.446)	
Leisure (daily) (residual of all other time use)	3.491	0.275	0.624	0.074	0.18
		(0.212)	(0.425)	(0.235)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 2 to separately identify these groups, using movers from later lottery rounds for those that moved in after the first round. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

A4.5 Main results by moving in status – ML Method (Endlines 1 and 2)

Table A26: Effects of winning the lottery and moving house on consumption, housing, and location. Endline 1

			ITT	By Moving Decision		
Outcome	N	Control mean	Lottery	Moved	Stayed	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Housing quality index	1,426	-0.05	0.67***	1.00***	-0.14	0.00
			(0.05)	(0.23)	(0.18)	
Distance from city centre	1,426	5.40	4.40***	9.26***	0.70**	0.00
			(0.27)	(0.27)	(0.35)	
Housing consumption	1,426	77.83	2.95	5.94**	-3.19	0.00
			(1.83)	(2.78)	(2.30)	
Transport expenditure	1,426	12.26	3.22***	7.75***	-0.58	0.00
			(0.76)	(1.19)	(1.50)	
Consumption (no housing & transport)	1,426	142.20	4.86	13.44	1.99	0.15
			(5.00)	(8.19)	(6.70)	
Non-housing Asset index	1,352	0.06	-0.06	0.01	-0.21***	0.02
			(0.06)	(0.08)	(0.08)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A27: Effects of winning the lottery and moving house on consumption, housing, and location. Endline 2

Outcome	N	Control mean	ITT Lottery	By Moving Decision: Moved	By Moving Decision: Stayed	By Moving Decision: Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Housing quality index	1,370	0.29	0.66***	0.92***	-0.16	0.00
			(0.09)	(0.28)	(0.27)	
Distance from city centre	1,370	6.07	4.34***	9.33***	-0.10	0.00
			(0.29)	(0.32)	(0.18)	
Housing consumption	1,370	103.36	20.81***	29.66***	7.04	0.00
			(4.04)	(4.50)	(5.14)	
Transport expenditure	1,370	14.95	2.58	5.42**	-1.21	0.00
			(1.91)	(2.30)	(2.81)	
Consumption (no housing & transport)	1,370	143.20	9.32	5.11	12.59	0.41
			(8.75)	(10.94)	(10.55)	
Non-housing Asset index	1,370	-0.02	0.03	-0.10	-0.16*	0.41
			(0.03)	(0.09)	(0.09)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A28: Effects of winning the lottery and moving house on household labour market outcomes. Endline 1

Outcome	N	Control mean	ITT Lottery	By Moving Decision: Moved	By Moving Decision: Stayed	By Moving Decision: Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Household labour market index	1,426	0.02	-0.04	0.18	0.04	0.41
			(0.05)	(0.15)	(0.14)	
Earnings per working age adult	1,426	85.44	1.36	6.13	-6.08	0.34
			(3.98)	(11.60)	(11.08)	
Total employed per working age adult	1,415	0.67	-0.02	-0.01	-0.00	0.80
			(0.02)	(0.02)	(0.02)	
Hours worked per working age adult	1,415	29.40	-1.16	-0.59	1.42	0.24
			(0.86)	(1.52)	(1.50)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A29: Effects of winning the lottery and moving house on household labour market outcomes. Endline 2

			ITT	By Moving Decision		
Outcome	N	Control mean	Lottery	Moved	Stayed	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Household labour market index	1,370	-0.02	-0.04	0.12	-0.28	0.02
			(0.09)	(0.21)	(0.21)	
Earnings per working age adult	1,370	69.43	4.58	11.45	-6.48	0.19
			(6.43)	(17.70)	(17.38)	
Total employed per working age adult	1,359	0.50	-0.03	0.00	-0.08**	0.01
			(0.03)	(0.04)	(0.04)	
Hours worked per working age adult	1,359	24.02	-1.43	0.84	-2.68	0.08
			(1.76)	(2.41)	(2.54)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A30: Effects of winning the lottery and moving house on complementary housing amenities not provided in government housing. Endline 2

			ITT	By Moving Decision		
Outcome	N	Control mean	Lottery	Moved	Stayed	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Housing amenities index	876	-0.11	0.49***	0.74***	0.14	0.00
			(0.13)	(0.13)	(0.14)	
Tiling or installed carpet in the living room	876	0.70	0.16***	0.24***	0.06	0.00
			(0.05)	(0.05)	(0.06)	
Tiling in the bathroom	876	0.35	0.35***	0.60***	-0.00	0.00
			(0.05)	(0.05)	(0.05)	
Tiling the kitchen	876	0.37	0.34***	0.57***	0.03	0.00
			(0.05)	(0.05)	(0.05)	
A shower	876	0.46	0.38***	0.65***	-0.00	0.00
			(0.05)	(0.05)	(0.06)	
Glass windows that open and close.	876	0.69	0.25***	0.41***	0.01	0.00
			(0.06)	(0.05)	(0.06)	
Kitchen sink built in.	876	0.41	0.41***	0.69***	0.01	0.00
			(0.05)	(0.05)	(0.05)	
Electric sockets built into the wall.	876	0.80	0.16***	0.26***	0.03	0.00
			(0.05)	(0.05)	(0.06)	
Plastered and tainted walls inside	876	0.16	-0.03	-0.06	-0.00	0.10
			(0.04)	(0.04)	(0.05)	
Painted walls outside	876	0.57	0.22***	0.30***	0.10*	0.00
			(0.06)	(0.06)	(0.06)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A31: Effects of winning by moving on neighbourhood & social outcomes (endline 1)

Outcome	N	Control mean	ITT Lottery	By Moving Decision: Moved	By Moving Decision: Stayed	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Subjective wellbeing (ladder)	1,426	4.28	-0.04	-0.16	0.06	0.53
			(0.14)	(0.30)	(0.13)	
Total number of social ties	1,414	11.37	-2.25***	-1.48**	-1.88***	0.56
			(0.45)	(0.71)	(0.70)	
Social ties in local neighbourhood	1,425	6.55	-2.56***	-2.89***	-2.32***	0.01
			(0.64)	(0.68)	(0.63)	
Can turn to neighbours for advice	1,426	1.80	-0.20**	-0.26**	-0.16	0.39
			(0.09)	(0.11)	(0.10)	
Felt lonely	1,375	1.52	-0.07	-0.09	-0.06	0.71
			(0.05)	(0.06)	(0.06)	
Needed help and couldn't find with friends	1,375	1.65	0.18***	0.17**	0.20***	0.74
			(0.06)	(0.07)	(0.07)	
Satisfied with social life in neighbourhood (1/0)	1,426	0.81	0.01	-0.04	0.04*	0.01
			(0.02)	(0.03)	(0.02)	
Satisfied with neighbours	1,426	3.30	-0.09**	-0.13***	-0.07	0.23
			(0.04)	(0.05)	(0.04)	
Beliefs: neighbours' contribution to pub. goods	1,311	-0.02	0.07	0.09	0.06	0.70
			(0.06)	(0.07)	(0.06)	
Arguments with neighbours	1,426	0.41	-0.12***	-0.17***	-0.09*	0.15
			(0.04)	(0.05)	(0.05)	
Household is a member of at least one iddir	1,426	0.55	0.13***	0.24***	0.04	0.00
			(0.02)	(0.03)	(0.03)	
Community meetings participation	1,426	0.37	0.11***	0.30***	-0.04	0.00
			(0.03)	(0.03)	(0.03)	
Respondent has leadership role in community	1,426	0.04	0.01	0.03**	-0.00	0.05
			(0.01)	(0.02)	(0.01)	
Index of public goods	1,426	-0.00	-0.23***	-0.38***	-0.11*	0.00
			(0.06)	(0.07)	(0.06)	
Clinic/hospital quality	1,426	3.24	-0.15***	-0.23***	-0.09**	0.00
			(0.04)	(0.04)	(0.04)	
Primary school quality	1,426	3.06	-0.06*	-0.11***	-0.02	0.01
			(0.03)	(0.04)	(0.03)	
Index of neigbhourhood amenities	1,358	0.02	-0.23***	-0.68***	0.12*	0.00
			(0.06)	(0.08)	(0.07)	
Neighbourhood has *less* smell of drains or sewerage	1,374	-0.01	0.10*	0.04	0.15**	0.16
			(0.06)	(0.07)	(0.07)	
Neighbourhood has working streetlights	1,426	0.40	-0.13***	-0.32***	0.01	0.00
			(0.03)	(0.03)	(0.03)	
Less debris/rubble lying around neighhbourhood	1,422	2.69	-0.29***	-0.66***	0.00	0.00
			(0.04)	(0.07)	(0.05)	
Condition of piping and sewerage system	1,362	-0.01	-0.04	-0.20**	0.09	0.00
			(0.06)	(0.08)	(0.07)	
Feels safe at night	1,370	5.72	0.02	0.04	0.02	0.64
			(0.04)	(0.05)	(0.05)	
Preference to stay	1,426	3.24	0.64***	1.18***	0.22**	0.00
			(0.08)	(0.08)	(0.09)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A32: Effects of winning by moving on neighbourhood & social outcomes (endline 2)

			ITT	By Moving Decision		
Outcome	N	Control mean	Lottery	Moved	Stayed	Equality pval
	(1)	(2)	(3)	(4)	(5)	(6)
Subjective wellbeing (ladder)	1,365	4.48	0.51***	0.66***	0.45**	0.21
			(0.16)	(0.20)	(0.20)	
Total number of social ties	1,358	4.99	-1.19*	-0.20	-0.63	0.56
			(0.64)	(1.05)	(1.08)	
Social ties in local neighbourhood	1,370	2.80	-0.54*	-0.64*	-0.44	0.57
			(0.32)	(0.34)	(0.39)	
Can turn to neighbours for advice	1,298	2.64	-0.03	-0.17	-0.21	0.81
			(0.06)	(0.18)	(0.17)	
Felt lonely	876	1.72	-0.39***	-0.42***	-0.34**	0.39
			(0.12)	(0.13)	(0.13)	
Needed help and couldn't find with friends	876	1.81	-0.46***	-0.48***	-0.43***	0.56
			(0.12)	(0.13)	(0.13)	
Satisfied with social life in general	1,370	3.31	0.08	0.13*	0.02	0.03
			(0.07)	(0.07)	(0.07)	
Satisfied with social life in neighbourhood	1,370	3.23	0.11	0.16**	0.06	0.05
			(0.07)	(0.07)	(0.07)	
Beliefs: neighbours' contribution to pub. goods (index)	803	0.02	-0.06	-0.12	0.12	0.12
			(0.12)	(0.18)	(0.19)	
Arguments with neighbours	838	2.27	-0.24***	-0.12	-0.16	0.67
			(0.06)	(0.13)	(0.14)	
Household is a member of at least one iddir	1,370	0.67	0.08**	0.14***	0.02	0.00
			(0.04)	(0.04)	(0.04)	
Community meetings participation	1,370	2.64	0.23***	0.48***	-0.02	0.00
			(0.08)	(0.09)	(0.09)	
Respondent has leadership role in community	1,370	0.02	-0.00	-0.00	-0.00	0.86
			(0.01)	(0.01)	(0.01)	
Index of public goods	1,370	0.03	-0.10	-0.05	-0.16*	0.09
			(0.09)	(0.09)	(0.09)	
Clinic/hospital quality	1,370	2.97	0.03	-0.01	0.07	0.03
			(0.05)	(0.05)	(0.05)	
Primary school quality	1,370	2.88	-0.03	-0.05	-0.01	0.30
			(0.05)	(0.06)	(0.06)	
Public space quality	1,370	2.97	0.09*	0.09*	0.10**	0.77
			(0.05)	(0.05)	(0.05)	
Index of neigbhourhood amenities	1,370	-0.06	0.19**	0.29***	0.10	0.01
			(0.09)	(0.09)	(0.09)	
Neighbourhood has *less* smell of drains or sewerage	1,370	-0.02	0.33***	0.45***	0.20**	0.00
			(0.09)	(0.10)	(0.10)	
Neighbourhood has working streetlights	1,370	0.24	-0.00	-0.03	0.03	0.23
			(0.03)	(0.06)	(0.06)	
Less debris/rubble lying around neighhbourhood	1,370	2.42	0.06	0.12*	0.01	0.02
			(0.06)	(0.06)	(0.07)	
Condition of piping and sewerage system	1,370	-0.03	0.17*	0.29***	0.04	0.00
			(0.09)	(0.10)	(0.10)	
Feels safe at night	1,370	5.54	0.21**	0.30***	0.13	0.02
			(0.09)	(0.09)	(0.10)	
Overall neighbourhood rating	1,370	5.33	0.39**	0.95***	-0.17	0.00
			(0.18)	(0.20)	(0.19)	
Proud of neighbourhood	1,370	3.77	0.24***	0.41***	0.07	0.00
			(0.09)	(0.10)	(0.10)	
Preference to stay	1,370	3.52	0.26**	0.54***	-0.03	0.00
			(0.11)	(0.11)	(0.12)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A33: Effects of winning the lottery and moving house on children's education outcomes. Endline 2

Outcome	Control mean	ITT	By Moving Decision		
		Lottery	Moved	Stayed	Equality pval
	(1)	(2)	(3)	(4)	(5)
Enrolled (all < 30)	0.656	-0.004	0.000	-0.009	0.66
		(0.020)	(0.022)	(0.022)	
Enrolled (all < 18)	0.958	-0.001	0.011	-0.012	0.18
		(0.017)	(0.018)	(0.020)	
Enrolled (primary age, < 15)	0.970	-0.006	0.009	-0.019	0.19
		(0.019)	(0.020)	(0.024)	
Enrolled in highschool or higher (all $15 - 19$)	0.613	0.053	0.038	0.071	0.56
		(0.057)	(0.063)	(0.064)	
Enrolled in tertiary (all $19 - 24$)	0.242	-0.006	-0.002	-0.010	0.90
		(0.055)	(0.061)	(0.064)	
Enrolled in University (all $19 - 24$)	0.203	-0.031	-0.009	-0.057	0.38
		(0.051)	(0.057)	(0.059)	
Completed highschool (all > 18)	0.703	0.019	0.043	-0.011	0.31
		(0.048)	(0.055)	(0.055)	
Completed degree (all > 24)	0.564	-0.076	-0.071	-0.083	0.90
		(0.090)	(0.101)	(0.103)	
Completed or enrolled in highschool (all > 14)	0.762	0.023	0.030	0.014	0.66
		(0.036)	(0.041)	(0.040)	
Grade in most recent year of school (all < 19)	79.368	1.477	1.984	0.907	0.44
		(1.166)	(1.307)	(1.409)	
Days absent from school in last 30 (all < 18)	0.928	-0.356*	-0.304	-0.407*	0.50
		(0.187)	(0.192)	(0.212)	
Aspires to tertiary education (all < 18)	0.906	0.024	0.030*	0.018	0.14
		(0.016)	(0.016)	(0.016)	
Confidently aspires to tertiary education (all < 18)	0.836	0.073**	0.088***	0.060*	0.26
		(0.029)	(0.031)	(0.032)	

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

Table A34: Effects of winning a late lottery very recently on children's education - Endline 2

Outcome	N	Control mean	ITT Estimate Lottery		Sharpened
			Coeff	Std. Err.	q-value
	(1)	(2)	(3)	(4)	(5)
Enrolled (all < 30)	1,898	0.676	-0.054**	0.024	0.122
Enrolled (all < 18)	1,025	0.978	-0.034*	0.018	0.177
Enrolled (primary age, < 15)	675	0.986	-0.012	0.015	0.655
Enrolled in highschool or higher (all $15 - 19$)	476	0.690	-0.061	0.075	0.655
Enrolled in tertiary (all $19 - 24$)	498	0.282	-0.128*	0.070	0.177
Enrolled in University (all $19 - 24$)	498	0.225	-0.179***	0.064	0.067
Completed highschool (all > 18)	665	0.753	-0.042	0.056	0.655
Completed degree (all > 24)	257	0.558	0.047	0.095	0.809
Completed or enrolled in highschool (all > 14)	1,141	0.822	-0.099**	0.040	0.086
Grade in most recent year of school (all < 19)	733	81.328	-0.273	1.473	0.925
Days absent from school in last 30 (all < 18)	993	0.635	-0.017	0.185	0.928
Aspires to tertiary education (all < 18)	1,025	0.989	-0.015	0.016	0.655
Confidently aspires to tertiary education (all < 18)	1,025	0.923	0.008	0.031	0.925

Note: This table shows the ITT estimates of winning the housing lottery side-by-side with heterogeneous effects for households that move into their units and those that stay (do not move). ITT results in Column 3 come from one regression, the decomposition in Columns 4-6 come from a separate regression, which uses Equation 3 to look at outcomes for mover and non-movers from the 10th round while controlling for a rich set of baseline covariates that predict whether households move in or not. Column 6 presents the p-value for a test of equality between the results in Column 4 and Column 5.

A4.6 Heterogeneous treatment effects by allocated site - First Endline

Table A35: Heterogeneous treatment effects by location of allocated site: household consumption and location (First Endline)

Outcome	N	CM	Differential effects by km from City Centre 0-4	6-12	16-2	25-30	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Housing quality index	1,525	-0.05	0.34***	0.46***	0.71***	0.58***	0.003
			(0.10)	(0.14)	(0.06)	(0.07)	
Distance from city centre	1,525	5.40	0.93*	3.40***	4.33***	4.84***	0.000
			(0.55)	(0.77)	(0.32)	(0.39)	
Transport expenditure	1,525	12.26	-1.18	0.53	4.10***	2.13*	0.003
			(1.50)	(2.08)	(0.87)	(1.06)	
Consumption (no housing & transport)	1,525	142.20	9.75	15.99	10.20	-9.26	0.031
			(9.74)	(13.28)	(5.57)	(6.75)	
Non-housing Asset index	1,450	0.06	-0.14	-0.05	-0.06	-0.11	0.840
			(0.11)	(0.15)	(0.06)	(0.08)	

Note: Each row represents a regression of the named outcome on which housing site the household was assigned to, with non-lottery winners as the omitted category, as in specification 4. Columns 3 to 6 show the ITT effect of winning a government house in the distance band indicated in the column header. Column 7 provides the p-value for a joint test of equality of the four site-specific coefficients in Columns 3 to 6.

Table A36: Heterogeneous treatment effects by location of allocated site: household labour supply (First Endline)

Outcome	N	CM	Differential effects by km from City Centre 0-4	6-12	16-2	25-30	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household labour market index	1,525	0.02	-0.17	0.01	0.04	-0.11	0.104
			(0.10)	(0.14)	(0.06)	(0.07)	
Earnings per working age adult	1,525	85.44	-27.37***	-3.24	6.41	-5.05	0.001
			(8.22)	(11.41)	(4.80)	(5.82)	
Total employed per working age adult	1,525	0.67	0.03	0.03	-0.01	-0.04	0.165
			(0.03)	(0.05)	(0.02)	(0.02)	
Hours worked per working age adult	1,525	29.40	-1.61	-0.61	-0.26	-2.13	0.513
			(1.74)	(2.41)	(1.02)	(1.23)	

Note: Each row represents a regression of the named outcome on which housing site the household was assigned to, with non-lottery winners as the omitted category, as in specification 4. Columns 3 to 6 show the ITT effect of winning a government house in the distance band indicated in the column header. Column 7 provides the p-value for a joint test of equality of the four site-specific coefficients in Columns 3 to 6.

Table A37: Heterogeneous treatment effects by location of allocated site: household social and neighbourhood outcomes (First Endline)

Outcome	N	CM	Differential effects by km from City Centre 0-4	6-12	16-2	25-30	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Subjective wellbeing (ladder)	1,525	4.28	0.56	0.68	-0.01	-0.21	0.257
			(0.42)	(0.59)	(0.25)	(0.30)	
Total number of social ties	1,525	11.37	-3.27***	-1.39	-2.38***	-2.17***	0.484
			(0.83)	(1.15)	(0.48)	(0.58)	
Satisfied with social life in neighbourhood	1,525	0.81	0.02	-0.00	0.03	0.01	0.839
			(0.04)	(0.06)	(0.02)	(0.03)	
Satisfied with neighbours	1,525	3.30	0.07	-0.04	-0.08*	-0.13**	0.087
			(0.07)	(0.09)	(0.04)	(0.05)	
Arguments with neighbours	1,525	0.41	-0.07	0.03	-0.12**	-0.18***	0.339
			(0.08)	(0.12)	(0.05)	(0.06)	
Household is a member of at least one iddir	1,525	0.55	-0.15***	0.14**	0.14***	0.11***	0.000
			(0.05)	(0.07)	(0.03)	(0.03)	
Index of public goods	1,525	-0.00	-0.12	-0.27*	-0.34***	-0.08	0.004
			(0.10)	(0.14)	(0.06)	(0.07)	
Index of neigbhourhood amenities	1,525	0.01	0.04	-0.26	-0.29***	-0.15	0.015
			(0.10)	(0.16)	(0.07)	(0.08)	
Index of crime and security	1,525	-0.03	0.33***	0.20	-0.03	0.20***	0.000
			(0.10)	(0.14)	(0.06)	(0.07)	

Note: Each row represents a regression of the named outcome on which housing site the household was assigned to, with non-lottery winners as the omitted category, as in specification 4. Columns 3 to 6 show the ITT effect of winning a government house in the distance band indicated in the column header. Column 7 provides the p-value for a joint test of equality of the four site-specific coefficients in Columns 3 to 6.

A4.7 Heterogeneous treatment effects by allocated site - Second Endline

Table A38: Heterogeneous treatment effects by location of allocated site: household consumption and location (Second Endline)

Outcome	N	CM	Differential effects by km from City Centre 0-4	6-12	16-2	25-30	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Housing quality index	1,597	0.29	0.63***	0.64***	0.67***	0.66***	0.980
			(0.12)	(0.13)	(0.09)	(0.10)	
Distance from city centre	1,597	6.07	0.97*	2.67***	3.84***	5.99***	0.000
			(0.50)	(0.57)	(0.41)	(0.45)	
Transport expenditure	1,597	14.95	-0.77	1.46	3.96**	1.82	0.076
			(2.20)	(2.52)	(1.80)	(1.98)	
Consumption (no housing & transport)	1,597	143.20	40.19***	42.01***	10.24	6.63	0.001
			(11.84)	(13.31)	(9.39)	(10.37)	
Non-housing Asset index	1,597	-0.02	0.00	0.10**	0.04	-0.01	0.009
			(0.03)	(0.04)	(0.03)	(0.03)	

Note: Each row represents a regression of the named outcome on which housing site the household was assigned to, with non-lottery winners as the omitted category, as in specification 4. Columns 3 to 6 show the ITT effect of winning a government house in the distance band indicated in the column header. Column 7 provides the p-value for a joint test of equality of the four site-specific coefficients in Columns 3 to 6.

Table A39: Heterogeneous treatment effects by location of allocated site: household labour supply (Second Endline)

Outcome	N	CM	Differential effects by km from City Centre 0-4	6-12	16-2	25-30	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household labour market index	1,597	-0.02	-0.17	-0.07	0.04	-0.12	0.086
			(0.11)	(0.13)	(0.09)	(0.10)	
Earnings per working age adult	1,597	69.43	-14.97*	12.23	7.74	4.92	0.004
			(8.13)	(9.31)	(6.64)	(7.33)	
Total employed per working age adult	1,597	0.50	-0.03	-0.09*	-0.00	-0.09**	0.018
			(0.04)	(0.05)	(0.03)	(0.04)	
Hours worked per working age adult	1,597	24.02	-2.60	-4.05	-0.50	-4.06*	0.096
			(2.17)	(2.49)	(1.77)	(1.96)	

Note: Each row represents a regression of the named outcome on which housing site the household was assigned to, with non-lottery winners as the omitted category, as in specification 4. Columns 3 to 6 show the ITT effect of winning a government house in the distance band indicated in the column header. Column 7 provides the p-value for a joint test of equality of the four site-specific coefficients in Columns 3 to 6.

Table A40: Heterogeneous treatment effects by location of allocated site: household social and neighbourhood outcomes (Second Endline)

Outcome	N	CM	Differential effects by km from City Centre 0-4	6-12	16-2	25-30	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Subjective wellbeing (ladder)	1,597	4.48	-0.06	-0.10	0.86***	0.03	0.000
			(0.19)	(0.22)	(0.16)	(0.17)	
Total number of social ties	1,597	4.99	-3.38***	-1.09	-2.53***	1.65***	0.000
			(0.64)	(0.74)	(0.53)	(0.58)	
Satisfied with social life in general	1,597	3.31	0.02	-0.15	0.06	0.08	0.025
			(0.08)	(0.09)	(0.07)	(0.07)	
Satisfied with social life in neighbourhood	1,597	3.23	0.01	0.03	0.12	0.10	0.263
			(0.09)	(0.09)	(0.07)	(0.08)	
Arguments with neighbours	1,040	2.27	-0.15**	0.34***	-0.23***	-0.25***	0.000
			(0.07)	(0.08)	(0.06)	(0.07)	
Household is a member of at least one iddir	1,597	0.67	0.04	0.16***	0.09*	0.04	0.089
			(0.05)	(0.06)	(0.04)	(0.04)	
Index of public goods	1,597	0.03	0.20*	0.44***	-0.08	-0.18*	0.000
			(0.11)	(0.14)	(0.09)	(0.09)	
Index of neigbhourhood amenities	1,597	-0.06	0.22**	0.11	0.16	0.17	0.805
			(0.11)	(0.12)	(0.09)	(0.10)	
Index of crime and security	1,040	0.17	0.11	0.08	0.26*	0.14	0.473
			(0.16)	(0.18)	(0.13)	(0.15)	
Overall neighbourhood rating	1,597	5.33	0.15	-0.33	0.54***	0.13	0.001
			(0.23)	(0.25)	(0.20)	(0.21)	
Proud of neighbourhood	1,597	3.77	0.11	-0.27**	0.25**	0.30***	0.000
			(0.11)	(0.11)	(0.09)	(0.10)	

Note: Each row represents a regression of the named outcome on which housing site the household was assigned to, with non-lottery winners as the omitted category, as in specification 4. Columns 3 to 6 show the ITT effect of winning a government house in the distance band indicated in the column header. Column 7 provides the p-value for a joint test of equality of the four site-specific coefficients in Columns 3 to 6.

Table A41: Heterogeneous treatment effects by location of allocated site: housing quality outcomes (Second Endline)

Outcome	N	CM	Differential effects by km from City Centre 0-4	6-12	16-2	25-30	pval
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Housing quality index	1,597	0.29	0.62***	0.63***	0.66***	0.66***	0.978
			(0.12)	(0.13)	(0.09)	(0.10)	
Formal wall	1,370	0.44	0.29***	0.15	0.21***	0.24***	0.625
			(0.10)	(0.11)	(0.05)	(0.05)	
Formal floor	1,370	0.89	0.03	0.07	0.09***	0.06	0.439
			(0.06)	(0.07)	(0.03)	(0.03)	
Private formal water source	1,370	0.70	0.08	0.12	0.04	0.05	0.833
			(0.09)	(0.09)	(0.04)	(0.04)	
Improved toilet (shared $<$ 5 others)	1,370	0.50	0.45***	0.18*	0.25***	0.20***	0.069
			(0.10)	(0.11)	(0.05)	(0.05)	
Cooks with electricity	1,370	0.88	0.08	0.08	0.08***	0.00	0.008
			(0.06)	(0.06)	(0.03)	(0.03)	
Cooks indoors	1,370	0.55	0.02	0.01	0.03	0.04*	0.868
			(0.04)	(0.04)	(0.02)	(0.02)	
Number of people per room	1,298	4.19	-0.15	0.11	-0.64***	-0.52**	0.204
			(0.42)	(0.44)	(0.19)	(0.21)	

Note: Each row represents a regression of the named outcome on which housing site the household was assigned to, with non-lottery winners as the omitted category, as in specification 4. Columns 3 to 6 show the ITT effect of winning a government house in the distance band indicated in the column header. Column 7 provides the p-value for a joint test of equality of the four site-specific coefficients in Columns 3 to 6.

A4.8 Robustness: Second endline results using Rounds 10, 11, and 12 as treatment

Table A42: Effects of winning the lottery and moving house on consumption, housing, and location using alternative definition of treatment (Endline 2)

Outcome	N (1)	Control mean (2)	ITT Lottery (3)
Housing quality index	1,370	0.000	0.647***
			(0.084)
Distance from city centre	1,370	6.441	3.663***
			(0.276)
Transport expenditure	1,370	14.440	2.174
			(1.883)
Consumption (no housing & transport)	1,370	137.497	9.722
			(8.544)
Non-housing Asset index	1,370	-0.039	0.025
			(0.028)
Housing amenities index	876	-0.357	0.473***
			(0.125)

Note: This table shows the robustness of the ITT results to redefining the treatment variable (Won Housing Lottery) to include households who had won previous subsequent lotteries (11 and 12, as well as 10). The results presented are estimated using specification 1.

Table A43: Effects of winning the lottery and moving house on individual labour supply using alternative definition of treatment (Endline 2)

Outcome	N	Control mean	ITT Estimate Lottery Coeff	Std. Err.	Sharpened q-value
	(1)	(2)	(3)	(4)	(5)
Did any work in the last 7 days	3,493	0.435	-0.027	0.026	0.647
Wage-employed work in the last 7 days	3,493	0.340	-0.044*	0.025	0.563
Self-employed work in the last 7 days	3,493	0.095	0.017	0.017	0.647
Total earnings in the last month	3,493	59.420	2.333	5.452	0.813
Individual hours worked in the last 7 days	3,493	20.727	-1.260	1.327	0.647
Permanent work	3,493	0.250	-0.038	0.024	0.563
White-collar work	3,493	0.154	-0.005	0.018	0.883
Permament white-collar work	3,493	0.259	-0.037	0.025	0.563
Switched between self/wage employment	1,220	0.266	0.066	0.048	0.584
Switched occupations	775	0.520	-0.009	0.060	0.883
Works in areas near housing sites	3,493	0.044	0.008	0.012	0.739
Works close to home	3,493	0.049	-0.014	0.013	0.647
Works in own home	3,493	0.010	-0.001	0.005	0.883
Commute time (cond)	978	40.732	6.828*	4.001	0.563
Commute cost (cond)	1,735	5.880	-1.285	1.771	0.739
Takes a minibus to work	3,493	0.071	-0.007	0.016	0.813
Walks to work	3,493	0.053	-0.009	0.014	0.739

Note: This table shows the robustness of the ITT results to redefining the treatment variable (Won Housing Lottery) to include households who had won previous subsequent lotteries (11 and 12, as well as 10). The results presented are estimated using specification 1.

Table A44: Effects of winning the lottery and moving house on children's education using altnerative definition of treatment (Endline 2)

Outcome	N	Control mean	ITT Estimate Lottery Coeff	Std. Err.	Sharpened q-value
	(1)	(2)	(3)	(4)	(5)
Enrolled (all < 30)	2,055	0.655	-0.043*	0.025	0.265
Enrolled (all < 18)	1,182	0.957	-0.039**	0.019	0.265
Enrolled (primary age, < 15)	915	0.969	-0.051**	0.020	0.162
Enrolled in highschool or higher (all $15 - 19$)	476	0.617	0.030	0.074	0.811
Enrolled in tertiary (all $19 - 24$)	498	0.244	-0.077	0.075	0.561
Enrolled in University (all $19 - 24$)	498	0.204	-0.130*	0.073	0.265
Completed highschool (all > 18)	755	0.709	0.014	0.062	0.869
Completed degree (all > 24)	257	0.574	0.017	0.099	0.869
Completed or enrolled in highschool (all > 14)	1,141	0.768	-0.023	0.047	0.807
Grade in most recent year of school (all < 19)	734	79.425	1.350	1.602	0.650
Days absent from school in last 30 (all < 18)	1,067	0.941	-0.349	0.240	0.356
Aspires to tertiary education (all < 18)	1,182	0.908	0.010	0.015	0.722
Confidently aspires to tertiary education (all < 18)	1,182	0.837	0.051	0.036	0.356

Note: This table shows the robustness of the ITT results to redefining the treatment variable (Won Housing Lottery) to include households who had won previous subsequent lotteries (11 and 12, as well as 10). The results presented are estimated using specification 1.