Changing Residential Mobility Considerations:
The Case of Public Housing in Israel[1]

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תמורות בשיקולים להחלפת מקום המגורים:
המקרה של מכירת דירות השיכון הציבורי בישראל

תמר רמות-ניסקה

תקציר

לסביבת המגורים יש חשיבות כלכלית עבור משקי בית ויחידים, מפני ששירותים מקומיים בסביבת
המגורים והמאפיינים החברתיים-כלכליים שלה משפיעים על הזדמנויות חברתיות וכלכליות
במהלך החיים. מדיניות בשוק הדיור עשויה לשנות את מערך השיקולים למעברי דירות, ותוצאה
אפשרית שלה היא פגיעה ביעילותו של שוק זה. למשל, משקי הבית עשויים להישאר באותה סביבת
מגורים, למרות שסביבת מגורים אחרת עשויה להיות טובה יותר עבורם, או להתגורר בדירה שאינה
תואמת את מאפייניהם, בכפוף לתמריץ כלכלי להישאר בדירת מגוריהם (lock-in effect). המחקר
הנוכחי מספק ממצאים לגבי נטייתם של משקי בית לעבור דירה כאשר משתנים התמריצים
הכלכליים, ועושה זאת באמצעות שימוש ב״ניסוי טבעי״ – מכירת דירות השיכון הציבורי לדייריהן.
רכישת דירה בהנחה על ידי משקי הבית שהתגוררו בה נמצאה כאירוע שמעלה את הסתברותם
לעבור מאותה הדירה (באמצעות מכירתה במחיר השוק לאחר שנרכשה בהנחה). מרבית משקי הבית
שאכן עברו, עשו זאת בתוך ישוב המגורים, וחלק קטן מהם עברו לשכונות בדירוג חברתי-כלכלי
גבוה יותר. ההסתברות לעבור דירה נמצאה גבוהה יותר עבור משקי הבית שגרו בדירות שמאפייניהן
הפיזיים נחותים ועבור משקי בית צעירים, להם אופק זמן ממושך יותר במקום המגורים החדש.
זירת המדיניות הייחודית בישראל והמידע המינהלי העשיר, מאפשרים יחדיו לבצע ניתוח מעמיק
לבחינת השפעות המדיניות על המוביליות הגיאוגרפית של דיירי השיכון הציבורי, וללמוד מכך גם
בנוגע להשפעת המדיניות על מסגרות אחרות של סיוע בדיור.

Changing Residential Mobility Considerations: The Case of Public Housing in Israel

Tamar Ramot-Nyska

Abstract

Residential location is economically important for households. It provides them access to local services, as well as to social and economic elements that influence their economic opportunities during their lifetime. Housing policies may create barriers for residential mobility that may create market inefficiencies such as lock-in effects or price distortions. This paper provides evidence on the effect of changing the incentives for residential mobility, using a natural experiment of public housing privatization in Israel. Buying an apartment at a discount was found to increase households' probability to move. Most movers turned to other neighborhoods within their residential locality, while a small portion left to higher opportunity neighborhoods. Moving probability was greater from properties of lower physical quality, and was higher for young buyers, expecting a longer duration at the new location. The unique policy setting and the rich administrative data allow deeper analysis compared to previous studies that sheds light on the potential effects of residential mobility disincentives existing in other affordable housing settings.

JEL Codes: R23, R28, H41.

1   Introduction

The dwelling and its surroundings provide the most immediate shelter, and form the basis for the provision of local services, the creation of social connections and engagement in local and regional economic activity. The dwelling's surroundings provides the closest environment for important neighborhood amenities such as schools, health services and transportation. Recent findings support the causal contribution of the neighborhood qualities to children's lifetime opportunities and emphasize the importance of exposure duration for the effect (Chetty et al., 2018).

Residential mobility enables households to optimize location with their changing preferences or needs due to life circumstances. It allows households to adapt their housing expenditures, and the physical attributes, location and surroundings of their dwellings to their needs and preferences. Other important considerations are financial or idiosyncratic attachment to specific places, e.g., the willingness to live close to family members. Residential mobility patterns vary by key life-course events such as marriage, divorce and job change. Another source of variation is the housing tenure type: owners tend to be less mobile than renters, while among renters, those in public or other subsidized rental settings are on average less mobile than the private market renters (Causa and Pichelmann, 2020). For instance, in Israel, according to the 2008 census, slightly less than three quarters of homeowners remained at the same address over a course of 5 years, in comparison to about one-fifth of private-market renters. Public housing tenants' residential mobility was similar to that of owners (Table 1 in this paper).

Generating residential stability is inherent to the design of public housing solutions because the supply of such units is limited and inelastic. Low income unassited households often suffer from frequent housing changes due to liquidity constraints. Therefore the inherent stability of social housing settings increases households' social security (Collinson et al., 2015).[1] Over time, mobility constraints embedded in housing assistance arrangements may prevent assisted households from optimizing their residential location. As the supply of such dwellings is limited, moving from unit-based housing assistance arrangements could lead to the loss of valuable subsidies.

Numerous countries, including the UK and Israel, operate rent-to-buy public housing

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[1]Insecurity with regard to housing consumption, including the place of residence, are hypothesized to have a disruptive effect on various aspects of life, including high stress levels among adults and children, imparing children's ability to create sustainable social connections that may be important for their immediate and long-term outcomes (Hanushek et al., 2004), increasing the risk of dropping out of high school (South et al., 2007) and potentially imparing adults' job searches and ability to maintain commitments in the labor market.

privitization programs, which enable public housing tenants to buy their tenancy units. This study examines the effect of such a program in Israel on the residential mobility of recent homebuyers. In the Israeli case, the sale was associated with large discounts on apartments' price. This paper analyzes residential mobility patterns, including "moving up" to better surroundings, and analyzes the role of the discount amount as a mechanism behind residential mobility. These questions are important for policy makers, as many countries operate housing affordability programs, while their effect on missallocation of households across locations and their housing market distortions are unclear.

Residential mobility is not an economic target *per-se*, but it contributes to housing market dynamics, which is essential in the matching process between households and housing units.[2] Additionally, residential mobility may create opportunities, which can be meaningful for the household members. Bilal and Rossi-Hansberg (2021) suggest considering residential location as an investment in future opportunites. Constrained agents borrow, i.e. transfer resources from the future to the present, by moving to lower rent neighborhoods, which usually offer lower future opportunities as payoff. Less constrained individuals invest, by paying a higher rent in the present in higher opportunity neighborhoods, hoping to receive a positive return in the future.

At the macroeconomic level, residential mobility may improve the allocation of existing housing supply among household types, e.g., by better matching households to units according to their size. Despite the potential benefits, several factors may decrease the incidence of residential mobility. The first is information asymmetries concerning the potential benefits from moving, causing households to not be aware of the potential contributions of such opportunities. Low residential mobility can also be caused by households' inability to rationally consider the trade-offs between housing costs and the qualities that different housing arrangements offer. The limited ability to engage in beneficial residential mobility can also be a result of income or credit constraints vis-a-vis the high moving costs and housing expenditures. Another reason for low residential mobility may be housing market policies that might limit the scope of options available to households, due to market segmentation by subsidized options.

During the first decade of the millenium, about a third of the Israeli public housing stock was sold to current tenants at a discounted price, while frequently exogenously changing rules set discounts on apartments' prices relative to their market price. Households that did not utilize their right to buy an apartment could remain in the same unit

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[2]Han et al. (2022), for example, evaluated the welfare effect created by higher transaction taxes. Higher taxes lower the residential mobility of owners, which worsens match quality between the households and their housing units.

and keep paying below-market-level rents in most cases. For those who became owners, the economic environment for residential mobility has changed dramatically yet gradually. During the first five years following the purchase, buyers willing to move were allowed to rent out the apartments or sell them only if buying more expensive ones instead. Anyway, selling an apartment within the first five years required permission from the authorities. According to public authorities' records, requests for such permission were rare,[3] implying that most buyers either stayed in place or rented out their recently bought apartments and moved elsewhere as private market renters.[4]

Once five years had passed from the puchase date, administrative mobility restrictions were removed and the households could sell the apartments for their unregulated market price, with no additional restrictions. Since public housing sales involved high discounts on apartments' market price, the act of buying an apartment included a substantial wealth transfer from the government, which could be realized to the market value five years after the transaction was originally made. Using highly detailed tenant-and-apartment-level administrative data, I track residential moves of the buyers and the nonbuyers. This is done in order to study the effect of the gradual removal of residential mobility disincentives, as well as the discount amount effect on household mobility patterns.

The analysis concentrates on a subgroup of the buyers who bought an apartment during the period 2005-2008, a period during which many apartments were sold through *Kan Beiti* ("This is my Home"), one of the subsidized sale events that took place in Israel, and a subsample of nonbuyers. To control for unobserved differences between the buyers and the nonbuyers over time, a difference-in-differences approach is used. Unsurprisingly, before treatment, buyers and nonbuyers' residential mobility patterns were quite similar. After the treatment (buying) occurs, residential mobility patterns diverge and develop gradually. Those of the buyers become significantly higher 4-5 years after purchase, while those of nonbuyers continue along the previous trend.

Residential mobility is examined in several dimensions. The first is by studying the effect in three different mobility measures: moving to another locality, moving to another neighborhood, or moving to a neighborhood with higher socioeconomic status (SES). The second is by examining two separate age groups: young and old. Because young households have a longer horizon for their potential social and economic gains from residential mobility, mobility tends to be negatively correlated with age (Causa and Pichelmann, 2020).

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[3]As documented in the author's correspondence with the largest public housing firm.
[4]Homeowners in Israel are not eligible for any sort of publicly financed housing assistance.

The results imply that removing residential mobility constraints, when they involve a meaningful wealth transfer, induces the expected mobility effect, as expressed by the various mobility measures. Robustness tests that compare mobility patterns of those who bought early with those who bought later suggest that the estimated differences represent the effect of policy: The mobility dynamics match the requirement to remain in place in the first years after treatment and move freely later. Among buyers, residential relocation appeared to be affected by having current lower quality housing and having a longer scope to enjoy the new location, but less realted to the nominal value of discounts. The aforementioned comparison of mobility patterns between early and late buyers also helps to deal with the potential simultaneity of the decision to buy an apartment and moving. By comparing two groups of buyers, the effect of home ownership on residential mobility is offset, so the effect measured is that of the timing at which the market value of apartments can be used to move up the housing ladder.

Previously implemented policies provided a fertile ground to analyze the economic effects of housing market regulations on residential mobility, both empirically and theoretically. Numerous studies concentrate on the effects of rent control regulations, a classic example for rationing housing units below market-level rent. Some of them found that rent control disincentivizes residential mobility and creates housing market inefficiencies, such as a lock-in effect (Gyourko and Linneman (1989), Glaeser and Luttmer (2003), Diamond et al. (2019)). Higher transaction taxes were also found to create housing market inefficiencies, including lower residential mobility. Han et al. (2022) find that increase in transaction taxes imposed in Toronto, Canada, lowered the residential mobility of homeowners (vs. private market renters). This was explained by the higher taxes that make moving less affordable because owners are required to pay the tax upon each move, making owners more tolerant to match quality with their current dwelling.

Another study on administratively allocated housing in China (Wang, 2011) points to the inefficiencient allocation of housing qualities among tenants, using the privatization of these units for the econometric identification. Other studies show that public housing privatization in Sweden and the economic windfall they provided drove buyers to increase their housing mobility (Karadja, 2016) with potential socioeconomic mobility resulting from moving to a better socioeconomic environment (Sodini et al., 2021).

This study adds to the empirical evidence on the effect of housing market policies on households' residential mobility and mostly to the few studies among them concentrating on public housing policies. Contrary to the aforementioned reforms in China and Sweden, where households had no limitations on residential mobility right after privatization, the

households that had bought public units in Israel had to wait five years until they could use their increased financial liquidity freely, even to obtain other housing arrangements.

The time passed until the limitations from moving had been removed may have had an important effect on households' ability to trade their assets, especially in an environment of rising housing prices. In addition, the 5-year waiting period makes it less likely that willingness to move had a first-order effect on buying. The evidence from the current research suggests that the discount mechanism increased the incentives (and probably also the ability) for residential mobility, because it released households' liquidity constraint. However, we find no correlation between the value of the discount and the incidence of residential mobility. Mobility change was most significant for buyers living in lower quality public-housing units, e.g. smaller and older apartments and those located in low SES neighborhoods.

The gradual removal of residential mobility restrictions enables better seperation between the effects of liquidity constraints and institutional disincentives on residential mobility. These important policy aspects had not been previousely studied. Another advantage of this study is that it better represents the low-income population, as the program had a wide geographic scope and included, in general, all public housing tenants, of all ages, employment statuses and family types. In the Chinese case (Wang (2011)) the mobility patterns are only measured for public sector employees, potentially creating a downward bias in the probability of moving. The Swedish case (Sodini et al. (2021) and Karadja (2016)) could have low external validity for different types of localities, as the studies relate to Stockholm, the capital, only. Additionally, in the Swedish studies, the privatization decision was a collective decision, which indicates community greater strength to organize in order to utilize an economic opportunity. This may be correlated with a greater willingness to take advantage of the economic gains from buying, including moving. On the other hand, a greater ability to take collective action may indicate tighter social connection between residents of the same project, which may downward bias the estimated probability to move.

The rest of this paper is organized as follows: Section 2 discusses the theoretical background for the anticipated effect of public housing policy constraints, and later their release, on geographic mobility, and reviews the relevant literature. Section 3 describes the methodology used for the analysis of residential mobility induced by the privatization of public housing in Israel. Section 4 describes the data used. Section 5 presents the results, including robusetness tests, and discusses potential mechanisms. Section 6 offers concluding remarks.

2 The Institutional Setting and Literature Review

2.1 Residential Mobility Limitations and Disincentives in the Israeli Public Housing System

Several fundamental characteristics of public housing rents and tenancy conditions frame residential mobility (dis)incentives before the purchase decision is taken and in the years that follow. The dynamics of these (dis)incentives, relative to the timing of housing transaction, are described below.

Prepurchase period

Residential mobility of public housing tenants is expected to be low relative to other housing arrangements (mainly ownership and private rent), as the ability to move between public housing apartments is limited, and the financial incentives to remain in public housing tenancy are high. The latter is due to two reasons: (1) the high rent subsidies that keep the price secure vs. market fluctuations and (2) the possibility that tenants may become owners at some stage, with a price discount that depends on the tenancy period. There is no time limit for public housing tenancy in Israel, and rents are highly subsidized. A study by the Bank of Israel (2019) found that the rents paid by public housing tenants are much lower than market level rents.[5] This is in part related to the fact that public housing stock is old and probably of bad quality relative to private market alternatives, but it is also partly because the assessed market rents considered in determining public housing rents are outdated and based on old appraisals. Additionally, public housing tenants have no alternative support schemes that provides subsidized rents at the same scale. This is true even when compared to the private market rental assistance scheme, which offers much lower subsidies.

Residential mobility for public housing tenants is also expected to be low due to institutional limitations when requesting a change of public housing unit, and the risk of losing an existing public housing rent subsidy. The number of non occupied public housing units is small, making the possibility to move within the existing stock limited. For certain reasons, public housing tenants may request to change their dwelling for a different unit

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[5]In 2013, public housing rents equaled between a quarter and a half of the average market rent level for 2.5-3 room apartments in the district (not adjusted for units' qualities). These figures probably over-estimate the gap between the market level rent and public housing rents, since public housing rents should be compared to those of same-quality housing units. Unfortunately, with the existing data, such a comparison is impossible.

in stock, and if such a unit does not exist, the Ministry of Housing is obligated to buy one. This may be timely, but also rare, as the reasons allowing a change of apartment include deteriorating health conditions, such as physical problems that require the use of an elevator. Other acceptable reasons to request a change of unit are over-crowdedness or separation of spouses.[6]

Public tenants are required to leave their public housing units only when they breach very basic eligibility conditions, such as if they become owners of another apartment or use the apartment for non residential purposes. When a public housing tenant moves to a new unit in stock, the rent which he pays may be updated, but this is also done under specific limitations to avoid high rent increases.[7]

The low residential mobility due to institutional constraints was recently documented in the State Comptroller's report. The report records that in the year 2019, over 20% of the families on the public housing waiting list (1,000 families out of 4,700) were existing tenants waiting for an apartment replacement due to medical reasons or over-crowdedness. On the other hand, the same report states that public housing tenants often live in low residential crowdedness due to a decrease in family size over the course of the residency period (Office of the State Comptroller and Ombudsman, 2019), meaning that re-allocation of public housing stock between existing tenants is also limited in scope.

Postpurchase period

Buying a public housing unit makes residential mobility more tangible. Yet financial incetives to move change gradually. The value of the discount granted on the apartment's market price is defined a *conditioned grant.* Accordingly, resale of the apartment during a period of 5 years is limited to a situation where a different apartment of greater value is bought in its stead. Otherwise, the grant must be returned to the authorities. This detail was provided in Ministry of Housing memos concerning transaction guidlines, which were meant to become clear among potential buyers. To make sure that households meet this requirement, the apartment's ownership rights are registered under the name of public housing firm at the time of purchase, in addition to that of the new homeowner, in a way that the latter cannot resell the apartment or change its ownership without public

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[6]Taken from The ministry of housing booklet on rights' essence for public housing tenants and rental assistance receivers.

[7]The information in this section is based on the "Kol Zchut" (all rights) website, which gathers information about rights and entitlements in Israel, supported by the Ministry of Justice, the National Digitization Project and JDC Israel. Access date: July 5th, 2020.

housing authorities being made aware of it.[8] Following the 5-year resale restriction period, purchasing households may sell the apartment for its market price with no additional resrtictions.

2.2 Literature Review

Residential mobility is economically important for two reasons. First, the place of residence, which can be changed through residential mobility, offers a variety of local services, social interactions and accesibility to the labor market, which influence the economic opportunities people have and the choices they make. Second, since residential mobility is influenced by housing costs, regulations that influence those costs may affect housing allocation and influence the intensity of residential mobility, which, in turn, can affect the efficiency of housing markets. The literature review relates to both of these issues.

The place of residence has various consequences for life opportunities, while its immediate implications are felt on everyday quality of life. People spend much time in their residence and its surroundings, consume local services, and make local connections. The benefits from the residential environment are expressed in immediate satisfaction with local services and social networks that are both socially and economically valuable. The residential location also affects housing expenditure, which is in most cases the largest ongoing expenditure households have.

In a recent paper, Bilal and Rossi-Hansberg (2021) interpert the residential location decision as an asset investment decision that relates both to renters and owners, an interpretation which gets empirical support based on French data. Agents can buy more of the asset (move to a more expensive location today that creates better opportunities for the future) or sell (move to a cheaper location with less future opportunities - i.e. transferring resources from the future to the present). The future payoff is better jobs or better opportunity prospects for the individual and her children. By borrowing on their location asset, agents adjust to income shocks - an adjustment common especially for those facing income constraints. Büchel et al. (2020) show that moving not only creates valuable connections, but it is also induced by such. Valuable social networks reduce information frictions concerning the housing market and local amenities, and pull people to move to specific locations.

As for the benefits from moving, a growing body of short and long-term evidence is

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[8]A letter from *Amidar* state that apartments resales within the restriction period (5 years) are very few.

concerned with the benefits of moving to a less poor environment, often with higher rents, for children from low income families. Children moving to "opportunity neighborhoods" at a young age were found to have better educational achievements and higher incomes upon adulthood, while the size of the effect is proportional to the duration of exposure (Chetty et al. (2016); Chetty and Hendren (2018)). Better socioeconomic outcomes were also found for children leaving high poverty public housing settings and moving to voucher supported rental housing in better-ranked neighborhoods (Chyn, 2018). Earlier studies indicated that adults also benefitted from moving to better residential environments as these improved their mental and physical health and their subjective well-being (Katz et al. (2001); Kling et al. (2007); Ludwig et al. (2013)).

Housing market regulations affect residential mobility patterns directly through housing costs, and indirectly through their effect on housing tenures, which influence overall residential mobility patterns. Rent control regulations are additional housing market interventions that keep the rents of existing tenants below the market level. These were found to create substantial inefficiencies in the allocation of the right to enjoy reduced rents and also to distort ownership attainment, residential mobility patterns, and housing durations (Glaeser and Luttmer (2003); Gyourko and Linneman (1989)). Autor et al. (2014) found that the end of rent control in Boston, MA in 1995 created immediate price increases for both never-controlled and decontrolled units, and additionally created turnover of residents in the decontrolled units.

Diamond et al. (2019) find two contradictive powers: Rent control increases the probability of staying in place by about 20% over a period of 5-10 years and prevents the displacement of minorities from the city. In the long run, landlords affected by rent control substitute their investment to nonregulated housing, reducing the supply of rental housing and transferring to less affordable housing supply. In this way, rent control eventually contributed to gentrification in San Francisco. Han et al. (2022) found that imposing a higher housing tax in Toronto, Canada, reduced homeowners' residential mobility and caused lower match quality between homeowners and their dwellings due to the "Lock-in" effect of the tax.

Housing supply regulations also influence the affordability of alternative housing options. These were found to affect the returns from moving and therefore the volume of moves to certain places. Ganong and Shoag (2017) find that housing supply regulations contribute to "skill-sorting", which reduces residential mobility of the low skilled from low to high-income places, while increasing lower-skilled emigration from the high skilled place. On the other hand, high-skilled migrants find greater return from moving to high-

income locations and are hence more mobile. These patterns were observed in the USA since the 1980s, and explain therefore the reduced income convergence rate between these places. Hsieh and Moretti (2019) find that the negative macroeconomic effect of the low mobility patterns to high productivity and high cost areas is substantial.

Several studies investigate the effect of privitizing publicly owned housing on residential mobility. Sodini et al. (2021) study the effect of large scale privatization of municipally-owned units in Stockholm, Sweden. Home ownership in this setting was found to strongly promote upward residential mobility, especially among young buyers.[9] Young homeowners are 4.7 percentage points more likely to move in a four-year period than otherwise similar renters, meaning that their residential mobility is 50% higher. Young new homeowners are also 4.4 percentage points more likely to move to a better neighborhood, where real estate is more expensive and disposable income is higher. Karadja (2016) studies the effect of the same set of municipal housing privatization data in Stockholm, Sweden, on buyers' residential and workplace mobility. The effect of privatization on residential mobility is estimated at about 2.6-4 percentage points. No effect was found, though, on workers' mobility between workplaces.

The relationships between public housing, housing missallocation and residential mobility were also identified through public housing privatization in China. Wang (2011) studies a large-scale reform in China, in which the state sold housing units previously supplied at a subsidized rent to state employees. This caused households to increase their housing consumption, which was reflected in increased residential mobility and in greater renovations and improvements of existing units. Residential mobility following the privatization process is a reaction to the misallocation of properties before the privatization. A doubling of the pre-reform housing misallocation level corresponds with an average 9.2% increase in the probability of residential mobility post-reform. The privatization increased both the supply and the demand of housing units in the private market, and the author finds that it caused prices to increase in the always private market, which was positively correlated with the level of misallocation of housing prior to the reform. Moreover, the same reform encouraged taking credit and seperated labor market status from housing decisions - which increased workers' mobility, pointing to the interaction between policies that create distortions in housing, labor and credit markets.

Residential mobility in Israel was mostly studied in the context of regional development and the effectiveness of policies aimed at promoting the development of peripheral

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[9]Younger than 40.

regions and development localities.[10] Braude and Navon (2006) study interlocality residential mobility of the veteran Jewish population, using the 1983 & 1995 censuses. During the twelve years between the censuses, about 17% of this population migrated between localities. As for the profile of movers vs. stayers, this study found that the tendency to move increased with income and was negatively correlated with age, an earlier finding also by Alfandari and Sheffer (1992).

As for the reasons for residential moves, the search for better housing, better local services and better job opportunities were mapped as the central reasons for inter-locality migration (Alfandari and Sheffer (1992); Hoshen et al. (2004)). A study on the southern city of Be'er-Sheva found that housing quality was ranked as the most important consideration in intralocality residential mobility decisions, while school quality was ranked highest for families with school-age children (Krakover and Shacher, 2003).

The search for greater housing affordability was also found to generate higher residential mobility in Israel. Ben-Shahar et al. (2020) found that the increasing "affordability distance"[11] to Tel Aviv was associated with out-migration from the city during 2000-2016; Azary-Viesel and Hananel (2019) found that during a period of housing price increases (2008-2015), families with children tended to move away from Tel Aviv to adjacent, more affordable, localities. None of the Israeli studies, to my knowledge, analyze the residential mobility of current or past public housing tenants, or makes the linkage between housing policies and residential mobility in Israel.

3 Methodology and Identification

The Effect of Buying a Public Housing Apartment on Residential Mobility

The empirical aims of this study are to identify the effects of the rent-to-buy program, which included removing residential mobility disincentives that exist under public housing tenancy as well as a capital transfer, on residential mobility. Three aspects of residential

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[10] "Development localities" were established mostly in the North or the South districts of the country as part of a policy to inhabit under-populated regions in the first years after the state's establishment. These localities became the home for immigrants during the large immigration waves experienced by the country. Many of them remained remote localities with a medium-low socioeconomic rating. A large share of the public housing stock is situated in these localities (Hausman et al., 2022).

[11] Defined as the incremental income required for a household to consume a standardized apartment in the nearest "superstar" city.

mobility are examined: moving to a different locality, moving to a different statistical area within the same locality, and moving to a higher socioeconomic ranked statistical area ("moving up the housing ladder").

Residential mobility disincentives were gradually removed from those who became the owners of a previousely rented public housing apartment, as explained in Subsection 2.1. Upon purchasing a public housing unit from the authorities, new homeowners could already move away and rent out their apartments freely. Resale of the apartments without additional restrictions became possible only 5 years later. The identification, therefore, takes advantage of the variation in the timing of treatment and how it was expressed in different timings of expected residential mobility outcomes.

First, buyers' probability of moving relative to nonbuyers is estimated over the whole observed period (2000-2018), controlling for observables expected to affect residential mobility. This estimates the baseline difference between the observed groups over time, while later specifications estimate the effect of policy. Equation 1 estimates the relative differences in the probability of moving over the whole period, controlling for the household's characteristics. It is estimated on two separate (nested) geographic levels - the locality and the neighborhood (the statistical area, hereinafter SA):

$$y_{hj} = \beta_0 + \beta_1 \times I_h^{homeowner} + X_h \beta_x + \theta_j + \varepsilon_{hj} \tag{1}$$

In this specification, y_{hj} represents an outcome (move to a different locality or statistical area) for household h in geographic area j (SA or locality), $I_h^{homeowner}$ is an indicator equalling one for households that bought their unit during the *Kan Beiti* sale event. X_h are household characteristics prior to the sale event (in 2004), including the main tenant's birth cohort and dummies for whether the individual is: a post-1989 immigrant, marital status (married vs. the rest), an adult with disabilities, a single parent, and dummies for having employees in the household and for being a welfare allowance recipient. Some of the specifications control the hedonic characteristics of the household's public housing apartment, including: the number of rooms in the apartment, the building's year of construction, and the floor number within the building.[12] θ_j represents the geographic area fixed effects (either for the locality or the statistical area of the public housing apartment), meant to control the within-area variation of the probability of moving, and ε_{hj} is an idiosyncratic error term. The coefficient of interest is β_1, as it reflects buyers' relative probability of moving over the course of the period, where $\beta_1 > 0$ implies a positive impact

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[12]Market price appraisals were only available for the apartments that were sold. The hedonic property characteristics are used to control for the property quality, and apply to all apartments in stock.

of becoming a homeowner on the probability to move.

Next, I examine the dynamic nature of the effect of removing residential mobility disincentives by adopting a difference-in-differences approach. The model estimates the treatment effect separately for each year, relative to the treatment date. This approach, also taken by Karadja (2016) and by Sodini et al. (2021), tracks buyers' tendency to move overtime, relative to the date of original transaction. Equation 2 describes this methodology.

$$y_{ht} = \beta_0 + \beta_1 \times I_h^{homeowner} + \sum_{l=-5}^{10} (\beta_2^l I_h^{homeowner} \times I_{ht}^{T+l}) + X_{ht}\beta_x + \theta_h + \delta_t + \varepsilon_{ht} \qquad (2)$$

In Equation 2 the outcome variable y_{ht} is the probability of household h of moving in year t. $I_h^{homeowner}$ is an indicator that obtains the value 1 if household h bought an apartment in one of the years 2005-2008. Additional controls in this specification are X_{ht}, which control households' time-varying individual characteristics: lags of the household's labor income, lags of marital status and lags of disability status. δ_t are single year dummies.

In equation 2 the paremeter l is an index valued from -5 to 10, indicating the number of years from transaction year T. I_{ht}^{T+l} is an indicator for whether the current year t is exactly l years before or after the year of purchase. For instance, if an individual bought the apartment in 2005, the dummy I_{i2010}^{T+5} obtains a value of 1, but the dummy I_{i2010}^{T+6} obtains a value of 0. These indicators are all 0 for nonbuyers. Since addresses are observed from the year 2000, some buyers have been observed 8 years *before* transaction (those who bought in 2008), but some are observed only 5 years at the longest. The same is correct for the period *after* the transaction. Some buyers will be tracked for as much as 10 years, and for others the horizon will be as long as 13 years. Hence the effect for 5 or more years *before* transaction date, and those for 10 or more years *after* the transaction date are grouped. The coefficients β_2^l indicate the marginal effect of each year before and after the purchase of an apartment on the probability of moving in that year. If purchasing households obey the requirement not to sell the apartment for 5 years after purchase, and moving to another address as renters is at a low scale, one can expect that $\beta_2^l > 0$ when $l \geq 5$.

Time-invariant unobservables are controlled by using fixed effect estimates of two types, in separate specifications: the individual household, represented by the term θ_h,

or the residential location (the locality or the statistical area) while residing in public housing, θ_j. The latter is used in alternative specifications, which control unobservable time fixed variation in the probability of moving among households that reside in the same geographic unit, and for other time-fixed apartment characteristics. If geographic level FE's, θ_j are applied, the outcome variable and the error term become dependent on the geographic location j, and the regression also controls individual household time-invariant characteristics, such as the apartment's hedonic attributes. An additional advantage of this approach is that the seperate year estimates enable us to follow the pretreatment trends seperately for the treatment and control groups.

In the next step, I turn to the main identification strategy, described by Equation 3. This is a difference-in-differences approach that considers each group of buyers separately in order to control the differences in residential mobility closely, *before* and *after* the transaction, and in fixed time windows following it.

$$y_{ht} = \beta_0 + \beta_1 I_h^{homeowner} \times After_{ht} + X_{ht}\beta_x + \theta_h + \delta_t + \varepsilon_{ht} \tag{3}$$

In Equation 3 the indicator $I_h^{homeowner}$ equals 1 if household h bought an apartment in one of the years 2005-2008, and 0 otherwise.[13] $After_{ht}$ is a dummy variable that abtains a value of 1 in the years following the transaction. X_{ht} control for households' time-varying characteristics: lags of household's labor income, lags of marital status, and lags of disability status. θ_h represents household level FE, and δ_t are single year dummies. To examine the development of residential mobility patterns closely in the period after the transaction was done, this equation is estimated separately for buyers in each year of transaction vs. all nonbuyers. To examine the effectiveness of the restrictions on selling the apartments in the first five years following the purchase, Equation 3 is estimated in two time windows: up to 5 years following the transaction date and up to 10 years following the transaction date. This approach is taken in order to observe discontinuities over time in the tendency to move while keeping fixed the time window during which the effect on mobility is estimated.

Moving could be endogenous to the decision to buy, i.e., households willing to move could have made a larger effort to become buyers, in a way that the decision to buy was simulataneous with the decision to move, making OLS estimates from Equations 2 and 3 upward biased. Hausman et al. (2022) use discounts on public housing apartment prices as an IV for being a homebuyer (homeowner), as discounts were found to be positively

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[13]The equation does not include the the indicator $I_h^{homeowner}$ other then in the interaction term, because of the control on household-level FE that is fully correlated with it.

correlated with the probability of buying. The endogeneity problem in the current case, however, could not be solved in a similar way, because discounts could also have a direct affect on moving. As such, the external restriction assumption could be violated. To overcome the endogeneity problem, I estimate the probability of recent homeowners of moving when the control group is *more recent* homeowners, assuming that if the decision to become an onwer is endogenous to moving, it has a similar effect on more- and less-recent buyers. Hence the bias of the estimates for both buyer groups would be similar, making difference-in-differences estimates unbiased. Sub-section 5.5 serves as a robustness test that seeks, in addition, to solve the endogeneity problem.

Moving to a Better-Ranked Neighborhood

Many of the public housing apartments purchased by tenants in Israel were small, old, and located in relatively poor neighborhoods.[14] A potential mechanism for subsidized home-ownership to expand socioeconomic mobility opportunities is moving away to a better (i.e. less poor) residential environment, while the purchase is a stepping stone for capital gains. The latter may spill-over to improve other aspects of life that less poor neighborhoods offer, such as better opportunities for children (Chetty and Hendren (2018)), and improved mental and physical health outcomes for adults (Katz et al. (2001), Kling et al. (2007)). Alternatively, buyers willing to improve their dwelling quality may remain in the current asset, now being their own, and renovate it (Wang (2011)). Another option is to use the subsidized ownership to finance a move to a less crowded or newer dwelling, even if in the same surroundings.

To study the socioeconomic aspect of housing mobility, I examine the ranking of the neighborhoods where public housing tenants live at the time of transaction (the "origin neighborhoods") vs. where they move (the "destination neighborhoods") (see Section 4). Upward mobility is defined as households moving to a higher ranked neighborhood in comparison to their origin. The socioeconomic mobility specifications are estimated only at the level of the statistical area. Equations 2 & 3 apply this outcome represented by a dummy equalling 1 only in a case of upward mobility (moving to a higher classified neighborhood) and 0 otherwise.

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[14]The mean year of construction was 1971, so the apartments in stock were at least 30 years old, on average, at the time of purchase. The average number of rooms per apartment was around 3 (including living room, but excluding kitchen and bathrooms). The bulk share of apartments were located in either the South or the North districts. Statistical areas with low socioeconomic rank were over-represented (Hausman et al., 2022).

4 Data

Public Housing Administrative Data

I use several administrative datasets to identify public housing tenants during the study period and to define them either as buyers or nonbuyers. These include: records of tenancy periods, records of purchases, and records of physical attributes of the apartments. The datasets and their assembly are described at length in Hausman et al. (2022). Most data are confidential, so all data work was done at the National Insurance Institute research room.

The analysis of residential mobility patterns is done on a sample of buyers, who bought a public housing apartment during the *Kan Beiti* sale period, which took place between 2005 and 2008, and a sample of nonbuyers, who are public housing tenants that were identified living in public housing from at least 2000 until 2012, but did not buy an apartment during that time (hereinafter *never-buyers* or *nonbuyers*).

Focusing on this sample to study residential mobility is valuable for several reasons. First, the discounts, which were found to be well correlated with the probability of buying an apartment (Hausman et al., 2022) increased during this sale event, making purchase more appealing and valuable. Second, focusing the residential analysis on this sale period adds another aspect of mobility to the aspects already analyzed in Hausman et al. (2022). Third, a greater share of the buyers during this period were younger than those in other sale events, so the mobility patterns among them are expected to be more meaningful.[15] Fourth, the available data make it possible to examine mobility patterns *before* and *after* the sale event only for this sample as a whole, while data limitations make it possible to do so regarding buyers in other sale periods.

National Insurance Institute Records

Tenants' records were matched with National Insurance Institute records on employment, labor income, incomes from NII allowances, marital status, and additional demographic data (year of birth & death, year of immigration, and number of children).

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[15]Accoding to documents found in files scanned to the State Archive, the *Kan Beiti* sale event was meant, more than previous sale events, to encourage younger tenants to buy the aparments they used to rent. These documents are non-confidential and are available through the author.

Addresses from Public Housing Companies

Public housing companies' records include the addresses of the apartment (street name and house number). Using the address registry of Survey of Israel (Israel's mapping authority), these addresses were converted into map coordinates to enable using GIS tools for further analysis. These data made it possible to know public housing tenants' exact addresses when living in these units, which were converted to the SA and locality resolutions.

Addresses from the Population Registry

To track households' addresses over time and identify which of the households had moved and to where, the population registry data, which is available at the NII's research room, is used. Although the NII holds highly detailed postal address records for the entire (insured) population, these are unavailable for research use due to confidentiality concerns. Instead, the NII's computing department converted the exact addresses to 5-digit postal codes, and those were converted into statistical-area codes by finding the modal statistical area for each postal code. This methodology creates some level of inaccuracy in the address conversion process, for several reasons: (1) Postal codes are not a geographic layer, but an administrative list used by the Israel Postal Authority. The 5-digit postal codes represent a relatively wide area (a number of blocks or streets) the shape of which does not match to other geographic layers.[16] (2) Due to mismatches between the databases of the mapping services and the postal services, a share of 24% of the full address list in Israel is missing a 5-digit postal code value. Therefore, they could not be ascribed a matching statistical area in the process of imputation. (3) Imputing the modal value of statistical area per postal code may lead to over representation of denser SA's in a certain postal code. This inaccuracy has a greater potential to exist in an analysis at the statistical area level than at the locality level. Therefore, the analysis is implemeted at both geographic levels.[17]

Another important feature of the population registry addresses is that they are updated upon people's action. When moving to a new residential address, one needs to update the new address at the registry, though in most cases, this update is not obligatory. In fact, updating the address is usually needed to extract social and civil rights,

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[16]Due to their low resolution they were replaced by a 7-digit postal code in 2011.

[17]Appendix Table A1 presents regression results of the probability that addresses in once source would not match those in the other source, on an indicator for being a buyer. At the locality level, there seems to be no bias for the mismatch between buyers and nonbuyers, while at the SA level, there seems to be a small bias for the nonbuyers, meaning that the mismatch among nonbuyers is slightly larger.

such as registering children at schools, voting in elections, and enjoying other rights and services that are location-based. This reason is expected to cause minor mismatches between the actual addresses and the registry addresses. Nevertheless, updating the address in the authorities' records may increase before purchasing an apartment.[18] The Ministry of Housing sale events memos specifically indicate that even when the buyers are the siblings of the original tenant, an address registry record indicating periods of tenancy in the current address must be presented upon submitting the purchase request.

Socioeconomic Ranking and Classification of Geographic Units

The Israeli Central Bureau of Statistics (CBS) publishes the socioeconomic classifications of localities and statistical areas, based on administrative data for these geographic units.[19] The socioeconomic classification is a composite of demographic characteristics of the population (such as the median age and the dependency ratio), education (such as the average number of years of schooling), incomes (from employment and transfer payments), employment data, and other data on the economic level of the population - such as the number of vehicles used by the population and days spent abroad. The CBS uses these data in factor and cluster analysis methods to produce the socioeconomic ranking and classifications of geographic units. The products used in this study include the ranking of statistical areas according to their actual index value and the socioeconomic cluster (with 1 being the lowest and 10 being the highest) of SAs. The 2015 classification used in the study is the first available for statistical areas and is not based on the data of the 2008 census but on higher resolution administrative data updated for 2015.[20]

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[18]This trend in address registration is also indicated in Karadja (2016).

[19]These data, as well as documentation of the methods, are available online through the CBS website.

[20]It should be noted that using the 2015 SES ranking of SAs includes the ex-post effect of mobility, and potentially affected by the residential mobility of households. However, as the volume of residential mobility was relatively low, and public housing tenants make up a relatively modest share of neighborhood redisdents, its effect on SES ranking was likely small, if not negligible.

5 Results

5.1 Stylized Facts on Residential Mobility

Residential Mobility According to Census Data

This subsection provides descriptive statistics on the relative residential mobility patterns of the different housing tenures in Israel. The decision to move has previously been shown to be closely related to various life events such as changes in marital status, changes in the household's composition, completion of vocational training or educational entitlement, and other events related to employment, as these are correlated with lifetime earning prospects, social preferences, and housing needs. Life circumstances affect the costs and considerations related to the place of residence, and therefore influence residential mobility decisions. For example, having school-aged children increases the cost of moving, as uprooting the children from their social environment is a major consideration. The relative costs involved with residential mobility are also influenced by types of housing tenures, which affects the relative cost of moving (Causa and Pichelmann, 2020).

Table 1 presents the differences in residential mobility patterns, over a time window of 5 years, between Israeli households in different age groups, type of housing tenure, and education level. Several conclusions can be taken from the table: (1) Less than a quarter of the homeowners change their place of residence in a 5-year window (within a locality or between localities); (2) Residential mobility within a locality is more common than it is between localities, but this is true only among owners and public housing tenants, and not among private-market tenants; (3) Homeowners' mobility patterns are quite similar to those of public housing tenants; (4) Younger age and higher education levels are correlated with higher residential mobility patterns. The relatively low residential mobility of public housing tenants might be an outcome of disincentives related to subsidized and protected housing, but these are likely also related to economic difficulties. It may also reflect the fact that public housing tenants are older and less educated than private renters, characteristics that are also associated with lower mobility patterns.

Residential Mobility: Administrative Data

The analysis concentrates on a sample of buyers in the *Kan Beiti* sale event, which took place between 2005 and 2008, and nonbuyers who were public housing tenants during

Table 1: Residential Mobility by Age, Housing Tenure, and Education, 2008

	Housing tenure			Education	
	Owners	Renters (private)	Renters (public)	Nonacademic	Academic
			Age group: 35-49		
Group's share of all households	72%	23%	3%	58%	42%
Place of residence, 5 years ago:					
Same address	76%	32%	78%	69%	61%
Same locality, different address	16%	42%	16%	21%	23%
Different locality	8%	25%	6%	10%	16%
			Age group: 35-69		
Group's share of all households	77%	18%	3%	58%	42%
Place of residence, 5 years ago:					
Same address	82%	36%	79%	76%	70%
Same locality, different address	12%	41%	15%	16%	18%
Different locality	6%	23%	6%	8%	12%

Notes: Own calculations based on the Israeli CBS Census (2008), public use file. The groups' shares of all households do not necessarily add up to 100% as some households' tenure type is marked as "other" in the census data.

the 2000-2012 period, similar to that analyzed in Hausman et al. (2022). Households aged 25-60 in 2004 are included in the sample, and individuals who died before 2018 are dropped.

Table 2 presents selected characteristics of buyers and nonbuyers in the different samples. Panel A of the table presents the full sample, while Panels B & C present descriptive statistics on the samples used for the mobility analysis at the Locality and SA levels, respectively. The households included in the subsamples of panels B & C represent those whose residential address according to the population registry matched that of public housing records in the year of 2005 (the matching was done at the locality and SA levels, respectively). This matching is a critical condition for residential mobility analysis, because the population registry is the source of data to study the dynamics of the place of residence. While the matching of addresses is very high for the locality analysis sample — about 92% of the observations lived in the same locality according to the two sources — in the SA resolution, the matching drops to just below 55%. Section 4 discusses several potential reasons for this mismatch.[21]

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[21]Appendix Table A1 presents estimation results of being a home-buyer on the probability for a mismatch in the public housing and population registry addresses. It seems that for the localities, there is no significant difference in matching probabilities between buyers and nonbuyers, while at the statistical area address resolution, the mismatch is slightly higher for buyers (by about 0.02 percentage points). I assume that the differences in matching probabilities between buyers and nonbuyers are small enough to be neglected in the analysis.

It is important to note, though, that there seem to be no significant differences between the characteristics of the different samples in each of the three panels of Table 2. This feature is most important when reproducing the residential mobility analysis in two separate geographic levels. Table 1 and Table 2 show that the probabilities of moving to a different locality are about one half of the probabilities of moving to a different neighborhood. It appears, in addition, that buyers are much more mobile than nonbuyers, indicating the potential effect of buying on residential mobility.

Residential mobility is expected to be responsive over time both to the dynamic of mobility disincentives, as these change for the buyers after they purchase an apartment, and to a baseline tendency of households to move. The data are not censored, as no observations leave the sample without having moved, and in addition multiple (consequent) events (moves) are not counted for the same households. Therefore, the Kaplan Meier estimate illustrates (Figure 1) the survival distribution over time in the data.

For the *Kan Beiti* sample of buyers, this period makes it possible to observe survival trends several years before the beginning of the sale event in 2005, representing the pre treatment survival trend. The survival rates evolve differently for buyers and nonbuyers over time, and the trends are not uniform within the groups over the whole period. The much flatter survival pattern of the nonbuyers seems to reflect the low incentives to move over the period, while the changing patterns among buyers suit the hypothesis regarding the change of mobility incentives among them after having purchased an apartment. The difference between the survival trends of the two groups, shown in the two panels of Figure 1, emphasizes again the greater tendency to move within a locality than between localities, as also shown in Tables 1 and 2.

5.2   Factors Affecting the Over-All Probability of Moving

The basic estimate I perform measures the differences in the probability of moving over the whole period from 2001 to 2018, of buyers vs. nonbuyers, as described by Equation 1. This basic estimation gives a sense of the relative effect of controls on the overall probability of moving. The estimation is performed at the two geographic levels: locality and statistical area. The general result that buyers have a much higher over-all probability of moving is stable at both the locality-level and SA-level regressions. Naturally, the differences between buyers and non-buyers are much greater when moving to a different SA is considered.

As indicated in Section 3, the regressions control for several sociodemographic char-
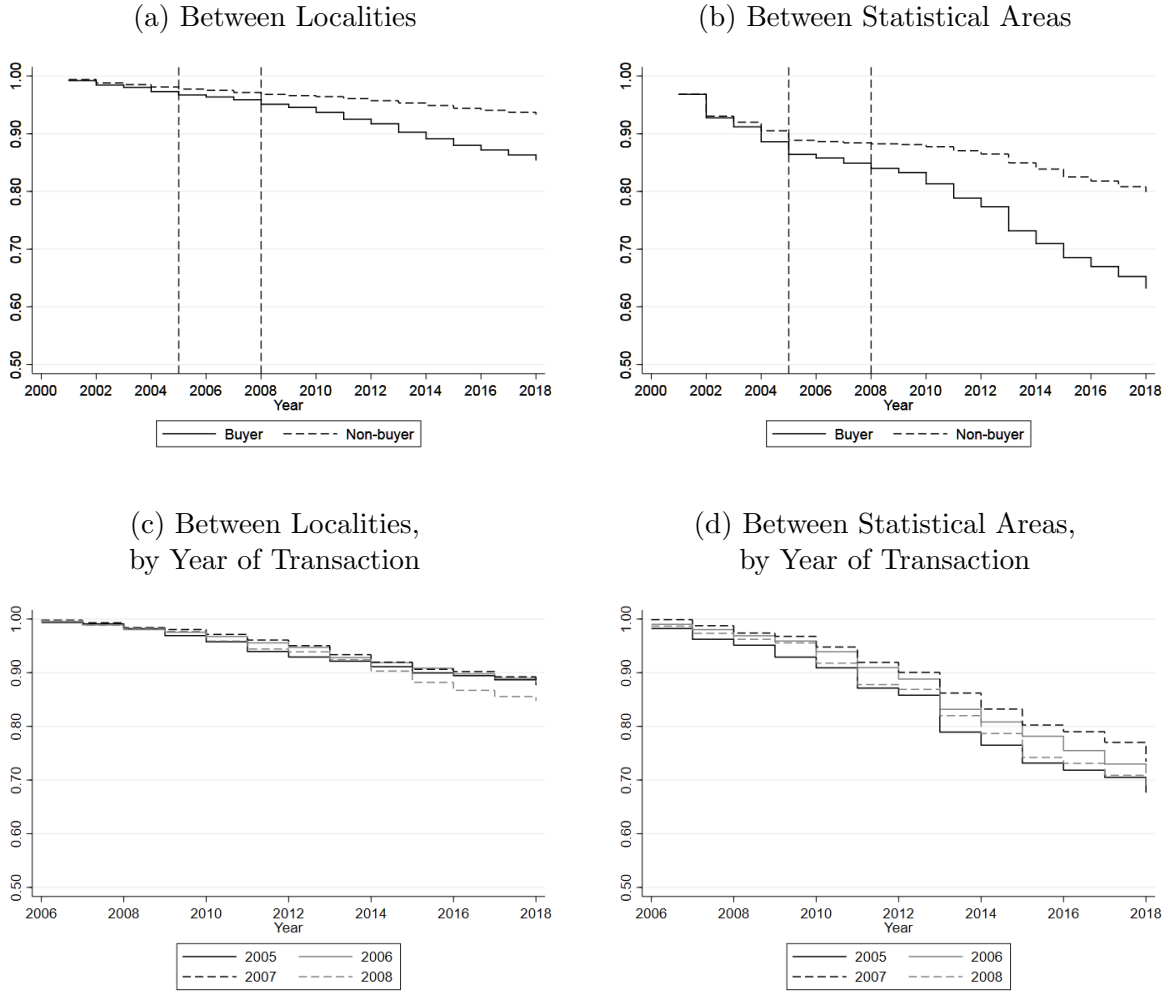
Table 2: Residential Mobility Analysis Samples: Balance Table

	Buyers	Nonbuyers	Difference	T-stat
Panel A: The Full *Kan Beiti* Sample				
Age	44	48	4	31
Post-1989 immigrant	33%	23%	-10%	-15
Married	54%	36%	-19%	-25
Single parents	38%	26%	-13%	-19
Number of children under 18	2.3	1.2	-1.2	-45.9
Receive income support	35%	41%	6%	7.7
Employed	69%	49%	-20%	-26.3
Monthly labor income (NIS)	4,757	4,035	-722	-25
Observations (households)	5,765	14,995		
Panel B: Locality Analysis Sample				
Age	44	48	4	30.8
Post-1989 immigrant	33%	23%	-10%	-15.2
Married	55%	36%	-19%	-24.3
Single parents	38%	25%	-13%	-18.3
Number of children under 18	2.4	1.2	-1.2	-45.4
Receive income support	35%	41%	6%	7.5
Employed	69%	49%	-20%	-25.2
Monthly labor income (NIS)	4,709	3,985	-724	-24.7
Moved to a different locality	10%	3%	-7%	-18.4
Observations (households)	5,339	14,029		
Panel C: Statistical Area Analysis Sample				
Age	45	49	4	21.1
Post-1989 immigrant	36%	24%	-12%	-12.5
Married	54%	35%	-19%	-18.8
Single parents	39%	24%	-15%	-15.9
Number of children under 18	2.3	1.1	-1.2	-36.3
Receive income support	36%	41%	5%	4.6
Employed	68%	49%	-19%	-18.6
Monthly labor income (NIS)	4,655	3,881	-772	-18.7
Moved to a different SA	29%	11%	-17%	-20.1
Observations (households)	3,020	8,099		

Notes: Amidar & NII data. The table relates to the population of buyers in the *Kan Beiti* sale event and nonbuyers are households that did not buy an apartment until the end of 2012. Buyers were already public housing tenants in the year of 2000 and bought an apartment between the years 2005 and 2008. Nonbuyers lived in public housing at least during the 2000-2012 period. The first two columns relate to the means in each groups (in the year of 2004, before the treatment begins). Columns 3 & 4 present the differences in means and t-statistics, respectively. Monthly labor income is calculated as the sum of the total annual labor employee-income (of the main tenant and his/her spouse) divided by the number of months worked during the year. The locality-level (statistical-area-level) analysis sample includes the buyers and nonbuyers whose residential locality in the public housing records (locality & statistical-area) matched the population registry records in 2005. Residential mobility is measured over the period 2005-2018.

Figure 1: Kaplan Meier Survival Estimates for Residential Mobility

(a) Between Localities

(b) Between Statistical Areas

(c) Between Localities,
by Year of Transaction

(d) Between Statistical Areas,
by Year of Transaction

Notes: The figures present Kaplan Meier survival estimates, when the risk event is moving to a different locality (subfigure a) or to a different statistical area (subfigure b). The graphs show the probability that the duration (not moving) will be at least until the specified years. The vertical lines resemble the *treatment period* during the *Kan Beiti* sale event, so the period before 2005 represents the *pretreatment* survival patterns. Similarly, subfigures c & d present the Kaplan Meier survival estimates for buyers only, grouped by transaction years, for the period 2006-2018. The samples used to produce the figures include the same households as in Table 2.

acteristics just before the sale event begins, as well as for physical attributes of the apartments. The inclusion of physical attributes serves two aims. First, for buyers, the physical attributes of the apartments are indicative of the apartments' market value and are therefore expected to be positively correlated with any wealth effect that exists. Second, for both buyers and nonbuyers, the physical attributes of the apartments are indicative of the apartments' quality: its size or the need to use the staircase (for instance in non-ground-floor apartments in old buildings) are almost the sole reasons for public housing tenants'

residential mobility, but they may also trigger buyers to move away, especially as they get older.

Table 3 presents the results from the estimation of a linear probability model for the probability of moving over the whole study period on being a buyer. The results are presented for the probability of moving to a different SA (Columns 1 & 2) and a different locality (Columns 3 & 4). The results are standing in-line with descriptive statistics. Over the entire period (2000 until 2018), being a buyer is correlated with a 4-6 percentage point higher probability of moving to a different locality, while the probability of moving to a different SA is about 11-17 percentage points higher, depending on the specification. Moving is also negatively correlated with the apartment's quality, when the number of rooms in the apartment is the dominant attribute, indicating that crowdedness may be an important consideration in the decision to move.[22]

5.3 Event Analysis: Residential Mobility Patterns Relative to Treatment Year

Subsection 2.1 discusses how buyers' situations with respect to residential mobility changes over time. The time of becoming the owner of a previous public-housing unit is a key date for buyers in many aspects. Beginning from the time of transaction, buyers are allowed to rent out the apartment they bought and move somewhere else. Another possibility is to sell the apartment and buy another instead of it, for at least the same price. As long as 5 years have not passed from the date of transaction, the liquidity effect of buying is expected to decrease the probability of moving, because buyers put down at least part of their financial resources and still cannot utilize the value of their recently bought apartment, unless a more expensive apartment is bought instead of it. The disincentives to move were removed only 5 years later, when the sale discount became a grant and apartments' market value could be converted freely, without involving any contact with public housing administrators. That is the timing that I expect homeownership's effect on residential mobility to significantly grow.

Figures 2a and 2b present raw shares of movers compared to those who remained (survived) in their public housing address, at the locality and SA levels. While the locality-level graph develops moderately, the SA-level graph presents a relatively volatile pattern for both buyers and nonbuyers. Both figures seem to present a common trend

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[22]In another specification, not presented here, I run the regression on buyers only and use the $log(marketprice)$ of the apartment as a control.

Table 3: Estimating the Over-All Differences in Residential Mobility,
Buyers vs. Nonbuyers

	Locality (1)	Locality (2)	SA (3)	SA (4)
Ever buyer	0.057***	0.040***	0.167***	0.112***
	(0.007)	(0.007)	(0.012)	(0.017)
Age of main tenant	-0.017***		-0.024***	
	(0.002)		(0.005)	
Age^2	0.000***		0.000***	
	(0.000)		(0.000)	
Young (below median age)		0.014***		0.024**
		(0.004)		(0.010)
Young (below median age)*buyer		-0.001		0.108***
		(0.004)		(0.021)
Floor #	0.000	0.000	0.004	0.003
	(0.001)	(0.001)	(0.003)	(0.003)
Year of building	-0.000	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.001)
Number of rooms	-0.006**	-0.007***	-0.017***	-0.018***
	(0.003)	(0.002)	(0.006)	(0.006)
Constant	0.572	0.186	0.572	0.186
	(0.395)	(0.412)	(0.395)	(0.412)
Observations	19,368	19,368	11,119	11,119
Buyers\nonbuyers	Both	Both	Both	Both
Geographic level FE	Locality	Locality	SA	SA
Geographic level clustering	Yes	Yes	Yes	Yes
Number of clusters	90	90	482	695
R-squared	0.038	0.033	0.131	0.128

Notes: Linear Probability Model regressions. The table estimates the treatment effect on the over-all residential mobility, defined as the probability of moving to a new address. An observation in the sample is a household whose public housing address matched the population registry address in 2005. The sample matches that of Panels B & C in Table 2. All regressions are OLS specifications with FE at the geographic level of the probability of residential mobility (between localities in Columns 1 and 2 and between SA's in Columns 3 and 4) on being a buyer, and control for demographic and socioeconomic characteristics in 2004, including: being an immigrant from 1989 or later, being a single parent, receiving disability allowance, receiving income-support payments and being employed in 2004, as well as the apartments' physical attributes. Standard errors are clustered by the indicated geographic levels. Similar results were obtained in a Logit specification and Cox model for the relative hazard. Robust standard errors are in parentheses. * denotes significance at the 10% level, ** at 5%, and *** at 1%.

of residential mobility until 2005, when the *Kan-Beiti* sale event begins. Over time, the raw-data figures at both geographic levels seem to show a gap developing between the mobility trends of buyers and nonbuyers, indicating the effect of treatment.

In the bottom panel of Figure 2, Figures 2c & 2d, display the coefficients of the difference between the treatment and the control groups, while every point denotes at a particular year before or after the treatment, as described by Equation 2. The regressions whose coefficients are presented in the figures control for individual household FE, yearly (lagged) family labor income, and marital status. The dashed vertical line shows the year before treatment, so that the treatment effect is displayed to the right of this line, and the pretreatment effect is displayed to its left.[23]

A general upward trend in the probability of moving begins for the buyers right after treatment, and it already becomes significant, yet small, one year after treatment begins at both the locality and SA levels. The effect becomes greater over time, indicating that buyers indeed had a greater tendency to move after buying. However, the share of moves each year is relatively small. Separate regressions for the two age groups, below and above the median age in 2004, show that the effect comes mainly from the young buyers (see Appendix Figure A1), similar to the findings by Sodini et al. (2021).

Tables 4 & 5 present estimation results of the interaction term from Equation 3, which indicate the effect of the treatment - buying an apartment - on the probability of moving to a different locality and neighborhood (SA), respectively. Each column in the tables relates to a different group of buyers, according to their year of transaction, while the group of nonbuyers remains fixed between the columns. Panel A presents estimation results for the time-window of the first 5 years following transaction date, while panel B presents estimation results for the period of up to 10 years following the transaction date.

All OLS estimations show that home purchase has a significant effect on the probability of moving, both to a different locality and to a different SA: depending on the year of transaction, buying an apartment increases the probability of moving to a different locality by 0.3 percentage points in a 5-year window and by 0.9 percemtage points in a 10-year window. According to the same specifications, the probability of moving to a different SA is higher for the buyers by 1-2.5 percentage points, in 5 & 10 year windows. As expected, the estimated OLS effects are greater for the 10-year time-window than they are for the 5-year time-window.

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[23]Similar specifications were run with FE for the geographic SES at the origin while controlling for other fixed household characteristics. The results were quite similar.

Table 4: Estimates of Home Ownership Effect
on the Probability of Residential Mobility Between Localities

	Panel A: Year of purchase (5-year window)			
	2005	2006	2007	2008
$I\{Year{\geq}Transaction\_year\}xI\{Homeowner\}$	0.00376***	0.00383***	0.00332***	0.00531***
	(0.00140)	(0.000729)	(0.000837)	(0.00137)
Observations	146,218	175,872	182,965	191,494
R-Squared	0.294	0.282	0.275	0.261
Number of Clusters	14,806	16,212	15,459	14,978
Moves until (5-year window)	2009	2010	2011	2012

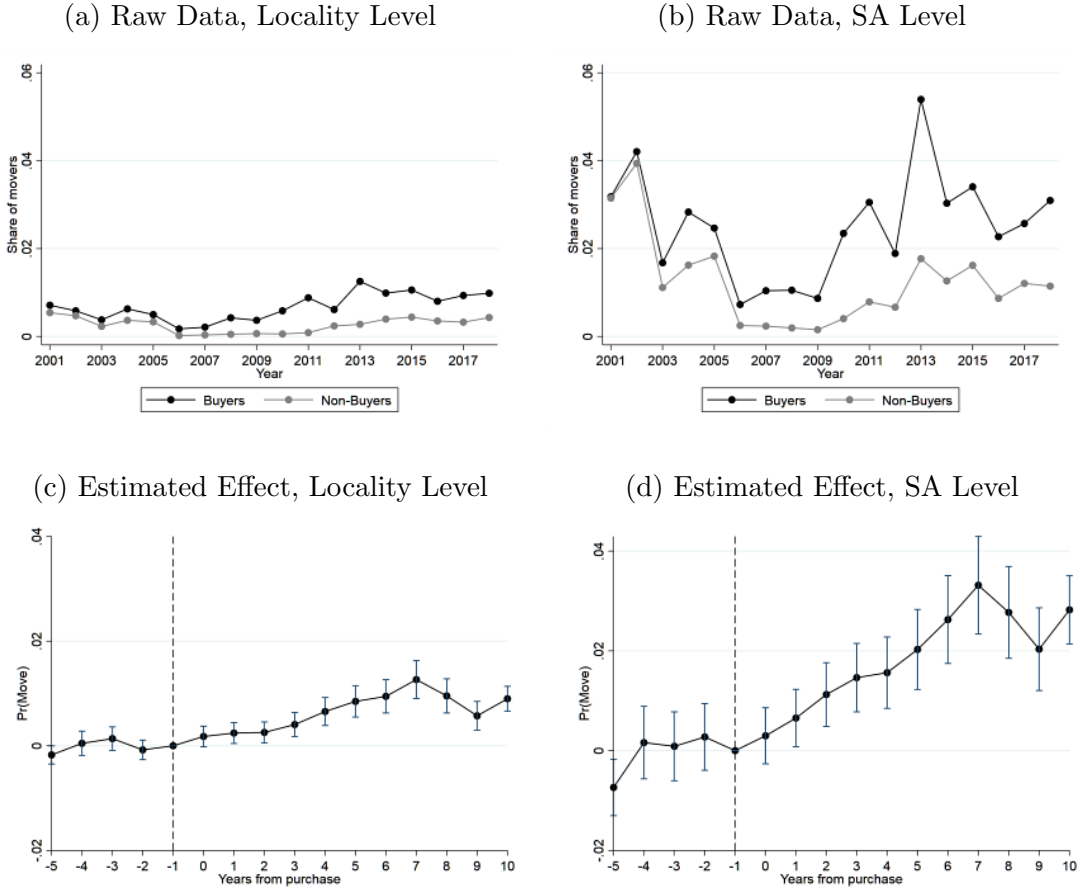|	Panel B: Year of purchase (10-year window)			
	2005	2006	2007	2008
$I\{Year{\geq}Transaction\_year\}xI\{Homeowner\}$	0.00657***	0.00585***	0.00596***	0.00920***
	(0.00138)	(0.000745)	(0.000912)	(0.00137)
Observations	218374	254514	257874	263625
R-Squared	0.217	0.193	0.181	0.180
Number of Clusters	14,806	16212	15459	14978
Moves until (10-year window)	2014	2015	2016	2017

Notes: The table presents the results of Linear Probability Model regressions, as explained in Section 3. An observation in this sample is household-year for the years 2000-2018. The sample includes the households that appear in the SA analysis sample in Table 2. The outcome variable is the probability of moving to a different SA. Each column in the table presents the estimation results for the sample of buyers that year and all nonbuyers. The regressions are fixed effect specifications of moving to a different address each year on the interaction of the home ownership indicator with an indicator for up to 5 years after the purchase date (in Columns 1 to 4 in the upper panel) and up to 10 years following the purchase date (in Columns 1 to 4 in the lower panel), including year effect, lagged family labor income, marital status, and indicators for disability status of at least one of the family members. The number of clusters do not match in Tables 4, 5 and 6 bacause of the mismatch between the NII's addresses and public housing addresses at the different geographic levels, as described in Section 4. Robust standard errors are clustered at the individual household level and presented in parentheses. *** denotes significance at the 1% level, ** at 5%, and * at 10%.

Table 5: Estimates of Home Ownership Effect
on the Probability of Residential Mobility Between Statistical Areas

	Panel A: Year of purchase (5-year window)			
	2005	2006	2007	2008
$I\{Year \geq Transaction\_year\}xI\{Homeowner\}$	0.0153***	0.0103***	0.0130***	0.0192***
	(0.00396)	(0.00172)	(0.00243)	(0.00398)
Observations	79,193	95,294	98,010	101,304
R-Squared	0.320	0.310	0.299	0.291
Number of Clusters	8550	9413	8904	8549
Moves until (5-year window)	2009	2010	2011	2012

	Panel B: Year of purchase (10-year window)			
	2005	2006	2007	2008
$I\{Year \geq Transaction\_year\}xI\{Homeowner\}$	0.0252***	0.0175***	0.0175***	0.0253***
	(0.00374)	(0.00182)	(0.00237)	(0.00377)
Observations	116,118	135,233	135,487	136,757
R-Squared	0.252	0.233	0.231	0.225
Number of Clusters	8550	9413	8904	8549
Moves until (10-year window)	2014	2015	2016	2017

Notes: The table presents the results of Linear Probability Model regressions, as explained in Section 3. An observation in this sample is household-year for the years 2000-2018. The sample includes the households that appear in the SA analysis sample in Table 2. The outcome variable is the probability of moving to a different SA. Each column in the table presents the estimation results for the sample of buyers that year and all nonbuyers. The regressions are fixed effect specifications of moving to a different address each year on the interaction of the home ownership indicator with an indicator for up to 5 years after the purchase date (in Columns 1 to 4 in the upper panel) and up to 10 years following the purchase date (in Columns 1 to 4 in the lower panel), including year effect, lagged family labor income, marital status, and indicators for disability status of at least one of the family members. The number of clusters do not match in Tables 4, 5 and 6 bacause of the mismatch between the NII's addresses and public housing addresses in the different geographic levels, as described in Section 4. Robust standard errors are clustered at the individual household level and presented in parentheses. *** denotes significance at the 1% level, ** at 5%, and * at 10%.

Figure 2: The Probability of Moving, Development Over Time

(a) Raw Data, Locality Level

(b) Raw Data, SA Level

(c) Estimated Effect, Locality Level

(d) Estimated Effect, SA Level

Notes: The figures present the dynamics of the probability of moving over time of buyers and nonbuyers (those who did not buy an apartment at least until 2012), as represented by the term β_2^l that is estimated in Equation 2. Subfigures a & b present raw data of the share of first-time movers relative to those who have not moved for the first time up to each year, at the locality and SA levels, respectively. Subfigures c & d present estimation results of the treatment effect on the probability of moving, relative to transaction year. These regressions control for the individual household FEs as well as the lagged labor income and lagged marital status. The samples used to produce the figures include the same households as in Table 2. 95% confidence intervals are displayed, based on robust standard errors clustered at the individual household level. In addition, the regressions control for lags of family labor income and marital status as well as individual year FE and individual household fixed effects.

5.4 Moving to a Neighborhood with Higher Socioeconomic Ranking

Descriptive Statistics

At the baseline, the distribution of the SES of neighborhoods where the buyers and the nonbuyers live seems similar, as observed in the locations of the bins on the x-axis of Figure 3. The figure divides buyers and nonbuyers into movers and nonmovers, while for each sub-group, the observations were divided into deciles according to their origin neighborhood's SES ranking, i.e. public housing place of tenancy in 2005. The hollow circles, representing the nonmovers within each group, illustrate the 45-degree line of those that did not move and therefore stayed in the same neighborhood rank. Focusing on the movers, buyers' SES distribution at the destination neighborhoods seems to be in neighborhoods with higher ranking than those of nonbuyers. This tendency seems to be stronger for buyers whose origin SES is at the lower part of the distribution, suggesting that buyers made greater use of residential mobility for upscalling their neighborhood SES, and that this was even more true for those who started low and were therefore more motivated to leave their old, poor, neighborhoods.[24]

Figure 3: The Correlation Between Origin and Destination Neighborhood SES

(a) Buyers   (b) Non-Buyers
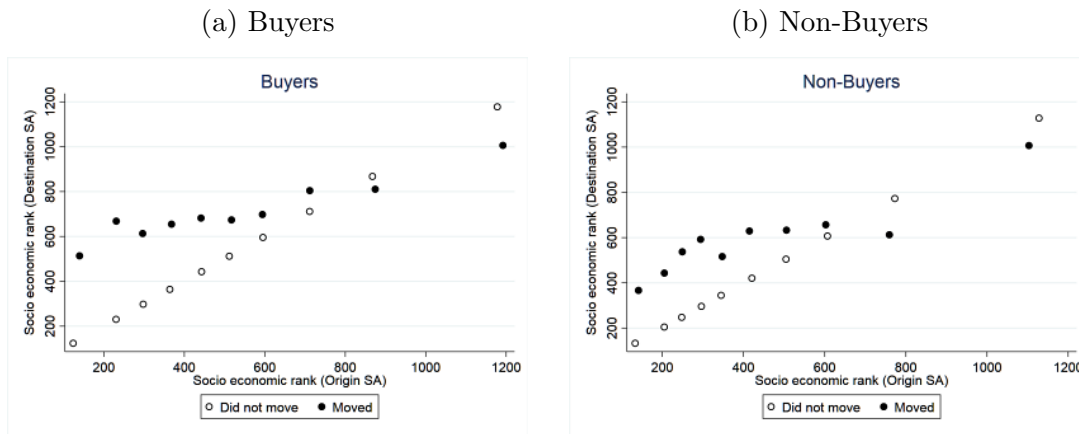
Notes: Each figure presents the distribution of origin SAs vs. destination SAs by their SES rank (valued 1-1,624), for the buyers (Figure a) and the nonbuyers (Figure b). The actual distribution of the origin SAs' SES rank was binned seperately within each subgroup to 10 equal sized bins. The hollow circles represent the distribution of nonmovers while the full circles represent that of movers. The samples used to produce the figures include the same households as in Table 2.

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[24]Another illustration of the greater tendency of buyers to move to higher rank neighborhoods appears in Appendix Table A2.

Estimation Results

Figure 4a presents raw data of the share of households that moved (for the first time during the study period) to a higher-than-origin SES cluster neighborhood (statistical area) each year, separately for the buyers and nonbuyers. The raw data present a common pretreatment trend of the share of first-time movers. Right after the beginning of the sale period, in 2005, nonbuyers' share of moves remains flat at a low rate, while for the buyers, it starts to incline and then falls through the end of the period.

The difference-in-differences coefficients presented in Figure 4b present the treatment effect on moving to a better neighborhood over time, relative to the year of the transaction. Moving to a higher SES cluster neighborhood becomes significant from the third year after buying an apartment, but a real shift in the trend is observed from the 5th year post-purchase. There are clear differences in this respect between young and old buyers. While young buyers set the tone in moving up, such moves are insignificant for old buyers (Appendix Figure A3). Sodini et al. (2021) arrived at similar findings concerning the differences between young and old recent home buyers in moving up.

Figure 4: The Probability of Moving to a Better Neighborhood
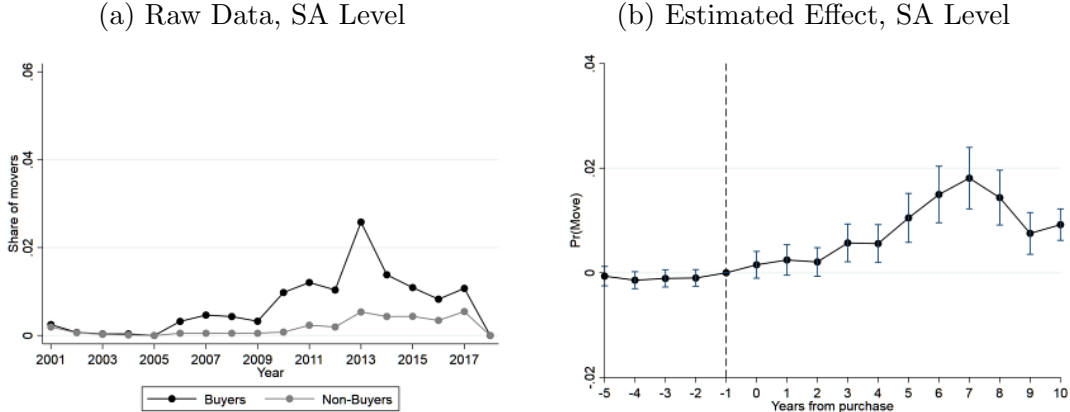
(a) Raw Data, SA Level   (b) Estimated Effect, SA Level

Notes: The figures present the dynamics of the probability of moving to a better neighborhood over time for buyers and nonbuyers. Subfigure a presents the share of first-time movers out of those who have not moved for the first time up to each year, at the locality-level and SA-level, respectively. Subfigure b presents estimation results of the treatment effect on the probability of moving, relative to transaction year. These regressions control for the individual household FEs as well as the lagged labor income and lagged marital status. The samples include the same households as in Table 2. 95% confidence intervals are displayed, based on robust standard errors clustered at the individual household level. The regressions also control for lags of family labor income and marital status as well as individual year FE and individual household fixed effects.

Table 6 presents estimation results for Equation 3, when the outcome variable is the probability of moving to a higher SES neighborhood. The estimated effect of buying a

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public housing apartment on the probability of moving to a higher ranked neighborhood is between 0.4 percentage points in a 5-year window and 1.4 percentage points in a 10-year windows. This is lower than the estimated effect on neighborhood residential mobility but higher than the estimated effect effect on the probability of moving to a different locality.

Table 6: Estimates of Home Ownership Effect
on the Probability of Residential Mobility to a Higher SES-Ranked Statistical Area

	Year of purchase			
	2005	2006	2007	2008
$I\{Year{\geq}Transaction\_year\}xI\{Homeowner\}$	0.00543***	0.00479***	0.00525***	0.00450**
	(0.00189)	(0.00107)	(0.00143)	(0.00192)
Observations	81,350	98,539	101,566	105,510
R-Squared	0.271	0.224	0.197	0.188
Number of Clusters	8157	8986	8492	8149
Moves until (5-year window)	2009	2010	2011	2012

	Year of purchase			
	2005	2006	2007	2008
$I\{Year{\geq}Transaction\_year\}xI\{Homeowner\}$	0.0136***	0.00929***	0.00828***	0.00703***
	(0.00224)	(0.00117)	(0.00146)	(0.00194)
Observations	121,651	142,672	143,218	145,359
R-Squared	0.127	0.113	0.110	0.106
Number of Clusters	8157	8986	8492	8149
Moves until (10-year window)	2014	2015	2016	2017

Notes: The table presents the results of Linear Probability Model regressions, as explained in Section 3. An observation in this sample is household-year for the years 2000-2018. The sample includes the households that appear in the SA analysis sample in Table 2. The outcome variable is the probability of moving to a different SA. Each column in the table presents the estimation results for the sample of buyers that year and all nonbuyers. The regressions are fixed effect specifications of moving to a different address each year on the interaction of the home ownership indicator with an indicator for up to 5 years after the purchase date (in Columns 1 to 4 in the upper panel) and up to 10 years following the purchase date (in Columns 1 to 4 in the lower panel), including year effect, lagged family labor income, marital status and indicators for disability status of at least one of the family members. The number of clusters do not match in Tables 4, 5 and 6 bacause of the mismatch between the NII's addresses and public housing addresses in the different geographic levels, as described in Section 4. Robust standard errors are clustered at the individual household level and presented in parentheses. *** denotes significance at the 1% level, ** at 5%, and * at 10%.

5.5 The Different Mobility Patterns of Early and Late Buyers

To examine whether the estimated home ownership effect on residential mobility is indeed related to the timing of becoming a homeowner, I take advantage of the fact that some of the buyers bought later than others. This makes it possible to examine the effect the timing that the resale of apartments is possible without additional restrictions on moving

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up the housing ladder. This examination achieves two goals. First, early and late buyers
are more similar in their socioeconomic characteristics than buyers and nonbuyers (see
Appendix Table A2), so their basic tendency to relocate is expected to be more similar
than that of buyers and nonbuyers. Second, since late-buyers were also treated, just
later, their residential mobility patterns relative to treatment date are expected to be
more similar to those of the early buyers than to those of nonbuyers, while taking place
at a later time.

To estimate the effect of purchase timing (buying early vs. buying late) on residential
mobility, I adopt a difference-in-differences approach, where the *treated* group is those
who bought early and the *control* relates to the late buyers. This approach also deals
with the potential simultaneity of the decisions to buy an apartment and to move away:
Comparing two groups of buyers probably offsets the effect of the probability of becoming
a homeowner on moving probability, so the estimation concentrates on the effect of the
timing at which the apartment can be sold for its market value on the decision to move.
Equation 4 describes the estimation methodology.

$$y_{ht} = \beta_0 + \beta_1 I_h^{EarlyBuyer} \times After_{ht} + X_{ht}\beta_x + \theta_h + \delta_t + \varepsilon_{ht} \tag{4}$$

In this equation, y_{ht} is the outcome variable: a dummy variable indicating whether
the household h moved to a different locality or SA in year t. $I_h^{EarlyBuyer}$ is an indicator
equalling 1 if the household bought an apartment in one of the years 2005 or 2006 and 0
otherwise - for the late buyers, who bought an apartment only in 2011 or 2012. X_{ht} are
time-varying household characteristics, including lags of labor income, marital status, and
disability status. θ_h are individual household FEs, controlling for time-invariant variation
in the probability of moving. δ_t are single year dummies, and ε_{ht} is the error term.

I estimate Equation 4 separately for early buyers that had bought in 2005 and in
2006, respectively, vs. all late-buyers, and apply the estimations in two time-windows.
The first time-window lasts 5 years following the early buyers' transaction date, and the
second lasts 10 years following that date. Throughout these time windows, early buyers
are already *treated*. The late-buyers, who were still *untreated* in the 5-year time window,
are already treated in the 10-year time window, but during this time-frame, they are still
under the restrictions with regard to selling the apartments they had just bought.[25]

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[25]Hausman et al. (2022) write that the actual time of purchase might be endogenous to the outcomes
of the household's labor supply. Since I relate to an outcome expected only several years after buying an
apartment, I assume that this issue is not major for the outcome of residential mobility.

Figure 5 presents raw shares of first-time movers in the samples of early and late buyers. Though the estimated effect is not very strong, it appears that the probabilities of residential mobility are slightly higher for the early buyers (illustrated by the black lines) than those of the late buyers (illustrated by the grey lines) after the treatment date (marked by the vertical full lines) and until the treatment date of the late-buyers (marked by the vertical dashed lines).

Table 7 presents estimation results for Equation 4. The results focus on the young sample, including home-buyers younger than the median age in 2004, who have a greater tendency to move, as shown earlier in the paper.[26] When the probability of moving to a different locality is examined, no significant effects were found in either time window or for either *early-buyers* groups. Nevertheless, when the probability of moving to a different SA is examined, the effect of buying an apartment early on residential mobility becomes positive and significant (except for the case of the 5-year window for the early buyers that bought in 2006), and also becomes greater in the 10-year time windows, indicating that those who bought early have a higher tendency to move when the treatment effect of the late buyers is still low.

5.6 Drivers for Moving

The analysis provides evidence concerning the greater tendency of buyers to move a short time following the transaction. This subsection investigates what drives certain buyers to move from their public housing address and others to stay, based on the differences in observables, which are either economic or sociodemographic factors. Public housing apartments were sold at a discounted price. Hausman et al. (2022) found that higher discounts were correlated with the probability of tenants to buy the apartments. As discussed earlier in this paper, the high discounts offered to buyers in practice - averaging about 75% - became part of the market value of the apartments 5 years from the date of transaction, when the value of the discount became a grant, and the apartments could be sold for their market price. Figure 6 presents the distributions of market (appraised) prices, as well as the discounts, seperately for the buyers who moved to a different address and those who remained in place.[27] It could be expected that the income effect of the discounts will cause buyers to consume more housing (e.g. by moving to different locations), but according to those distributions, it seems that it is less likely that the value of discounts created a difference in the probability of moving.

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[26]I also estimated the effect for the old sample, where no significant differences were found.

[27]These are valued for the time of becoming homeowners.

Table 7: Estimates of Buying Effect on the
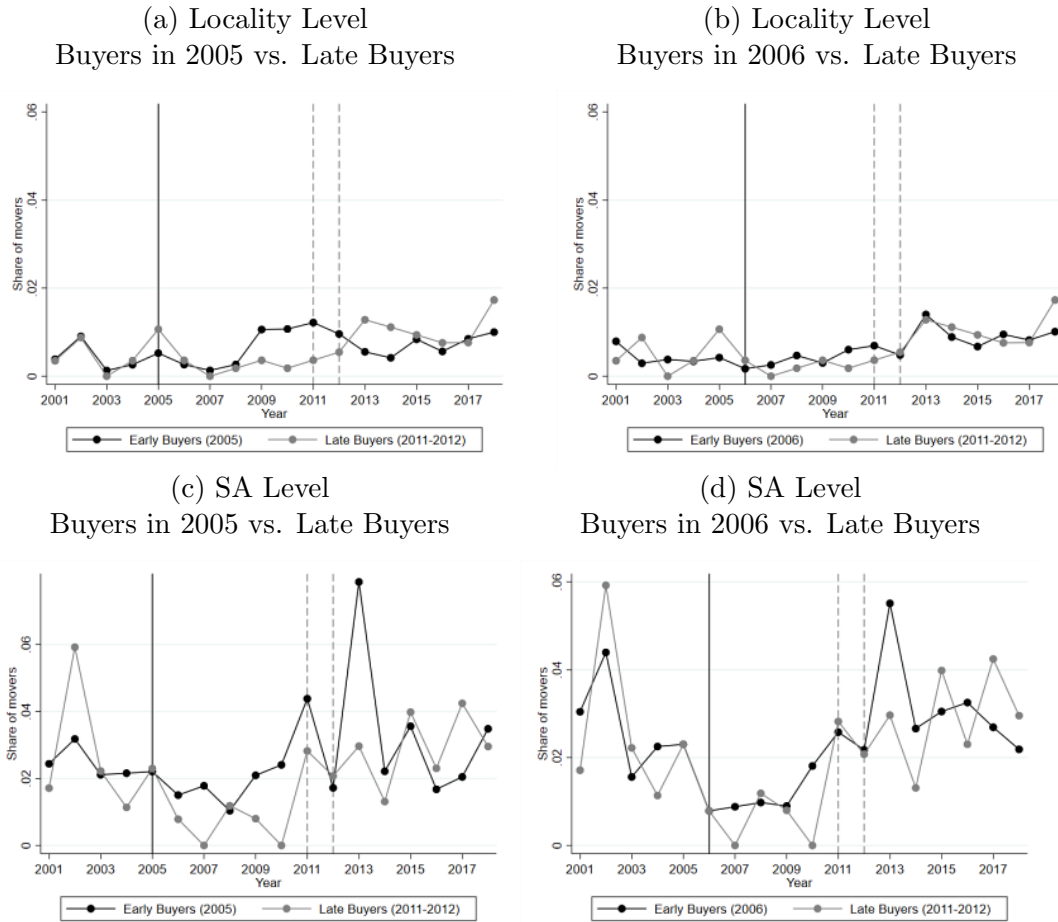Probability of Residential Mobility Between Localities and SAs: Early and Late Buyers

Panel A: Buyers in 2005 vs. 2011-2012 Buyers

	(1) Locality	(2) Locality	(3) SA	(4) SA
$I\{Year \geq 2005\}xI\{EarlyBuyer\}$	-5.41e-05	0.00134	0.0135*	0.0236***
	(0.00325)	(0.00293)	(0.00789)	(0.00741)
Observations	9,573	14,140	4,851	6,898
R-Squared	0.233	0.163	0.258	0.192
Number of Clusters	977	977	531	531
Moves until	2009	2014	2009	2014
Year of Transaction early buyers	2005	2005	2005	2005
Year of Transaction late buyers	2011-2012	2011-2012	2011-2012	2011-2012

Panel B: Buyers in 2006 vs. 2011-2012 Buyers

	(1) Locality	(2) Locality	(3) SA	(4) SA
$I\{Year \geq 2006\}xI\{EarlyBuyer\}$	0.000328	0.00132	0.00266	0.0115**
	(0.00183)	(0.00185)	(0.00464)	(0.00468)
Observations	20,612	30,560	11,068	15,879
R-Squared	0.258	0.169	0.286	0.203
Number of Clusters	2101	2101	1218	1218
Moves until	2010	2015	2010	2015
Year of Transaction early buyers	2006	2006	2006	2006
Year of Transaction late buyers	2011-2012	2011-2012	2011-2012	2011-2012

Notes: OLS estimates are the results of Linear Probability Model regressions. An observation in this sample is household-year for the years 2000-2018. The sample includes the households that bought a public housing apartment early (in 2005 or 2006) and late (in 2011 or 2012). The outcome variable is the probability of moving to a different Locality or SA and relates to households whose main tenant was younger then the median age in 2004, prior to the *Kan-Beiti* sale event. The regressions are fixed effect specifications of moving to a different address each year on the interaction of the home ownership indicator with an indicator for up to 5 years after the purchase date (in Columns 1 & 3) and up to 10 years after the purchase date (in Columns 2 & 4), including year effect, lagged family labor income, marital status and indicators for disability status of at least one of the family members. Robust standard errors in parentheses. *** denotes significance at the 1% level, ** at 5%, and * at 10%.

Figure 5: Residential Moves, Early vs. Late Buyers, Raw Data

(a) Locality Level
Buyers in 2005 vs. Late Buyers

(b) Locality Level
Buyers in 2006 vs. Late Buyers

(c) SA Level
Buyers in 2005 vs. Late Buyers

(d) SA Level
Buyers in 2006 vs. Late Buyers

Notes: The figures present the dynamics of the share of first-time movers to a different locality (Subfigures a & b) or SA (Subfigures c & d), out of those tenants who have not moved until the indicated year. Early buyers are *Kan Beiti* buyers, who bought an apartment in one of the years 2005-2006. Late buyers are *Dira Misheli* buyers, who bought an apartment in one of the years 2011-2012.

Table 8 compares the property and the personal characteristics of movers and stayers among buyers in the two samples: the locality and the statistical area. In both samples, it seems that movers' *property characteristics* were slightly inferior to those of stayers. The apartments were slighly older, smaller, located on a higher floor (with most buildings having no elevator) and had a lower average market price. The geographic location of apartments that movers bought tended to be in priority areas, which are mostly in the geographic periphery, but the differences were not significant to a specific geographic location. With respect to personal characteristics, the most dominant difference between movers and stayers is with respect to their age: Movers are 3.5-4 years younger, on average.[28]

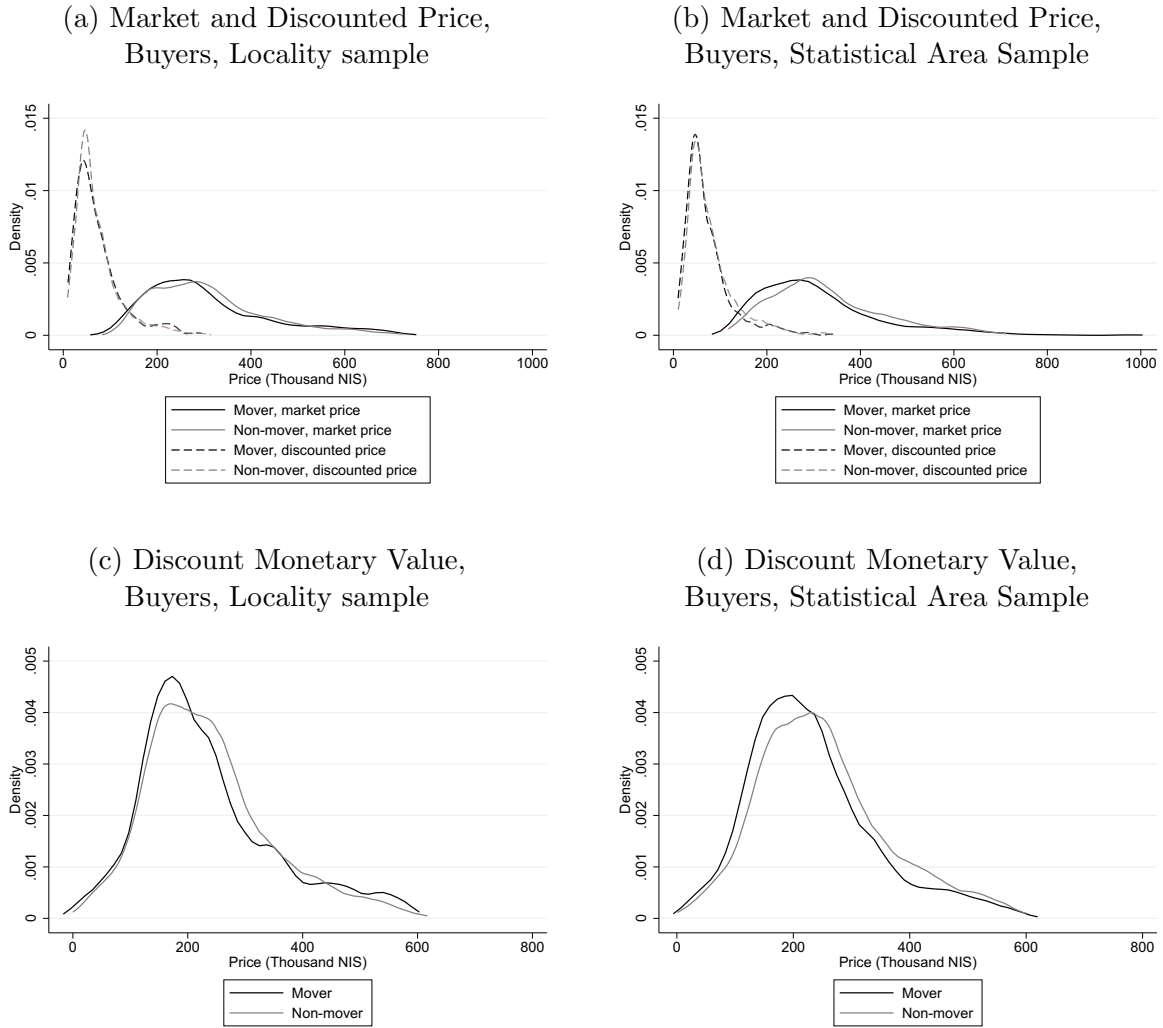[28]This was also examined in a regression on the probability of moving.

Table 8: Buyers: Comparison Between Movers and Nonmovers
Property, Geographic and Household Characteristics

	Locality analysis sample			Statistical area analysis sample		
	Non-mover	Mover	Difference	Non-mover	Mover	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Property characteristics						
Year of building\construction	1,975	1,974	-0.798*	1,976	1,974	-2.104***
	(10.574)	(9.633)	(0.450)	(10.898)	(10.163)	(0.401)
# of rooms	3.2	3.2	-0.070**	3.3	3.1	-0.171***
	(0.738)	(0.774)	(0.032)	(0.734)	(0.743)	(0.028)
Floor number	2.5	2.6	0.099	2.5	2.6	0.096*
	(1.482)	(1.619)	(0.064)	(1.545)	(1.529)	(0.058)
Appraised (market) price (NIS)	313,998	311,918	-2,079.463	336,273	308,287	-27986.518***
	(134392.375)	(144199.281)	(6,055.059)	(136169.500)	(129334.742)	(5,147.217)
Post-discount price (NIS)	75,804	78,042	2,238.783	83,520	75,589	-7,930.811***
	(64,917.320)	(67,421.820)	(2,913.314)	(72,554.898)	(60,982.262)	(2,639.420)
Discount rate	0.76	0.75	-0.008	0.75	0.75	0.002
	(0.162)	(0.178)	(0.007)	(0.162)	(0.164)	(0.006)
Priority area	0.37	0.42	0.046**	0.32	0.37	0.044**
	(0.482)	(0.493)	(0.021)	(0.468)	(0.482)	(0.018)
Geographic district						
Jerusalem	0.07	0.08	0.008	0.07	0.09	0.025**
	(0.253)	(0.267)	(0.011)	(0.248)	(0.288)	(0.010)
The North	0.25	0.30	0.052***	0.22	0.25	0.036**
	(0.432)	(0.459)	(0.019)	(0.413)	(0.436)	(0.016)
Haifa	0.09	0.11	0.016	0.08	0.08	-0.004
	(0.287)	(0.309)	(0.012)	(0.275)	(0.269)	(0.010)
The Center	0.20	0.16	-0.044***	0.24	0.18	-0.064***
	(0.403)	(0.366)	(0.017)	(0.427)	(0.380)	(0.015)
Tel Aviv	0.10	0.14	0.039***	0.12	0.13	0.010
	(0.297)	(0.343)	(0.013)	(0.320)	(0.331)	(0.012)
The South	0.29	0.22	-0.070***	0.28	0.28	-0.002
	(0.454)	(0.415)	(0.019)	(0.448)	(0.448)	(0.017)
Household characteristics						
Age of main tenant	44	41	-3.492***	46	42	-4.003***
	(8.911)	(9.072)	(0.384)	(8.760)	(8.790)	(0.331)
Post-1989 immigrant	0.34	0.29	-0.044**	0.40	0.29	-0.110***
	(0.472)	(0.455)	(0.020)	(0.491)	(0.455)	(0.018)
Receive disability allowance	0.21	0.19	-0.015	0.21	0.18	-0.034**
	(0.405)	(0.394)	(0.017)	(0.408)	(0.381)	(0.015)
Single parents	0.38	0.41	0.029	0.39	0.39	0.006
	(0.485)	(0.492)	(0.021)	(0.487)	(0.488)	(0.018)
Employed	0.69	0.71	0.022	0.67	0.71	0.037**
	(0.463)	(0.454)	(0.020)	(0.470)	(0.456)	(0.018)
Annual labor income (NIS)	38,877	40,317	1,440.253	37,429	38,552	1,122.467
	(48,705.379)	(54,254.363)	(2,123.950)	(47,862.105)	(49,729.273)	(1,832.624)
Receive income support	0.35	0.32	-0.039*	0.38	0.34	-0.036**
	(0.478)	(0.465)	(0.021)	(0.485)	(0.475)	(0.018)
Observations	4,729	610		1,910	1,110	

Notes: The samples match those in Table 2. Source: National Insurance Institute, Amidar, and the author's calculations.

Figure 6: Discount Effect? Apartment Price and Discount Value for Buyers
by Mover Status

(a) Market and Discounted Price,
Buyers, Locality sample

(b) Market and Discounted Price,
Buyers, Statistical Area Sample

(c) Discount Monetary Value,
Buyers, Locality sample

(d) Discount Monetary Value,
Buyers, Statistical Area Sample

Notes: The figures present the monetary value of assessed market price, discounted price actually paid
(Subfigures a & b) and the differences between them (Subfigures c & d). Observations with prices higher
than the 99th percentile or lower than the 1st percentile were dropped. The samples used to produce the
figures include the same households as in Table 2.

6   Discussion and Concluding Remarks

Understanding the effects of housing policies on residential mobility is economically im-
portant for two reasons. First, the place of residence determines the variety of services
and social networks households enjoy, and these may have an impact on economic oppor-
tunities. Second, residential mobility is influenced by the distribution of housing tenure
types and housing costs. Economic policies that affect housing costs and housing tenure

types may change residential mobility patterns, and may lead to misallocation of housing between household types and even make housing markets less efficient.

This paper takes advantage of public housing sales to sitting tenants in Israel to empirically study the effect of home ownership on buyers' residential mobility. The main results indicate that becoming the owners of a previousely public housing apartment increased the probability of moving to a different neighborhood by 1-1.9 percentage points in a 5-year window and by 1.7-2.5 percentage points in a 10-year window. Buying a public housing apartment also increased the probability of moving to a better SES ranked neighborhood, though at a lower rate of 0.4-0.5 percentage points. The incidence of residential mobility to a different locality is lower: OLS results point to an increase of 0.3-0.5 percentage points in the probability of moving to a different locality over the course of 5 years (and 0.5-0.9 percentage points over the course of 10 years). The estimated OLS effects are meaningful and stand in line with the findings of previous studies.

Three effects may explain the observed residential mobility differences between buyers and nonbuyers: (1) Removing regulatory barriers for residential rellocation: Public housing tenants' ability to change their place of residence is limited to the segment of available public housing supply and the allocation rules of public housing authorities. Once becoming the owners of an apartment, these barriers are removed. (2) The income effect created by the discounts on apartments' market prices upon purchase. (3) Granting tradable property rights. The empirical examination in this study could not seperate the three different effects. However, by focusing on the potential mechanism that causes some buyers to move and others to stay in the same location, we can arrive at three conclusions: (1) Property characteristics influenced the decision to move, indicating that movers were those who wished to upgrade from poor housing quality. (2) Movers were younger, indicating that the longer prospect of enjoying a different location matters in the decision to move. (3) The exact nominal value of the discounts did not make a difference in the decision to move.

Governments worldwide support housing affordability for low-income households, and many provide public housing in those settings (Salvi del Pero et al., 2016). Some, for example the UK, manage schemes that support public tenants in buying public units and becoming homeowners (see, for example, Disney and Luo (2017)). This paper is probably the first to provide evidence on the residential mobility of low-income public housing tenants becoming homeowners in those settings. Previous papers that dealt with the question of residential mobility following the purchase of public housing units dealt either with households that were not necessarily from the lower income strata (Karadja

(2016), Sodini et al. (2021)) or with situations where the setting served state employees (Wang, 2011). Yet, similar to the current paper, these papers found that following the assisted home ownership, residential mobility increased and caused households to move up the housing ladder - i.e. to move to better-ranked neighbodhoods or improve the match between the dwelling and their needs.

There is growing evidences of the importance of residential location, and therefore residential mobility, as a leverage for socioeconomic mobility, especially when moving to lower-poverty environment. The quality of the residential environment generates interactions that may be essential for the economic mobility of children (Chetty and Hendren (2018), Chyn (2018)). Policies may prevent or encourage households from making decisions concerning their residential location. They influence both the relative costs of residential options and the information that households receive and understand concerning the potential contribution of the residential location (Bergman et al., 2019).

In the current setting, several data limitations prevented us from discussing important issues and limited the scope of discussion. First, the resolution of the addresses that were available for this research is based on an algorithm that has some built-in inaccuracies in setting the location. It is preferable to estimate the probability of residential mobility using higher-quality geographic measurements of addresses, which will improve the estimation accuracy, as explained in Section 4. Second, as changes in household composition (such as the number of people living in the apartment) are expected to have an important role in residential mobility decisions, it could be valuable to include such measures as controls in the research. Third, richer data on employment location could be valuable in analyzing the interactions between residential mobility and labor markets. Such data were not available to me as a longitudinal series in the current setting. These should be developed and investigated in future research.

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A   Appendix Tables and Figures

Figure A1: The Probability of Moving,
Over Time, Divided into Young & Old
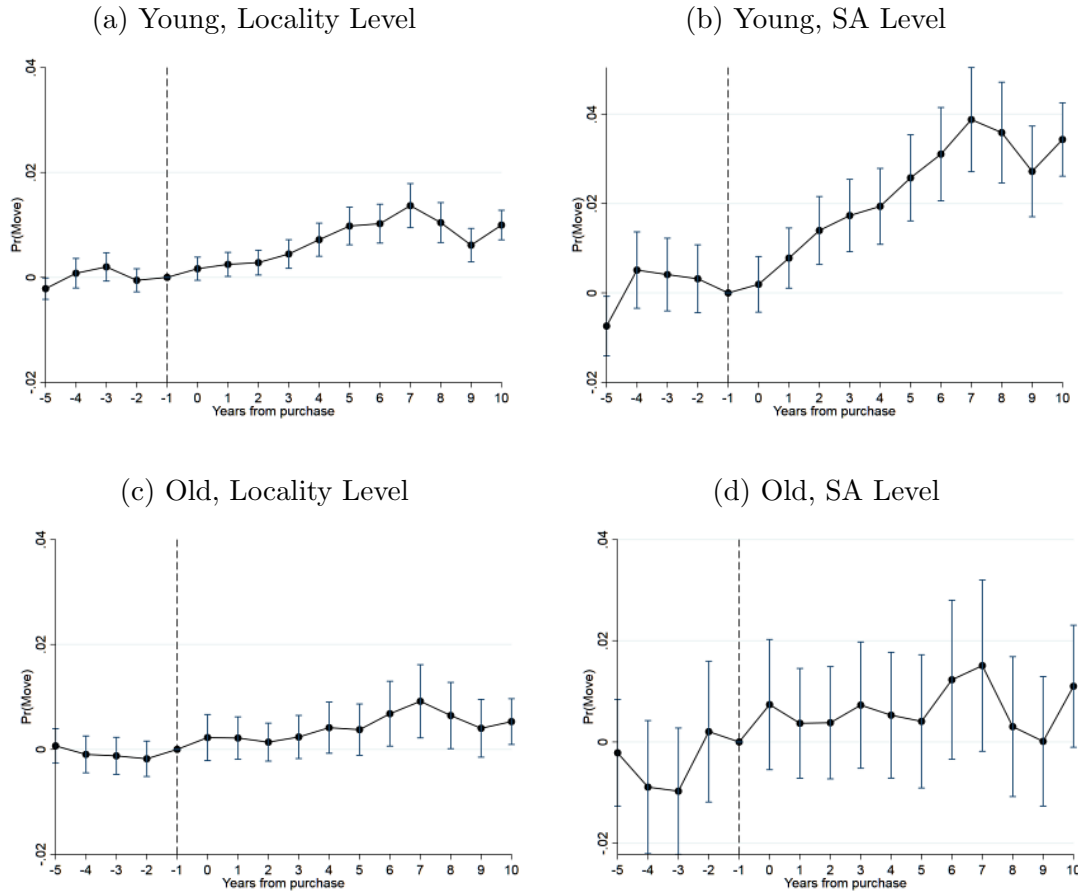
(a) Young, Locality Level

(b) Young, SA Level

(c) Old, Locality Level

(d) Old, SA Level

Notes: The figures present the dynamics of the probability of moving over time of buyers and nonbuyers, divided by age groups according to their age relative to the median age in 2004, as represented by the term β_2^l that is estimated in Equation 2. Subfigures a & b present estimation results of the treatment effect on the probability of moving, relative to transaction year, at the locality and the SA levels, for the young age group. Subfigures c & d present estimation results of the treatment effect on the probability of moving, relative to transaction year, at the locality and SA levels, for the old age group. These regressions control for the individual household FEs as well as the lagged labor income and lagged marital status. The samples used to produce the figures include the same households as in Table 2. 95% confidence intervals are displayed, based on robust standard errors clustered at the individual household level. In addition, the regressions control for lags of family labor income and marital status as well as individual year FEs and individual household fixed effects.
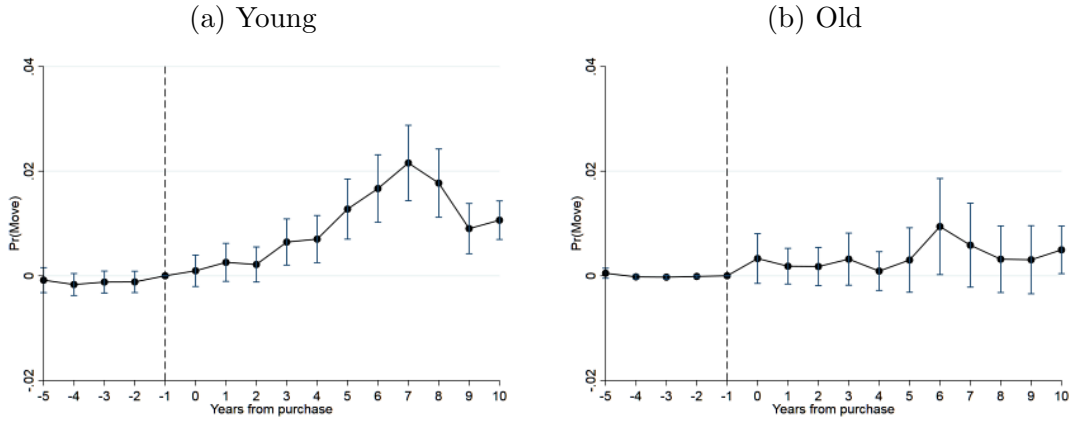
Figure A2: The Share of Households Moving to a Different SES Neighborhood
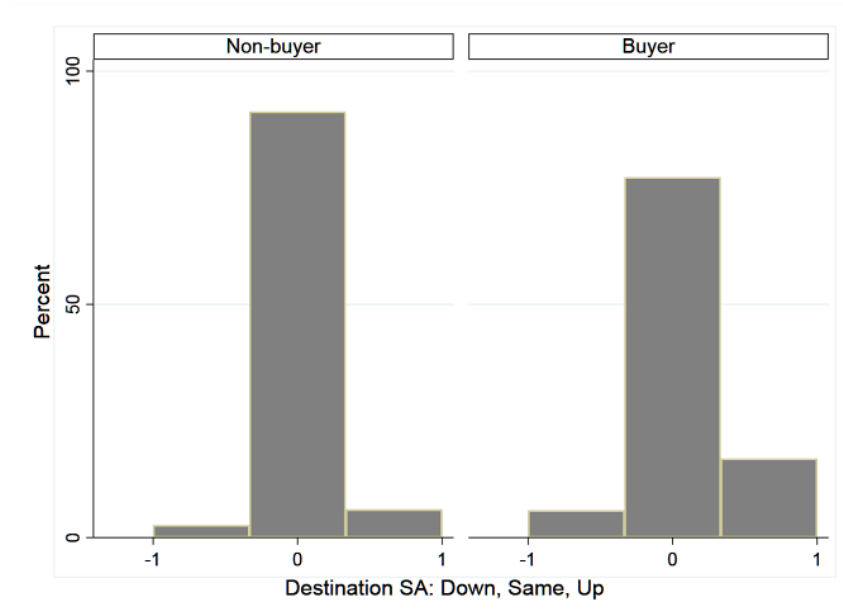
Notes: The figure presents the share of households that moved to a higher or lower SES cluster or stayed in the same cluster over the period 2005-2018, broken down to nonbuyers and buyers.

Figure A3: The Probability of Moving to a Better Neighborhood,
Over-Time, Divided into Young and Old

(a) Young   (b) Old

Notes: The figures present the dynamics of the probability of moving to a higher SES neighborhood over time of buyers and nonbuyers, divided by age groups according to their age relative to the median age in 2004, as represented by the term β_2^l that is estimated in Equation 2. Figure A3a presents estimation results for the buyers and the nonbuyers whose age was below the median age in 2004, while Figure A3b presents the results for those who were older than the median age. The regressions control for the individual household FEs as well as the lagged labor income and lagged marital status. The samples used to produce the figures include the same households as in Table 2. 95% confidence intervals are displayed, based on robust standard errors clustered at the individual household level. In addition, the regressions control for lags of family labor income and marital status as well as individual year FEs and individual household fixed effects.

Table A1: The Probability of Mismatch between
the Public Housing and Registry Records of Addresses

	(1) Localities	(2) SA's
Buyer	-0.00563	-0.0206**
	(0.00507)	(0.00844)
Constant	0.934***	0.540***
	(0.00141)	(0.00235)
Observations	20,840	20,840
R-squared	0.025	0.320
Geo FE	Locality	SA
Number of clusters	90	860

Notes: Linear Probability Model regressions. The table presents estimate results of the probability of mismatch between the public housing address in Amidar's data and the population registry data. An observation in the sample is a household in 2005. The sample matches that of Panel A in Table 2. Robust standard errors in parentheses. ** denotes significance at the 5% level and *** at 1%.

Table A2: Selected Characteristics of Early and Late Young Buyers

Panel A: Buyers in 2005 vs. 2011-2012			
	Late Buyers	Early Buyers	Difference
Age	41.479	41.662	0.182
	(7.168)	(6.470)	(0.607)
Post-1989 immigrant	0.247	0.484	0.236***
	(0.433)	(0.500)	(0.043)
Number of children under 18	1.546	2.258	0.712***
	(1.629)	(1.783)	(0.156)
Single parents	0.351	0.395	0.044
	(0.478)	(0.490)	(0.044)
Disabled	0.201	0.160	-0.041
	(0.402)	(0.367)	(0.034)
Employed	0.665	0.727	0.062
	(0.473)	(0.446)	(0.041)
Receive income support	0.381	0.359	-0.022
	(0.487)	(0.480)	(0.044)
Observations	194	337	

Panel B: Buyers in 2006 vs. 2011-2012			
	Late Buyers	Early Buyers	Difference
Age	41.479	41.888	0.408
	(7.168)	(6.234)	(0.500)
Post-1989 immigrant	0.247	0.344	0.096***
	(0.433)	(0.475)	(0.037)
Number of children under 18	1.546	2.527	0.981***
	(1.629)	(1.734)	(0.135)
Single parents	0.351	0.446	0.096**
	(0.478)	(0.497)	(0.039)
Disabled	0.201	0.184	-0.017
	(0.402)	(0.387)	(0.031)
Employed	0.665	0.722	0.057
	(0.473)	(0.448)	(0.035)
Receive income support	0.381	0.356	-0.025
	(0.487)	(0.479)	(0.038)
Observations	194	1,024	

Notes: Amidar & NII data. Column 1 relates to *LateBuyers*: buyers that bought in the *Dira Misheli* sale event in the years 2011-2012. Column 2 relates to *EarlyBuyers*: buyers in the *Kan Beiti* sale event, who bought their apartments in the years of 2005 or 2006. Column 3 is the differences in means. The buyers included in the table are those whose age was lower than the median age in 2004.