Like Father Like Son?

Social Engineering and Intergenerational Mobility in Housing Consumption

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December 2021

Abstract

We estimate the rate of intergenerational mobility in housing consumption in the context of large-scale social engineering programs in Singapore. Using a comprehensive set of data on residential demographics merged with the real housing transaction records covering 149,745 parents-child pairs from 1995 to 2018, we find upward mobility for children born to grass-roots parents, downward mobility for children of middle-class parents, and high persistence for children of upper-class parents. Affordable public housing and high-quality public education are evident to promote intergenerational mobility in housing consumption for children born to grass-root parents. Those parents save from housing consumption and invest in children's human capital; quality education further promotes their upward mobility. Possible reason for the downward intergenerational mobility of children born to middle-class parents lies in financial constraints in children's human capital investment or difficulties in sorting into good neighborhoods squeezed from high housing consumption. Our results shed light on the design of social engineering programs for countries aiming to tackle social inequality using public policies.

Keywords: housing consumption, intergenerational mobility, social engineering programs, human capital

JEL Codes: E24, J62, J68

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1 Introduction

From the classic American Dream to the emerging Chinese Dream, many stories have raised hopes about rising from rags to riches across generations (Piketty, 2000; Krueger, 2012; Corak, 2013). Most literature focuses on intergenerational mobility in income (Solon, 1989, 1992; Corak, 2004; Fan, 2016; Fan et al., 2021; Emran et al., 2019) or intergenerational correlations in wealth (Charles and Hurst, 2003; Boserup et al., 2014; Adermon et al., 2018; Fagereng et al., 2019; Black et al., 2020a), to investigate the transmission of economic well-being across generations. Yet, consumption is arguably more directly connected to consumers' utility and material well-being than other measures (Charles et al., 2014). However, few studies have been done on intergenerational correlation in consumption, partially due to a lack of quality data on expenditure records of parents and children.

In this paper, we focus on the pattern and mechanism of correlation in housing consumption across generations. There are reasons to suppose that intergenerational mobility in housing consumption may provide new insights about the extent and mechanism of transmission of material well-being across generations. First, as the largest household consumption good, housing contributes significantly to the overall consumption and thus the intergenerational correlation in consumption. To the best of our knowledge, this is the first study using real and large-scale housing transaction data to examine the intergenerational correlation in housing, despite that literature has touched upon intergenerational transmission of homeownership (Helderman and Mulder, 2007) or used imputed housing value as a component of overall consumption (Bruze, 2018). Second, housing consumption co-moves with other household expenditures because of substitution effects under household budget constraints. Among household expenditures beyond housing consumption, human-capital investment in offspring is a prominent component, which serves as an important channel for intergenerational transmission (Mogstad, 2017). Third, as an asset class that stores value, housing provides access to home equity which affects consumption behaviors (Agarwal and Qian, 2017). The wealth effect of housing on household consumption is found to be larger and more significant than that of other types of net equity (Caceres, 2019).

Nevertheless, estimating intergenerational mobility in consumption is challenging because of lifecycle bias, attenuation bias, and co-residence bias. Different age-consumption trajectories may bias the estimate of lifetime consumption. Consumption in specific year(s) may be subject to transitory shocks and thus may not be a proper measure of lifetime consumption. In such case, the estimates are likely biased, which is termed as attenuation bias. Conventional household surveys, which target

household members staying at home during survey time, are selective and cannot represent the overall population. Our high-quality residential data linking with real housing transaction records contribute to overcome those challenges. Using data from proprietary and public sources in Singapore, we merge residential data tracking household members' full residential history with housing transaction records in the nearest years from 1995 to 2018. We thus create a comprehensive housing mobility dataset for a large sample of 149,745 parents-child pairs. To overcome the lifecycle bias, we restrict children to be at least 30 years old, and use housing transaction prices for parents from the first observed waves and for children from the last observed waves. By nature, housing is not a commodity with high trading frequency and housing prices are also unlikely to fluctuate excessively. The nature of housing consumption contributes to mitigate the attenuation bias. In addition, we focus on non-co-residing parents and children, which overcomes the conventional coresidence bias.

We generate ranks in housing consumption between 0 and 100 for children and parents in their generations respectively, and regress the former on the latter. Using this measure of rank-rank slope, we show a non-monotonic pattern in intergenerational mobility in housing consumption. We find upward mobility (compared to their parents) for children born to the grass-roots parents (whose housing consumption lies in the bottom 50^{th} percentiles) with an intergenerational housing rank correlation as low as 0.06; and downward mobility for children born to the middle-class parents (whose housing consumption lies between 50^{th} and 80^{th} percentiles) with an intergenerational housing rank correlation of 0.11. However, the children of rich parents in the top 20 percentile ranks have a high intergenerational housing rank correlation of 0.9, which indicates very high persistence in housing consumption across generations.

To explore the mechanism of intergenerational mobility in housing consumption, we first associate it with social engineering program in public housing in Singapore, to test if freeing up parents' financial resources allows more investment in child's human capital and thus promote intergenerational mobility in housing consumption. Singapore's large-scale public housing scheme provides a valuable institutional setting to test this hypothesis. With generous subsidies from the government, the public housing in Singapore accommodates more than 80% of Singapore's residents; and about 90% of the residents own their public housing units. Compared to the Move to Opportunity (MTO) experiment in the U.S., which involved 4,604 low-income families in five cities between 1994 and 1998 (Chetty et al., 2016), Singapore's experiment, which covers more than two million residents, provides nice variations in housing cost to test our hypothesis.

Specifically, if affordable public housing can relax parents' budget constraints and trade-off with their investment in child's human capital, we would expect the correlation in intergenerational housing consumption to be lower among poor families than rich ones—as the former is more financially constrained and can save proportionally more from affordable public housing. Thus we would anticipate higher mobility for children born in public housing (at the lower end in the housing consumption spectrum) compared to their counterparts born in private housing (at the upper end of the housing consumption spectrum). From the temporal perspective, we would expect higher degree of intergenerational mobility in period with more aggressive public housing expansion, compared to period with less aggressive expansion. Echoing the two hypotheses, we indeed find that children who grow up in public housing experience significantly more mobility in housing consumption later in life than those who are born to parents living in private housing. The intergenerational rank correlation estimate in the former group (0.14) is merely 15% of the one in the latter group (0.92). In addition, there is significantly higher intergenerational mobility in housing consumption during aggressive public housing expansion periods when restrictions on the housing supply are relaxed to meet increasing demand by eligible applicants in the public housing market.

In addition, we also exploit variations in public school quality in Singapore and test if educational quality is an important driver of upward mobility in housing consumption. If public education, specifically at primary school, benefit children from poor families more than those from rich ones—since the former are more financially constrained and are less able to provide complementary private education—we would expect that children born to poorer parents but growing up in neighborhoods with good public schools demonstrate high intergenerational mobility in housing consumption. Specifically, we exploit variations in the quality of primary schools at the neighborhood level as a measure for public education. We characterize good neighborhoods as those with above-median take-up rates of primary schools, while inferior neighborhoods are defined as those with below-median take-up rates.

Consistent with our expectation, we find heterogeneous pattern in the impact of higher education quality versus lower education quality neighborhoods on intergenerational mobility in housing consumption. The good neighborhoods have significantly positive effect in promoting intergenerational mobility for children born to parents in the bottom quintile of housing consumption. By contrast, the good neighborhoods stagnate housing consumption across generations for children born to the richest parents in the top quintile of housing consumption. Possibly, it is due to the reason

that richer parents can sort into neighborhoods with higher quality public education. The non-constrained budget in investing in their children's human capital from complementary private education further enhances their persistence in intergenerational housing consumption. Nevertheless, the neighborhood quality does not show statistically significant impact on the intergenerational mobility in housing consumption of children born to parents in the 3 mid- quintiles.

One assumption for our analysis is that for financially constrained parents, there is a trade-off between their housing consumption saved from affordable public housing and human capital investment in children. A potential concern is that such substitution may alternatively happen between housing consumption and parents' other individual/household consumption, instead of investing in children's human capital. If this is true, we would expect a change in consumption other than housing for parents with financial constraints (presumably at the lower end of housing spectrum), but not those without financial constraints. In the intergenerational context, we would expect differential patterns in intergenerational mobility of consumption other than housing across poor and rich families. Using credit/debit card data recording expenditure other than housing from a leading bank of Singapore, we explicitly test this hypothesis. We show low intergenerational rank correlation in consumption other than housing. Such pattern is uniform across parents' percentile ranks and with no significant difference between parents living in public and private residences. It validates our hypothesis that parents with financial constraints trade-off their housing consumption from affordable public housing with investment in child's human capital.

Our paper makes two contributions to the literature. First, most studies in the intergenerational literature focuses on income or wealth across generations (Solon 1992; Corak, 2004; Adermon et al., 2018; Fagereng et al., 2019; Black et al., 2020a; Fan et al., 2021). Recent literature extends intergenerational research to financial behaviors, such as consumption, investment, and savings. Specifically, Waldkirch et al. (2004), Charles et al. (2014) and Bruze (2018) use survey data to construct parents-child pairs and document intergenerational linkages in household consumption. Using Swedish administrative data, Black et al. (2017) show association in financial investment behavior between children and both biological and adoptive parents. Similar intergenerational correlation is observed on household saving rates and consumption, using the same Swedish data (Black et al., 2020b). Housing, as the largest component of household consumption, has important implications in intergenerational mobility, though only a few studies have touched upon. Chiteji and Stafford (1999) suggest that parental choice of homeownership could have carryover across

generations. Black et al. (2020a) use imputed market value of housing as a component of overall wealth to examine wealth inequality and intergenerational transmission. Using administrative data combined with housing transaction records, we are able to identify the real housing consumption of parents and children. To the best of our knowledge, this is the first study to document correlation in real housing consumption across generations. Moreover, we provide first set of empirical evidence on a new environmental pathway of affordable public housing which can relax budget constraints in child's human capital investment. We show high intergenerational mobility in housing consumption among grass-root families, declining housing status (compared to their parents) for children from sandwiched middle class, and high persistence across generations in housing consumption for the rich families. We consider our paper as complement to active intergenerational literature in financial behaviors, given the nature of housing being not only the largest household consumption good, but a store of wealth and a vehicle of investment.

Second, our study contributes to the understanding of mechanisms for intergenerational transmission of socioeconomic status. Literature examines nature versus nurture effect that drives intergenerational mobility. The nurture effect is found to be influential in shaping children's outcomes, with a prominent factor of human capital (Mogstad, 2017; Fagereng et al., 2018; Li et al., 2018; Smith et al., 2019). Researchers also investigate other channels, such as neighborhood effect, redistribution preferences, and differential fertility (Alesina et al., 2018, Chetty and Hendren, 2018a,b; Yu et al., 2021). Using Swedish adoption data, Black et al. (2017, 2019) disentangle genetic and environmental factors, and find that the environmental influences are more important for financial behaviors such as investment, consumption, and savings. Contributing to this set of active literature, we show a new environmental pathway of affordable public housing in understanding intergenerational mobility in housing consumption. Using large-scale social engineering programs in Singapore as a laboratory, we demonstrate positive effects of public housing, together with public education programs, in promoting intergenerational mobility, especially for children born to grass-root parents via freeing up financial constraints in investing in child's human capital in early childhood. For rich parents with no financial constraints on sorting into good neighborhoods and little taxation interventions, their children's housing consumption highly persists. For the sandwiched middle-class parents, however, their children appear to worsen off in housing consumption, as they may neither be eligible to take public housing nor being financially capable to sort into good neighborhoods.

Our findings have policy implications for other countries aiming to use public housing policies to

promote intergenerational mobility, especially for grass-root families. The results also call for policy that pays more attention to the declining status of the sandwiched middle-class children and persistence in socioeconomic status across generations for the richest families. Social engineering programs have significant ramifications for different segments in a society, not only intragenerationally, but also intergenerationally.

The rest of the paper is organized as follows: Section 2 provides the institutional background on social engineering programs in Singapore; Section 3 describes the data; Section 4 specifies the empirical strategy; Section 5 analyzes the empirical results; and Section 6 concludes.

2 Social Engineering Programs in Singapore

As a city-state, Singapore implements various programs to promote affordable housing and quality education, such as public housing scheme to promote home ownership, a public education system to provide access to general education, and, at the same time, a relatively low tax environment to attract talents across the world. The institutional setting of Singapore thus offers a valuable opportunity for studying how large-scale social engineering programs can affect mobility in intergenerational housing consumption.[1]

2.1. Subsidizing Homeownership via Public Housing Programs

The housing market in Singapore consists of private landed houses, private non-landed houses (condominiums and apartments), and subsidized public housing flats, ranked in descending order by price, and offers Singaporean residents (citizens and permanent residents) and non-residents diverse housing choices (Sing et al., 2006). Foreigners are excluded from the public housing market; they can

[1] In a speech on social mobility, trust in the government and institutions delivered in the UK in June 2019, Singapore's Senior Minister Tharman Shanmugaratnam said: *Social mobility is stubbornly low in many countries, median income growth negligible for a decade or longer, younger people see fewer prospects of getting good jobs and owning a home, and inequalities have widened. It is much easier to promote relative social mobility, when you have absolute mobility, where everyone is progressing. We must ensure this moving escalator continues. When the escalator slows or stops moving, those in the middle cannot be faulted for becoming more anxious not just about those who might catch up from behind. These tasks cannot be left to the market, which on its own tends to amplify initial disadvantages and advantages through assortative mating, better-educated parents investing more time and resources in their kids, different peer influences shaping different aspirations as kids grow up, and top employers hiring people based on education or social pedigree. It is hence facile to object to upstream interventions on grounds that they amount to "social engineering." The role of state and of all of us collectively, must be to mitigate the "social engineering" of the market, make opportunities less unequal, and prevent an underclass and other legacies from becoming too entrenched to solve in democratically acceptable ways.*

purchase non-landed dwellings such as condominiums and apartments.[2]

The Singapore government has embraced the Home Ownership for the People scheme as one of the key social agenda targeted at solving acute housing shortage problems since 1964. Via its national housing authority, Housing and Development Board (HDB), the government initiated many rounds of large-scale public housing construction to provide affordable housing to meet the nation's housing needs. The HDB completed nearly 667,575 housing units between 1960 and 1990, enabling a high rate of homeownership of 87% by 1990 (Sing and Dinesh, 2018). The new public housing flats are sold at subsidized prices only to Singaporean citizens who meet the eligibility criteria. One of the criteria used to ensure that affordable housing is accessible for the low-to-medium income families is an income ceiling, currently set at SGD 14,000 per month per household.[3] Moreover, the government provides housing grants of up to SGD 80,000 as a form of demand-side financial support to support first-time buyers of housing flats directly from the HDB.[4]

High-income families (earning more than SGD 14,000 per month) and Singapore's permanent residents who are not eligible to buy new housing flats directly from the HDB can still buy flats without subsidies on the public housing resale market. Owners who benefited from HDB subsidies in their flat purchases can sell their flats at the full market price after they occupied them for five years, fulfilling the minimum occupation period (MOP).

The supply of new HDB (public housing) flats vary across years, depending on the market condition and the public housing flat allocation system. Before 2001, the HDB flats were sold under the Registration for Flats System (RFS). It was effectively a queue system where applicants were allocated apartments that were either under construction or that has been completed. It was criticized for over construction and waste of public resources especially during the 1997 Asian Financial Crisis

[2] In 2017 and 2018, the average private residential property price was SGD 1,183,375, whereas public housing flats sold for an average SGD 439,792 in the resale housing market. In the new (primary) sale by the HDB, new housing flat prices are heavily subsidized, ranging from SGD 86,000 for a two-room flat to SGD 415,000 for a five-room flat in non-mature towns, and from SGD 117,000 for a two-room flat to SGD 562,000 for a four-room flat in mature towns. The Residential Property Act (Chapter 274) prohibits foreigners from owning vacant residential lands and landed houses without prior approval from the Controller of Residential Property, with the exception of landed developments in designated locations in Sentosa, a tourist island to the south of Singapore.

[3] The income ceiling has been raised three times in 8 years to reflect growth in national income from SGD 8,000 to SGD 10,000 SGD in August 2011, SGD 12,000 in 2015, and to SGD 14,000 in September 2019. The other eligibility criteria for the purchase of new HDB flats include the formation of a nuclear made up of spouses, parents, children, or siblings. Unmarried couples could apply for new HDB flats under the Fiancé/Fiancée program.

[4] First-timer families who buy housing flats from the HDB are given up to SGD 80,000 as an Additional Central Provident Fund (CPF) Housing Grant (AHG) of up to SGD 40,000 and a Special CPF Housing Grant (SHG) of up to SGD 40,000. With these grants, first-timer families could pay as little as SGD 6,000 for a two-room Flexi flat, or SGD 90,000 for a three-room flat.

and was replaced by the Build-To-Order (BTO) Scheme introduced in April 2001. In the new BTO system, the HDB will commence construction on new public housing only after receiving new flat applications for at least 70% of the units projected to be built. It therefore greatly scaled back construction since the inception of the HDB. The supply policy in 2001-2010 caused severe imbalance with high pent-up demand in the market, which fueled unsustainable price inflation in the resale market. This compelled the government to act swiftly to beef up construction programs that add more new flats to the market afterwards.

Figure A1 portrays the annual number of HDB flats constructed from 1977 to 2017. It varies from as low as 2733 new units in 2006 to as high as 67,017 units in 1984. We divide the overall time span into three periods: low, median, and high HDB expansion period, where the low and high period represents years with new HDB flats constructed in the bottom and top 1/3, respectively. We then match parents' housing transaction years with the three construction periods, to capture the supply-side shock on intergenerational mobility in housing consumption. Detailed empirical specification is discussed in Section 4.

Other than meeting basic housing needs, Singapore's government also employs various housing programs, such as the Married Child Priority Scheme (MCPS) and the Multi-Generation Priority Scheme (MGPS), to promote intergenerational family bonding and cohesion. The MGPS in particular encourages married children to live near their parents by giving priority allocation to parents and married children who jointly apply for two flats in the same BTO project.[5] The typical wait time for BTO flats is from four to five years from receiving approval for a flat to taking occupancy of the flat; and families that do not wish to wait for BTO flats buy existing flats on the resale market, and they either receive housing grants of SGD 40,000 if they choose to live near or with their parents or SGD 30,000 otherwise. The differential grants called Proximity Housing Grants (PHGs) in 2015 were increased to SGD 20,000 if they either buy a resale flat to live with their parents or buy a resale flat that is within 2 km of their parents' flat.[6]

[5] Under the MGPS, parents and their married children can make a joint application for two flats, which may include either studio apartments, two-room Flexi or three-room flats in a BTO project. If balloted, both parents and married children are given the opportunity to choose flats on the same floor or elsewhere in the BTO project.

[6] In 2018, the PHG was raised to SGD 30,000 as long as one of applicants (parents or married children) is a Singaporean Citizen (SC) or Singapore's Permanent Resident (SPR), and lives nearby, the definition of which was extended from 2 km to 4 km (Chia, 2018).

2.2. Public Education System in Singapore

The education system in Singapore is divided into three stages: six-year primary school education, the four- to five-year secondary school education, and post-secondary school education. Different school options, from primary schools to universities, are available for children of all age groups and academic ability.

All Singaporean citizens born after January 1, 1996, are required to attend national primary school, whether government schools or government aided schools. Government schools are fully funded and managed by the government, and they strictly follow the curriculum and guidelines created by the Ministry of Education (MOE), whereas government aided schools receive funding from private sources via various fund-raising activities, supplemented by a substantial proportion from the government. They are private schools that have some degree of autonomy with independent management boards. Some government aided schools are affiliated with religious groups, local clan associations, or private organizations; and they are members of a group of schools affiliated with other secondary schools, junior colleges and tertiary institutions. Children of foreigners can either register their children at one of these types of schools or enroll them at international schools, which charge high tuition compared to national schools.

Singaporean parents who are competitive will go the extra distance to get their children into popular primary schools. The primary school allocation system adopted by the MOE consists of several phases, which allocates places sequentially in descending order from Phase 1 to Phase 3. Children who are Singaporean citizens (SCs) and Singapore Permanent Residents (SPRs) can participate in any of the Phases. Students with a particular affiliation to a school are given priority in allocation.[7] Some parents who lack such affiliations (from Phase 1 to Phase 2A) opt to either perform voluntary service at schools, churches, or clans directly connected with schools or become active community leaders; and others relocate to live within 1 or 2 km from schools in order to enhance their children's chance of getting into them, especially popular ones, at Phase 2B. Non-SC and non-SPR children have few options other than to be placed on a waiting list for placements that are unallocated in Phase 3. Table A1 summarizes the admission criterion for public primary schools at different Phases. The distance-based allocation rules invite rent seeking behaviors by unaffiliated parents, in the form of relocation to zones nearer to their preferred school (Agarwal, 2016). We use the cumulative

[7] Allocations to affiliated children are made from Phase 1 to 2A. The affiliations include children with siblings currently studying in the schools, whose parents and siblings are alumni of the schools, whose parents are members of advisory and management boards of schools, or whose parents are teaching staff in schools.

take-up rate at the end of phase 2B in 2006 to measure the primary school quality. The year of 2006 is the earliest year with information available on the take-up rate of each primary school, which is used to proxy the growing up neighbourhood quality of children.

The primary school allocation favors parents who can volunteer their time to perform community service or afford to relocate to be closer to their preferred primary school; After their children attend their preferred primary schools, they take a national exam, called the Primary School Leaving Examination (PSLE), at the end of the sixth year. Their PSLE scores are the main criteria used in the selection and admission to secondary school. Some children who are talented in sports and core-curriculum activities (e.g., arts performance or leadership) can get into selected secondary schools before the PSLE exam is held. Every secondary school has its own admission criteria; and some secondary schools, especially those that are the more competitive and popular, require a minimum PSLE score for acceptance. Secondary schools then use their PSLE scores to place students on either an accelerated four-year or the normal five-year secondary education track. Post-secondary education consists of many different institutions, including junior colleges, Singapore Sports School and School of the Arts, Institutions of Technical Educations, polytechnics, and universities.

Given the importance of primary school in the educational system and its distance-based allocation rules, we use the primary school quality—measured by the cumulative take-up rate by Phase 2B—to proxy the neighbourhood quality when children grow up. Based on the proximity boundary, we divide the island of Singapore into 156 subzones with diagonal of 4 km each (Figure A2) and test whether the neighborhood quality promotes intergenerational mobility in housing consumption. Detailed empirical strategy is specified in Section 4.

2.3. Personal Income and the Taxation System

Taxes are an important source of government revenue to fund social projects and community development, security, foreign relations, economic development and public services. In fiscal year 2018/2019, social development made up the largest share of Singapore's operating expenditure, 54.5%. Tax revenue accounts for 71.1% of the government's operating revenue in fiscal year 2018/2019, and the largest share comes from income taxes, consisting of the corporate income tax, individual income tax, and withholding tax, which together accounted for 56% of Singapore's tax revenue over that period.

Singapore adopted a progressive personal income tax rate for residents liable to taxation, which

includes SCs and SPRs residing there (except for temporary absence), as well as foreigners who live or work in Singapore (excluding company directors, entertainers, and professionals) for at least 183 days in a calendar year or over two calendar years. They are required to pay income tax on all income earned in Singapore and any foreign-sourced income brought into Singapore before January 1, 2004. The tax rate increases progressively with income earned, starting at 2% for income below SGD 30,000 and up to 22% for income above SGD 320,000. For other residents, a flat income tax rate of 15% or based on the progressive tax rate applies, whichever is the higher. Singapore's income tax has a top rate of 22%, which is one of the lowest in the world compared with many developed countries, including Sweden and Denmark, for example, with a tax rate of 60%, and the rate in the U.K. and the U.S. around 45%. Moreover, Singapore has no capital gains tax, and the inheritance tax (or called estate duty in Singapore) was abolished as of February 15, 2008.

Based on the assessment in 2018, the assessed income taxes for tax residents and non-tax residents are estimated at SGD 11.53 billion (98.3%) and SGD 0.20 billion (1.74%), respectively. For the tax residents, the top 13.2% of taxpayers contributes to about 90.6% of the next assessed tax for the year, and their assessed income are in the above SGD150,001 bracket; and the lowest 30% and those taxpayers in the middle percentile range contribute about 0.7% and 8.7% to the net assessed tax for the year, respectively.

The low-tax environment in Singapore and the highly progressive tax structure are expected to significantly affect intergenerational mobility. We sort the families into three groups based on the parents' housing consumption and taking into account the fact that public housing residents composing approximately 80% of the population: the grass-root families who rank in the bottom 50 percentile ranks; middle-class families, who rank in the 50^{th} - 80^{th} percentiles; and high-income families, who rank in the top 20^{th} percentiles. We specify empirical strategy in Section 4 to explore whether the low-tax environment encourages parents and their children to have more housing consumption across generations.

3. Data and Descriptive Statistics

Conventional household survey data are subject to small sample size constraints; in addition, they are not ideal for the study of intergenerational mobility in housing consumption because household surveys cannot track household members moving out of original families. In this study, we construct parent-child pairs from a representative residential dataset with social demographic characteristics and

histories of residential addresses. We then merge the parent-child sample with records on housing transactions from two major micro-datasets on private and public housing markets. To complete the story, we include additional evidence on consumption other than housing from credit/debit card expenditures from a leading bank in Singapore.

3.1. Residential Data

The residential address dataset is provided by a proprietary source that contains demographic information, including gender, age, race, home address, and housing type, for a sample from 1996 to 2018 of 2,171,383 Singaporean residents at least 20 years old.[8] The residential data systematically collect longitudinal data in multiple waves of approximately five-year intervals, enabling us to track whether people move to a new home based on changes in their home address between two different data waves. We restrict the sample to residential cohorts born after 1965, when Singapore gained independence, and the youngest cohort in our sample consists of those born in 1984. Children are restricted to be at least 30 years old, to capture housing status in the mid- to late- life stages. We suspect that residences for which an address is shared by more than 10 people are likely to be rented to non-residents, such as worker quarters, and omit them from the sample. After excluding these residences, we retain 99.2% of all residential buildings (Figure A3) and consider it representative of the general population.

Our residential database does not have direct information on family relationships among the sample residents. However, we identify parent-child relationships as those that share the same home address with intact housing transaction records, and the age gap between the two samples is between 18 and 45 years. Using this criterion, we obtain 2,578,121 potential parent-child pairs across waves. To exclude potential parent-in-law and child pairs, we omit those with more than two different parents (13.5%). We also omit children whose two parents having the same gender, which is considered measurement errors (3%). We further restrict parent-child pairs to those in the sample for at least two waves, which reduces it by 10%. The remaining sample consists of 1,947,292 parent-child pairs across waves.

Using a unique de-identified personal identity (ID) number of residents and their home addresses in different years enabled us to track whether parents or children move and where they move. We use

[8] According to 2019 mid-year estimates from the Department of Statistics Singapore, the total population of Singapore is 5,703,600 of which 4,026,200 are Singapore citizens or permanent residents. The total population equal to or above 20 years old is 3,213,000. Approximately 99.4% of the data are from 1996, 1998, 2000, 2005 and 2011.

the residential status in the first data wave as a proxy for parents' housing status and the residential status in the latest wave as a proxy for children's housing status, as children are in their mid- to late-life stage and are at least 30 years old. We focus on non-co-residing parent-child pairs following Charles et al. (2014), since co-residing parents and children share the same housing consumption, and we cannot identify the ownership from the dataset. Specifically, a non-co-residence status is identified for children who move out of their parents' dwelling in the first data wave. The final dataset consisting of 149,745 non-co-residing parent-child pairs is then formed. This dataset is one of the most comprehensive ever constructed in Singapore, which enables us to conduct a series of empirical tests on intergenerational mobility in housing consumption and explore the impacts of social engineering programs on mobility across generations.

We also collect information on take-up rate at phases 1-3 for each of the 172 primary schools in 2006, use the cumulative take-up rate by the end of phase 2B in constructed subzones as a proxy of neighborhood quality, and match with the residential data to measure the neighborhood quality when children grow up.

3.2. Housing Transaction Data

We used two different datasets on housing transaction prices, the private housing transaction records from the Real Estate Information System (REALIS) published by the government agency Urban Redevelopment Authority (URA), and public housing transaction records from the HDB website. The REALIS database covers every transaction in the private housing market from 1995 to 2018, with information on residential addresses, floor levels, door numbers, transaction prices, floor areas, and sale dates. These detailed residential address records enable us to match the nearest private housing transaction price (in or before the observed data waves) paid by parents and children respectively, in the constructed two-generation sample.

The public housing transaction data collect transaction details on resales of public housing for the period between 1997 and 2012. As discussed in Section 2, the price for resales of public housing is market-based.[9] Because almost 80% of SCs live in the public HDB flats, for privacy reasons, the government does not publish price information on floor levels and door numbers. Instead, every five floors are grouped together (e.g., floors 1-5, 6-10). Nevertheless, detailed information on building

[9] Due to data limitations, we do not have complete details for the HDB resale transaction data after 2012 or first-time public housing purchase prices with generous government subsidies. Taking this into account, our estimate likely provides a lower bound of the true degree of intergenerational mobility in housing consumption.

addresses, room types (number of rooms), transaction prices, floor areas, and sale dates are recorded in the dataset. We thus match the nearest public housing transaction records in or before the observed data waves in the same buildings with the same floor divisions and room types to parents and children, respectively, because of the high homogeneity of public housing flats. We drop parent-child pairs with multiple public housing transaction records in the same floor divisions, room types, and years, which consist 1.3% of the sample. All transaction prices are adjusted to 2014 Singapore dollars.

3.3. Credit/Debit Card Consumption Data

The last dataset we use is on parents' and children's consumption other than housing, to complete the story on intergenerational housing consumption mobility. It is a proprietary dataset on individual consumption between 2016:01 and 2017:12 for 25,000 customers of a leading bank in Singapore (Sumit et al., 2019). For each individual, there is detailed transaction-level information from their credit cards, debit cards, and cash withdrawal. Transaction date, amount, and merchant category are specified, which facilitate us to calculate overall consumption from different categories. Another merit of the dataset is that instead of providing transaction information for one single card account, we have information on each debit card and credit card an individual has with the bank. Although we do not have information about an individual's accounts from other banks, given the large market share the bank and the fact that the average number of cards in our dataset equals Singapore's average number, the measurement error in cards expenditure is considered minimal (Agarwal et al., 2020).

Consistent with the main dataset derived from matched residential and housing data, we pair parents' consumption (other than housing) with children's consumption (other than housing) and restrict children to be at least 30 years old. We sum up individual consumption by month from all identified categories including transportation, supermarket, entertainment, apparel, dinning, travel, service, durable, bill payment and others from credit and debit cards. As income is a prominent determinant of consumption, we also extract information on monthly income and calculate the ratio of consumption over income per month. To get rid of potential measurement errors, we trim top and bottom 1% of the consumption over income ratio. We then average the consumption over income ratio across months to get rid of transitory shocks in specific months to proxy lifetime estimate for a final sample of 876 parent-child pairs.

In addition to providing comprehensive consumption data other than housing, this dataset contains a rich set of demographic and socioeconomic information, including age, gender, ethnicity, property

type (public or private housing), and property address (at postal-sector level), which facilitate our exploration on the determinants of the consumption/income ratio. Detailed empirical specification is illustrated in Section 4.

3.4. Summary Statistics

Table 1 presents the summary statistics for the final sample of 149,745 non-co-residing parent-child pairs, with children at least 30 years old in the 1965-1984 birth cohorts. By matching the resident samples to the housing transactions, we estimate the average housing price of children in the latest wave is SGD 498,386.5, which is approximately 30% higher than the average housing price of SGD 385,121.5 for parents in the first wave. The average age of children and parents is 39 and 58 years, respectively, which are at mid- to late- life stage. Gender of children is balanced with 52% of males. The proportion of children living in public residences is 83%, which is lower than the proportion among their parents (95%). Ethnicity is stable across the two generations with a majority of Chinese. On average, each family has 2.65 children among those with children.

Table A2 summarizes statistics on consumption other than housing for the 876 parent-child pairs from the bank data. The average consumption/income ratio of children is 77%, which is higher than the corresponding ratio of 69% for their parents. Consistent with the main dataset, the average age of children and parents are at the mid- to late- stage of life cycle, which serve as good proxy for lifetime estimates. The gender is balanced, and the ethnicity is stable across two generations; showing the representativeness of the sample. Nevertheless, the proportion of children and parents living in public residences are around 60%, which is lower than the corresponding percentage in our main sample. It is possibly because that the bank data are skewed toward the right end of the wealth distribution as the very poor public housing residents may not have debit/credit cards.

4. Empirical Strategy

4.1. Relative Mobility

We use the rank-rank slope as the main measure for intergenerational mobility in housing consumption, which according to Nybom and Stuhler (2017), is a more robust measure than others, such as intergenerational elasticity (IGE) and intergenerational log-correlation. Following Dahl and DeLeire (2008), we calculate the percentile ranks of housing consumption, which have a value from 0 to 100, for the parents and the children separately and then estimate the rank-rank slope as follows:

$$y_i^k = \alpha_0 + \alpha_1 x_i^p + Z_i' \alpha_Z + \epsilon_i \quad (1)$$

where y_i^k denotes the housing rank of a child from family i in the last observed wave, and x_i^p denotes the housing rank of his/her parents in the first observed wave. The percentile ranks of parents' and children's housing consumption is defined relative to housing consumption in the respective generation. Z is a vector of classical age controls including parents' and children's age and age squared (Solon, 1989, 1992; Nybom and Stuhler, 2016, 2017). Standard errors are clustered at the building level.

One common bias in intergenerational mobility studies is co-residence bias. Conventional household surveys, which interview individuals who either live in the household or maintain close economic relationships with a household, do not record information on children or other family members who move out of these households. In other words, household surveys have selection bias in which individuals are self-selected to remain at home. Nevertheless, it is not likely in our case as we use representative residential data that detail information on each parent/child's residence in each wave. Using de-identified IDs, we focus on non-co-residing parent-child pairs and are able to track the history of changes in residence by both parents and children over the years. As restricting children to be at least 30 years old, the non-co-residence status is likely to be stable, which is not affected by measurement errors in their housing status at an early life stage.

Other than co-residence bias, lifecycle bias and attenuation bias are two potential problems faced by many empirical studies on intergenerational mobility. Lifecycle bias is caused by the correlation between current and lifetime earnings or wealth, which vary systematically over a lifetime. The current earnings of children, especially in an early stage of life, might produce inconsistent estimates of intergenerational mobility (Haider and Solon, 2006; Grawe, 2006). We avoid this bias by taking four steps in our analysis: first, we restrict a child's age to at least 30, which is a mid- life stage, and explicitly control the age polynomials in Eq. (1); second, we use the housing consumption of parents from the first observed data wave as a proxy for parents' lifetime housing consumption x_i^p and that of children in the last observed data wave as a proxy for a child's lifetime housing consumption y_i^k; third, we use a robust intergenerational rank correlation—rather than IGE or intergenerational log-correlation—to measure intergenerational mobility in housing consumption (Nybom and Stuhler, 2016; 2017); and fourth, we adopt a set of robustness checks, such as restricting children's age to be at least 35, including additional control variables on gender and ethnicity, and changing the clustering to the household level.

Attenuation bias arises from transitory fluctuation in income (or consumption) in a specific year (Solon, 1989, 1992; Mazumder, 2005); the literature addresses this bias by either taking averages of income over multiple years (Mazumder, 2005; Lee and Solon, 2009) or predicting income with instrumental variables (Gong et al., 2012). As housing is not a commodity with high trading frequency, and housing prices are also unlikely to fluctuate excessively, the use of transaction prices in nearest years in our analyses is unlikely to lead to attenuation bias.

In a supplementary examination on intergenerational correlation in consumption other than housing using the bank credit/debit card data, we follow Eq. (1) but denoting y_i^k as the rank of average consumption/income ratio of a child from family *i*, and x_i^p as the rank of average consumption/income ratio of a parent from family *i.* Taking advantage of the longitudinal structure of the credit/debit card expenditure data, we also implement fixed-effect estimation to Eq. (1) which swipes constant preference in consumption across generations as a supplement check. Results are discussed in Section 5.

To explore the effects of social engineering programs on housing mobility across generations, we introduce interaction terms—indicating parents' housing rank categories and housing type, phases of HDB housing expansion periods, or neighborhood quality—into Eq. (1) and examine the rank-rank slope in intergenerational housing correlation. The estimation is specified as below:

$$y_i^k = \beta_0 + \beta_1 x_i^p + \beta_2 I_i + \beta_3 x_i^p \times I_i + Z_i' \beta_Z + \delta_i \qquad (2)$$

where I_i is an indicator variable indicating different socioeconomic groups, as the social engineering programs are expected to have differential impacts across the groups. Specifically, in the specification of parents' housing rank categories, I_i equals 1 if parents are in the top 50 percentile ranks. Otherwise, it is equal to 0. In the specification of parents' housing type, I_i equals 1 if parents are observed in the private residence in the first wave. In the specification of HDB expansion period, I_i is an indicator vector which specifies low HDB expansion period or high HDB expansion period. In the specification of neighborhood quality, I_i is an indicator variable which is equal to 1 if children grow up in good neighborhood as identified by subzones with above-median quality of primary schools.

To virtualize the geographic pattern in intergenerational mobility in housing consumption, we generate heat maps representing the distribution of children's housing consumption at the building level, conditional on the parents' housing consumption rank in the bottom and top 50 percentile ranks, respectively. Results are discussed in Section 5.

4.2. Absolute Mobility

Relative mobility, as measured by the rank-rank slope in Eq. (1), studies the outcomes of children from families with low housing consumption relative to those of children from high housing consumption families. However, it cannot distinguish if the high mobility is driven by upward mobility from children born to parents with low housing consumption, or by downward mobility from children born to the parents with high housing consumption.

We thus adopt the measure of absolute mobility, which investigates the outcomes of children from families of a given level of housing consumption in absolute terms. We estimate the slope and intercept of the rank-rank relationship by regressing children's housing consumption rank on parents' housing consumption rank without control variables:

$$y_i^k = \gamma_0 + \gamma_1 x_i^p + \mu_i \quad (3)$$

The absolute mobility is defined as the expected housing rank of a child with parents who have a housing rank of *m*. Specifically, we focus our analysis on the expected housing rank of a child with median parent housing in the distribution of housing consumption in HDB and private housing market, respectively:

$$\overline{y_{50,h}} = \gamma_0 + \gamma_1 \times 50 \quad (4)$$

where $\overline{y_{50,h}}$ (*h = public housing market, private housing market*) is the expected housing rank of a child born to hypothetical parents with median housing rank in either public or private housing market.

We also calculate the threshold point for parents' housing consumption rank below which children's housing rank surpasses parents' housing rank:

$$y_t = \frac{\gamma_0}{1-\gamma_1} \quad (5)$$

where y_t stands for the threshold point at which parents' housing rank equals children's housing rank.

5. Empirical Results

5.1. Intergenerational Correlation in Housing Consumption

Table 2 presents estimates on the rank-rank slope in housing consumption across generations derived from Eq. (1). Panel A displays estimates from the full sample, while Panels B-C present results by dividing parents' housing ranks into different categories. Columns (1) and (2) report the results without and with age controls, respectively. We find high mobility in housing consumption across generations from Panel A, with a robust estimate around 0.18, without and with controlling for the age profiles of children and parents. Both estimates are statistically significant at the 1% level. Our results survive a

battery of robustness checks as presented in Table A3, by including additional demographic controls on children's gender and parents' and children's ethnicity, clustering standard errors at family level, or redefining sample to include children at least 35 years old. This estimate of 0.18 is close to the intergenerational income correlation of 0.22 in Singapore estimated using 40,000 father-son pairs by Yip (2019). It is slightly higher than the intergenerational linkages in home ownership of 0.11 estimated using PSID 1989 in the U.S. (Waldkirch et al., 2004).

To investigate the threshold of parents' housing consumption rank below which children's rank in housing consumption surpasses the corresponding one of their parents, we apply Eq. (5) to estimates presented in Column (1) of Panel A, and obtain the cut-off point at the 50^{th} rank as shown in the last row of Panel A. We then divide parents' housing ranks into bottom and top halves accordingly and introduce an indicator variable for parents in the top 50 percentile ranks into the estimation, following Eq. (2). Results are presented in Panel B. For children of grass-root parents defined as having housing consumption in the bottom 50 percentile ranks, the estimate is as low as 0.06 and is statistically significant at the 1% level. Such mobility estimate implies high upward mobility for children born to grass-root parents; the level of estimate is comparable to the grandparent-grandchild rank correlation in wealth reported in Sweden (Adermon et al., 2018). The estimate of intergenerational rank correlation for parents in the upper 50 percentile ranks, however, is almost 6 times as large as the one in the lower half, reaching 0.36. Both this point estimate and the estimate on the difference between the upper and lower halves are statistically significant at the high 1% level of significance. This mobility estimate in housing consumption for parents in the top 50% is close to the intergenerational wealth elasticity (IWE) of 0.37 in the U.S. (Charles and Hurst, 2003).

To virtualize the findings in Panel B of Table 2, we show in Figure 2 a building-level distribution of average housing ranks of children conditional on parents at the bottom and top 50^{th} percentiles, respectively. Compared to grass-root parents with an average of 27.2 percentiles (upper-left panel), their children demonstrate high upward mobility in housing consumption with an average housing wealth rank of 46.5 percentiles (upper-right panel). In contrast, children born to parents in the upper half distribution of housing consumption—who have an average rank of 72.8 (lower-left panel) — demonstrate downward mobility in housing consumption with an average rank of 54.1 (lower-right panel). It could be partially driven by mechanical reason as there is little room for those children from rich families to surpass their parents. However, we are more focused on exploring plausibly causal impacts from relaxed financial constraints of parents from public housing and quality education from

public education, with relevant discussion in Section 5.2.

As 80% of the Singaporean residents live in public housing flats, we further separate parents' housing ranks in the top 20% from the rest in the upper half of the housing consumption distribution, and present our findings in Panel C of Table 2. The intergenerational rank correlation for children born to middle-class parents, defined as those with housing ranks between 50 and 80 percentile ranks, is estimated to be almost twice higher than the one for children born to grass-root parents, reaching 0.17. Both this point estimate and the difference estimate are statistically significant at the 1% level. As revealed in Figure 1 (lower panels), this intergenerational mobility is more likely driven by the downward, rather than upward, mobility of children born to middle-class parents. The estimate for children born to parents at the top 20 percentile ranks is as high as 0.96, indicating high intergenerational persistence in housing consumption. This mobility estimate is close to the IGE estimates for Brazil, Nigeria, and Peru (Corak, 2004; Narayan et al., 2018).

Figure 2 illustrates our findings in Panel C, plotting the child's average housing rank (*y* axis) against that of the parent (*x* axis). The 45-degree line indicates that children remain in the same housing category as their parents, as in the concept of absolute mobility. The intersection of the plotted line and the 45-degree line indicates the threshold point of parents' housing rank below which children's housing rank surpasses their parents. In out context, the threshold is 50th percentile. Strong upward mobility in housing wealth is seen for children of grass-root parents, who rank in the bottom 50th percentile. These children rise above their parents on the socioeconomic ladders, as the children are plotted far above the 45-degree line. However, children in the middle-class families, whose parents rank in the 50th to 80th percentile are worse off than their parents. The children of parents who rank in the top 20th percentile families by housing consumption demonstrate the strongest persistence in housing mobility relative to their parents, as shown by a steep slope in the plot. Nevertheless, they are worse off than their parents in absolute rank, partly because they have limited options in the housing market to surpassing their rich parents.[10]

[10] We also show the results of intergenerational mobility in housing consumption sorted by family size and ethnicity in Table A4, following Eq. (2). Families with one child have higher intergenerational housing consumption persistence—thus less mobility—than large families (Panel A). The child quantity-quality trade-off theory predicts that children in smaller families receive more human capital investment because of resource concentration (Becker & Lewis, 1973; De La Croix & Doepke, 2003). Families with one child only therefore demonstrate less intergenerational mobility in housing consumption—either via human capital investment or direct transfer—than large families. The pattern among Chinese, Indian, and Malay families is similar. Malay families show the lowest persistence of intergenerational housing consumption (Panel B), because of their cultural preference for large families.

5.2. Mechanism Discussion

What are the drivers for the differential patterns of intergenerational mobility in housing consumption for children born to different families? The valuable institutional settings in Singapore, with large-scale social engineering programs, provide a laboratory to explore possible reasons. We hypothesize that affordable public housing frees up poor households' budget constraints; parents are thus able to invest more in child's human capital in early childhood, which is considered to play an important role in increasing equality of opportunity (Black, et al., 2020a). Quality education through public education program further enhances the upward mobility of those children born to poor families. On the upper end of spectrum, rich parents can be financially free to move into good neighborhoods with top schools. The lack of (sufficient) tax intervention at the top further enhances their intergenerational persistence in housing consumption. For the sandwiched middle-class parents, however, they may neither be eligible to take public housing nor being financially capable to sort into good neighborhoods. Their children may be more likely to purchase public housing as driven by economic rationale, appearing to worsen off compared to their parents. We empirically test those hypotheses in the context of Singapore's social engineering programs in public housing, public education, and taxation system as follows.

Public housing and relaxed budget constraints. Recent literature examines the impact of public housing demolition, specifically, the Moved to Opportunity program in the U.S., on child's performance over the long term. It is evident to increase college attendance and earnings, and reduce crime rates (Chetty et al., 2016; Chyn, 2018). Using Singapore's large-scale affordable public housing as a laboratory, we look at the effect of public housing on relaxation of budget constraints and intergenerational mobility. Through the "home ownership for the people" initiative, Singapore's government has successfully provided affordable public housing for more than 80% of Singapore citizens since the 1960s and across the city state (Figure A4).

We first examine heterogeneity in intergenerational mobility outcomes by the type of parents' housing. Table 3 presents the results under Eq. (2) and shows evidence of a higher mobility rate among children who grow up in public housing than among those who live in private housing. Specifically, we find the rank-rank estimate of low persistence in intergenerational housing consumption, around 0.14, for children who grow up in public HDB flats. By contrast, the rank-rank estimates indicate high persistence, with an estimate around 0.91, for children who grow up in private housing. The two point estimates and the estimates on the difference are statistically significant at the 1% level of significance.

Most families who are able to buy public housing flats as their first property are attracted by generous government subsidies. When they sell these flats on the resale HDB market, they can purchase more expensive resale public housing flats or private housing. The generous subsidies on this first public housing helps children born to parents living in relatively low ranks of public housing to move up the housing ladder, with a low intergenerational rank estimate. We further calculate the expected housing rank of children born to hypothetical median parents living in public versus private residence, using Eq. (4).[11] The corresponding children's rank is 49.3 and 26.9, respectively, consistent with our evidence on a much higher mobility rate for children who grow up in public housing than those born to parents living in private housing.

This also echoes our early findings on the upward mobility of children born to grass-root parents using a building-level analysis, as shown in the upper panels of the heat maps in Figure 1. Parents in the bottom 50 percentile ranks (upper-left panel)—all of whom live in public housing residences—have limited geographic distribution along HDB old towns, as portrayed in Figure A5. With the expansion of HDB towns, the geographic distribution of children born to HDB parents covers larger regions.

The downward mobility in housing consumption of children born to middle-class parents (lower panel of Figure 1) can also be explained by the large-scale public housing programs. It implies that economic rationality may outweigh the social status motivations in driving families' housing mobility decisions. Instead of living in a private residence which is a symbol of high social status, children growing up in middle-class families appear to consider rational concerns and choose to live in public housing flats. The government started to build ahead of time in 2011 to meet the strong pent-up demand in the public housing market and also increased the monthly household income ceiling from SGD 8,000 to SGD 10,000, to allow more middle-income families to be eligible to buy their public housing flats.

Furthermore, we estimate intergenerational mobility in housing consumption over high versus low public housing expansion period. Results are shown in Table 4. Columns (1) -(2) present estimates for children born to parents in public housing residence, while columns (3) - (4) present falsification test on children born to parents living in private residence. The last row presents the difference in rank-rank estimates between high and low public housing expansion periods. We find that in the high

[11] The regression for parents in public housing residence is $y_i^k = 42.53 + 0.14x_i^p$ and the regression for parents in private housing residence is$y_i^k = -18.59 + 0.91x_i^p$, following Eq. (3).

expansion period, when the HDB lifted restrictions on supply by aggressively stepping up new construction to soak up with strong pent-up demand, the intergenerational rank correlation decreases by 6 percentage points compared to the low expansion period, which restored active mobility activities in the housing markets. The estimates are statistically significant at the 1% level of significance. By contrast, the estimated difference in rank-rank correlation in the private housing market is smaller in magnitude and is not statistically significant at conventional levels of significance. To sum up, our results shed light on the positive effect of the public housing programs in driving intergenerational mobility in housing consumption, especially for those at the lower end of the scale.

Public education and neighborhood effect. Place matters for intergenerational mobility; in the U.S., children's upward mobility rates rise when they relocate to counties with better schools (Mayer and Lopoo, 2005; Chetty and Hendren, 2018a,b). Black et al. (2020a) suggest that increasing equality of opportunity in early childhood, with human capital as a possible channel, may play an important role in equalizing wealth distribution.

In Singapore's context, we use primary school quality as measure for neighborhood quality at childhood and calculate the average cumulative take-up rate by phase 2B in the 156 subzones as described in Section 3. Good neighborhood is defined as subzones with above-median primary school take-up rate. Bad neighborhood includes those with below-median primary school take-up rate. The estimation follows Eq. (2) in examining the heterogeneous pattern in intergenerational rank correlation across neighborhoods. Moreover, we include an additional interaction with quintile of parents' housing rank, to investigate heterogeneous effect of neighborhood quality on intergenerational rank correlation across quintiles. Results are displayed in Table 4 and visualized in Figure 3.

Although on average there is no statistically significant impact of neighborhood quality on intergenerational rank correlation, an interesting pattern on the heterogeneous effect across quintiles appears. As portrayed in Figure 3, there is a monotonic increase in the differential impact of good versus bad neighborhood on intergenerational rank correlation, conditional on parents' housing quintiles. In the lowest quintile—which represents the poorest 20% of parents—good neighborhood decreases (promotes) children's intergenerational persistence (mobility) in housing consumption by 0.259. The estimate is statistically significant at the 1% level of significance. Estimates for the 2^{nd}-4^{th} quintiles gradually increase—indicating declining impact of good neighborhood in promoting intergenerational mobility in housing consumption—although with no statistical significance. In the top housing quintile where parents are likely living in the private residence, the estimate is positive

0.173 and is statistically significant at the 5% level. It indicates that good neighborhood, with above-median primary school quality, enhances intergenerational housing persistence for children born to parents in the top 20 percentile ranks.

Given the generally high quality of public education in Singapore, children from poor families have a better chance of moving up the housing ladder as long as they live in neighborhoods with good public schools. These results are consistent with Biasi (2019), showing that a school finance equalization program in the U.S. improves intergenerational mobility, especially for low-income students. Given the low housing cost of affordable public housing, parents in the bottom quintile of housing rank can have more private investment in children's human capital, which is supplementary to the public education. With higher human capital from both public and private investment, children born to parents in the bottom quintile housing rank climb up the housing ladder.

However, good neighborhood also enhances intergenerational persistence (thus decreases intergenerational mobility) in housing consumption for children born to top-quintile parents, which could be largely due to sorting by rich families into neighborhoods with better-quality schools. Children of middle-class parents lack the financial means to move to neighborhoods with better-quality schools; thus the good neighborhood has insignificant impact on their housing mobility and they fail to keep up with the level of their parents' housing consumption, as portrayed in Figure 2. It is also possible that under constraint budget, the middle-class parents who have spent much on housing consumption have limited resources to invest in children's human capital which prohibits the upward mobility of their children.

Taxation and intergenerational stagnancy at the top. In Singapore's context, the higher-income pairs, which are likely to be in the top bracket (22%) in the progressive tax structure, have limited, if any, social engineering programs designed to mitigate stagnation in the distributions of housing consumption. Moreover, Singapore has no capital gains tax, and the inheritance tax was abolished in 2008. We find high intergenerational housing persistence of children born to parents in the top 20 percentile ranks (Panel C of Table 2) and children born to rich parents living in private residence (Table 3). With no budget constraints, the rich parents likely enjoy high housing consumption while not reducing investment in children's human capital. The lack of effective policy interventions targeting rich families may have caused the stagnation in intergenerational mobility at the high end. The government is mindful of the stagnation in the society, especially for those with upper income. In 2015, the Ministry of Finance announced an increase in the income tax rate of two percentage points

for the top 5% income bracket, and, at the same time, an immediate one-time tax rebate to the middle-income earners of 50%.[12] Due to data limitation, we may not be able to capture the impact of this taxation policy change on intergenerational mobility in housing consumption. We leave it for future studies.

5.3. Trade-off between Housing and Other Consumption

One potential concern to our findings is that parents may perform trade-off between housing consumption and other individual/household consumption, instead of investment in children's human capital.

To examine this hypothesis, we use the credit/debit card transaction data as introduced in Section 3.3 and test the effect of parents' residential type on the rank of children's consumption (other than housing) over income ratio. Results are shown in Table 6. Column (1) presents estimates with age controls while Column (2) includes additional demographic controls on gender and ethnicity of parents and children. Under both scenarios, parents' residential type does not show statistically significant impact on the rank of children's consumption/income ratio.

To complete the story, we also estimate the intergenerational correlation in ratio of consumption (other than housing) over income using Eq. (1), present the results in Table 7, and visualize the pattern in Figure 4. Panel A of Table 7 presents the intergenerational rank correlation from full sample and Panel B displays the differential effect by parents' residential type. Column (1) shows results with children at least 30 years old, echoing the sample in the main analysis. Column (2) presents results from a larger sample including children equal to or above 20 years old. We find that the intergenerational correlation in consumption/income ratio is as low as 0.066-0.085 and this low intergenerational correlation appears uniform across parents' distribution (Figure 4). Moreover, no statistically significant difference is found in the intergenerational consumption/income ratio between children born to parents living in public or private residences (Panel B of Table 7). Since one possible reason for parent-child correlation in consumption arises from intergenerational transmission of preference, we take advantage of the longitudinal credit/debit card expenditure data and implement

[12] At a public dialogue held by the Institute of Policies Studies (IPS), National University of Singapore (Yahya, 2018), Mr Tharman Shanmugaratham, the then Deputy Prime Minister of Singapore also warned: "*Once stagnation in the middle of society takes place over a long period of time is what happened in the United States and a range of other advanced economies, inequality becomes a much sharper and much more brittle issue, and the politic of inequality acquires a momentum of its own. An escalator that continue to carry everyone upwards also make it much easier for a country to have social mobility. There are more opportunities, new skills to be learnt, new jobs to be obtained. It becomes much easier to achieve relative mobility when you have absolute mobility – what I get is not at the expense of someone else.*"

fixed-effect estimation. The results presented in Table A6 show an even lower intergenerational rank correlation in consumption/income ratio around 0.03, after swiping the constant preference in consumption across generations.

In sum, we do not find empirical evidence of trade-off between housing consumption and other individual/household consumption. It consolidates our findings in the main analysis that with low housing consumption, grass-root parents likely invest more in children's human capital which supplements public education investment and promotes intergenerational mobility in housing consumption.

6. Conclusion

This paper investigates intergenerational mobility in housing consumption and explores possible mechanism via relaxed financial constraints from public housing and quality education from public education, in the context of Singapore's large scale social engineering programs. Singapore's government is effective in using public programs in housing and education to socially engineer and promote housing mobility among Singaporean residents. Using high-quality residential data merged with detailed housing transaction records, we find that the upward mobility in intergenerational housing consumption by grass-roots families is strongly linked to these public housing and education programs. We also rule out the potential threat on trade-off between housing consumption and other individual/household consumption using credit/debit card expenditure data. It supports our argument that the low housing consumption by grass-root parents facilitates their private investment in children's human capital, which supplements investment from public education and promotes intergenerational mobility. However, the children of middle-class parents show downward mobility in housing consumption. It could possibly be caused by their parents' financial constraints in investing in their human capital or relocating to expensive neighborhoods with high-quality public schools; or simply economic rationality that they move to HDB towns rather than staying in expensive private residences especially in high public housing expansion period with lifted income ceiling restrictions. The children of rich families tend to have stronger correlations with their parents in their housing consumption, which restrains their mobility possibly because of no financial constraints of their parents in sorting into good neighborhoods and a lack of effective public policy interventions targeting the rich.

One caveat of our study is that our mechanism exploration sheds light on possible causality only.

More rigorous empirical identifications are to leave for future investigation when more longitudinal data are available. The treatment effects of such social engineering policies on intergenerational mobility should be studied in light of policy changes.

Parents **Children**

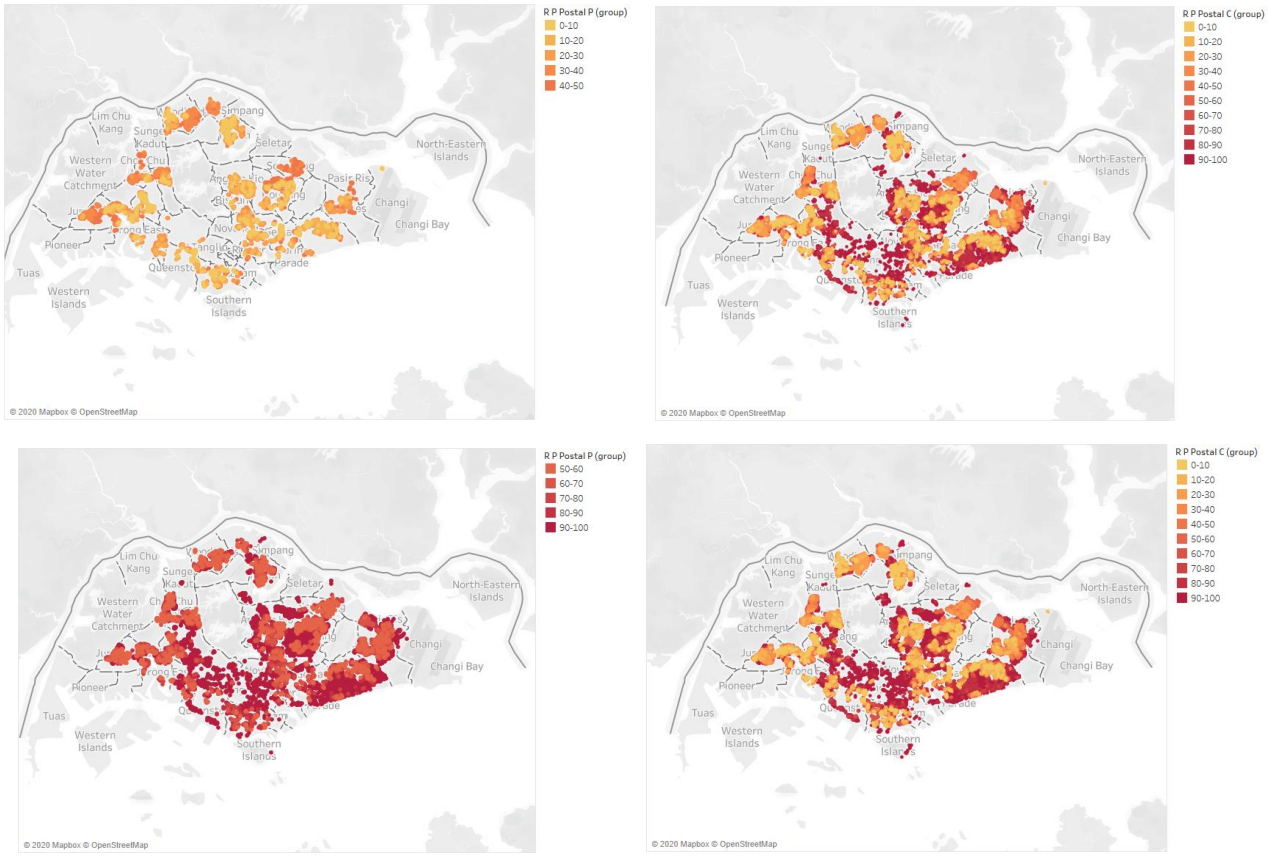

Figure 1: Heat Maps of Housing Ranks of Parents and Children Conditional on Parents in the Bottom 50% (Upper Panels) and Top 50% (Lower Panels)

Note: The color spectrum shows building-level average ranks of parents' and children's housing consumption. The redder the color, the higher the housing rank. Upper left panel: heat map of parents in the bottom 50 percentile ranks (with average rank of 27.2 and the rate of parents from HDB of 100%). Upper right panel: heat map of children's housing ranks conditional on parents in the bottom 50 percentile ranks (with average rank of 46.5). Lower left panel: heat map of parents in the top 50 percentile ranks (with average rank of 72.8 and the rate of parents from HDB of 90.33%). Lower right panel: heat map of children's housing ranks conditional on parents in the top 50 percentile ranks (with average rank of 54.1).

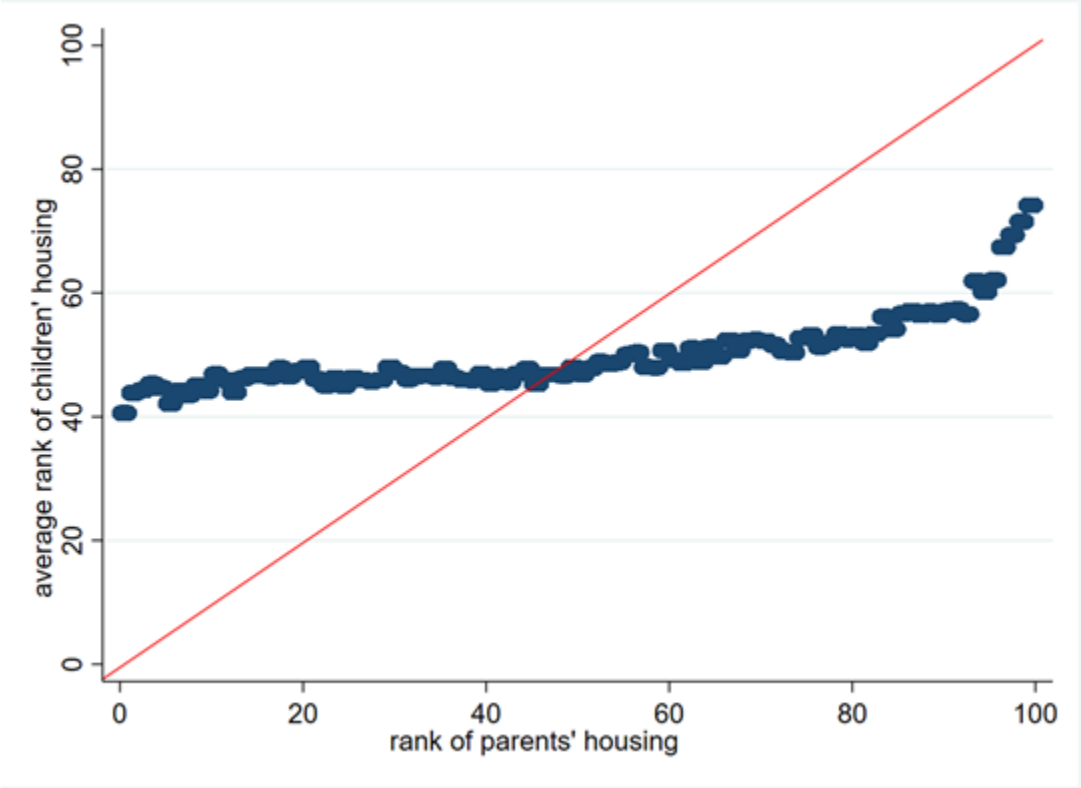

Figure 2: Child's Housing Rank versus Parents' Housing Rank

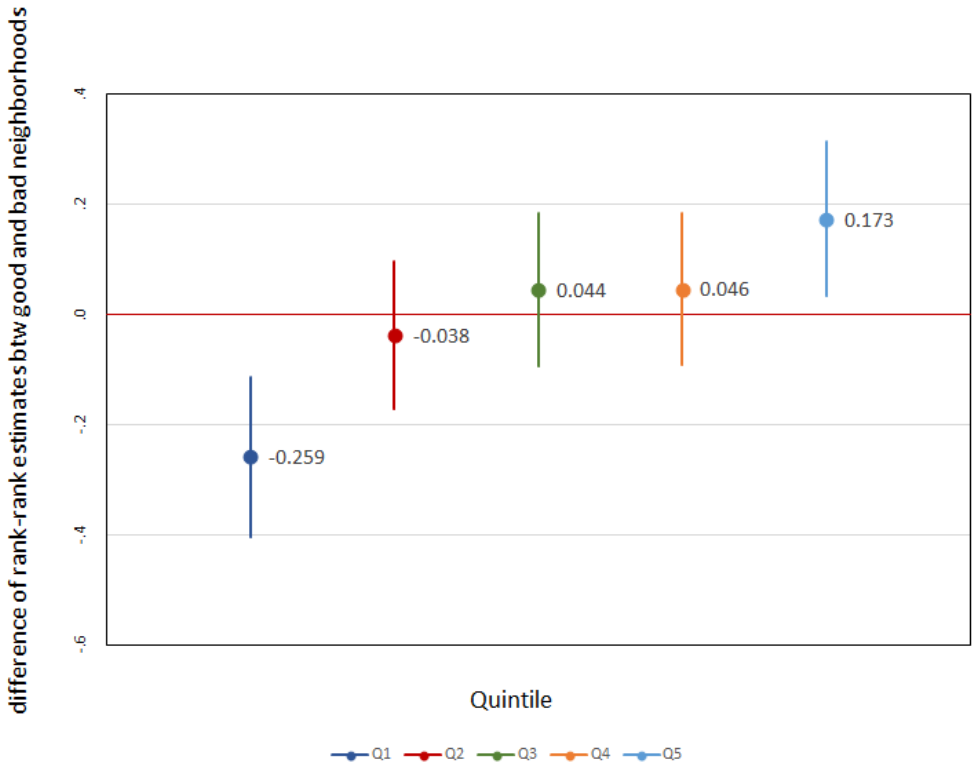

Figure 3: Difference in Rank-rank Correlation Coefficients between Good and Bad Neighborhoods Conditional on Parents' Housing Quartile

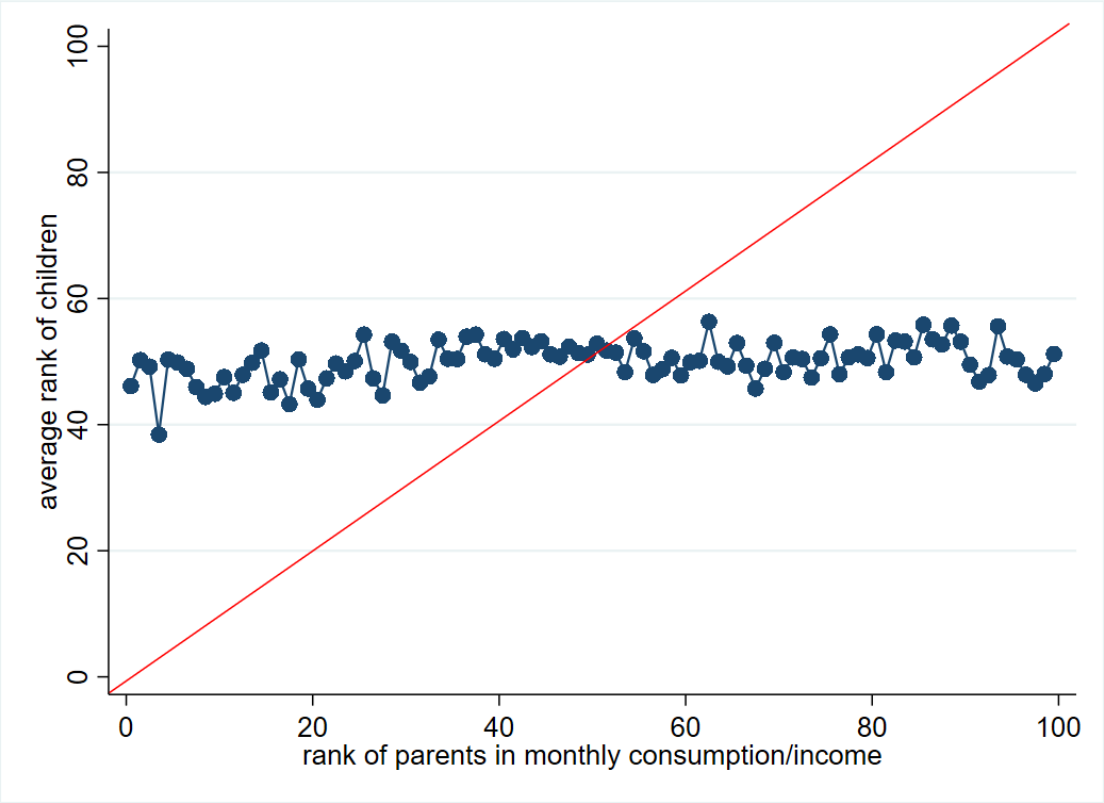

Figure 4: Children's Consumption/Income Rank versus Parents' Consumption/Income Rank (other than Housing Consumption)

Table 1: Summary Statistics

Variable	Mean (Standard deviation)
Housing price of children in the latest wave	498386.5 (462469.3)
Housing price of parents in the first wave	385121.5 (362318.5)
Children's age in the last wave	38.93 (4.24)
Parents' age in the first wave	58.25 (7.46)
Children's gender (male=1)	0.52 (0.50)
Children's type of residence (HDB=1, other=0)	0.83 (0.38)
Parents' type of residence (HDB=1, other=0)	0.95 (0.22)
Children's ethnicity (Chinese=1, Indian=2, Malay=3, Other=4)	1.41 (0.80)
Parents' ethnicity (Chinese=1, Indian=2, Malay=3, Other=4)[a]	1.40 (0.79)
Number of children per family	2.65 (1.20)
Observation	149,745

Note: Children are born in 1965 to 1984 cohorts and are at least 30 years old. Housing prices is adjusted to 2014 prices.
[a] Parents' ethnicity is defined as fathers' ethnicity. If no information is available on fathers' ethnicity, mothers' ethnicity is used instead.

Table 2: Intergenerational Correlation in Housing Consumption

Outcome Variable: Housing Rank of Children		
	(1)	**(2)**
Panel A. Full Sample		
Parents' housing rank	0.175***	0.176***
	(0.004)	(0.003)
Constant	41.26***	-
	(0.204)	-
Age controls	N	Y
Observation	149,745	149,745
R-squared	0.031	0.036
Threshold for children's upward mobility (surpassing parents' rank)	50.012	-
Panel B. Parents' Rank in [0, 50] and [50, 100] Categories		
Parents' housing rank	0.058***	0.057***
	(0.009)	(0.009)
Parents' housing rank × I (parents in ranks 50-100)	0.301***	0.303***
	(0.013)	(0.013)
Age controls	N	Y
Observation	149,745	149,745
R-squared	0.037	0.042
Panel C. Parents' Rank in [0, 50], [50, 80], and [80, 100] Categories		
Parents' housing rank	0.058***	0.057***
	(0.009)	(0.009)
Parents' housing rank × I (parents in ranks 50-80)	0.110***	0.114***
	(0.021)	(0.021)
Parent's housing rank × I (parents in ranks 80-100)	0.904***	0.906***
	(0.036)	(0.036)
Age controls	N	Y
Observation	149,745	149,745
R-squared	0.041	0.046

Notes: Additional regressors in Column (2) of Panel A include age and age squared of child and parents. Additional regressors in Column (1) of Panels B-C include dummy variables for parents' housing rank. Additional regressors in Column (2) of Panels B-C include age and age squared of child and parents, and dummy variables for parents' housing rank. Standard errors are clustered at the parents' postal code.

Table 3: Intergenerational Correlation in Housing Consumption by Parents' Type of Residence

Outcome Variable: Housing Rank of Children		
	(1)	**(2)**
Parents' housing rank	0.136***	0.137***
	(0.004)	(0.004)
Parents' housing rank × I (parents in private residence)	0.774***	0.784***
	(0.148)	(0.146)
Age controls	N	Y
Observation	149,745	149,745
R-squared	0.040	0.045

Notes: Additional regressors in Column (1) include dummy variables for parents' housing rank. Additional regressors in Column (2) include age and age squared of child and parents, and dummy variables for parents' housing rank. Standard errors are clustered at the parents' postal code.

Table 4: Intergenerational Correlation in Housing Consumption by HDB Expansion Period

Outcome Variable: Housing Rank of Children				
	(1)	**(2)**	**(3)**	**(4)**
	Parents in HDB residence		**Parents in private Residence (falsification test)**	
Parents' housing rank	0.169***	0.171***	0.753**	0.801***
	(0.014)	(0.014)	(0.301)	(0.301)
Parents' housing rank × I (high HDB expansion period)	-0.051***	-0.053***	0.246	0.217
	(0.015)	(0.015)	(0.370)	(0.370)
Parents' housing rank × I (low HDB expansion period)	0.014	0.009	0.208	0.179
	(0.016)	(0.016)	(0.420)	(0.420)
Age controls	N	Y	N	Y
Observation	142,432	142,432	7,313	7,313
R-squared	0.019	0.024	0.009	0.012
Difference in rank-rank estimate between high and low HDB expansion periods	-0.065***	-0.061***	0.038	0.038
	(0.009)	(0.009)	(0.376)	(0.377)

Notes: Additional regressors in Columns (1) and (3) include dummy variables for parents' housing rank. Additional regressors in Columns (2) and (4) include age and age squared of child and parents and dummy variables for parents' housing rank. Standard errors are clustered at parents' postal code. The low HDB expansion period is defined as parents' housing transacted in years when the annual HDB flats construction is in the bottom 1/3. The high HDB expansion period is defined as parents' housing transacted in years when the annual HDB flats construction is in the top 1/3.

Table 5: Intergenerational Correlation in Housing Consumption by Neighborhood Quality

Outcome Variable: Housing Rank of Children		
	(1)	**(2)**
Parents' housing rank	0.169***	0.345***
	(0.005)	(0.048)
Parents' housing rank × I (good neighborhood)	0.005	-0.259***
	(0.007)	(0.074)
Parents' housing rank × I (2nd quintile)	-	-0.316***
	-	(0.065)
Parents' housing rank × I (3rd quintile)	-	-0.149**
	-	(0.065)
Parents' housing rank × I (4th quintile)	-	-0.195***
	-	(0.067)
Parents' housing rank × I (5th quintile)	-	0.507***
	-	(0.069)
Parents' housing rank × I (good neighborhood) × I (2nd quintile)	-	0.221**
	-	(0.102)
Parents' housing rank × I (good neighborhood) × I (3rd quintile)	-	0.303***
	-	(0.102)
Parents' housing rank × I (good neighborhood) × I (4th quintile)	-	0.305***
	-	(0.102)
Parents' housing rank × I (good neighborhood) × I (5th quintile)	-	0.432***
	-	(0.103)
Age controls	Y	Y
Observation	141,308	141,308
R-squared	0.034	0.045

Notes: Good neighborhood is defined as subzones with above-median quality of primary schools. Quality of primary schools is measured by the cumulative take-up rate at the end of phase 2B in 2006. Standard errors are clustered at the parents' postal code.

Table 6: OLS Estimates on the Effect of Parents' Residential Type on Children's Ratio of Consumption/Income (Other than Housing Consumption)

Outcome Variable: Rank of Children's Consumption/Income Ratio		
	(1)	**(2)**
HDB parents (=1)	2.814	2.921
	(2.256)	(2.278)
Age of child	-0.515	-0.661
	(1.952)	(2.021)
Age squared of child	0.005	0.007
	(0.025)	(0.026)
Age of parents	-2.228	-2.060
	(1.942)	(2.051)
Age squared of parents	0.015	0.014
	(0.015)	(0.016)
Children's gender	-	6.258***
	-	(1.782)
Parents' gender	-	-1.119
	-	(1.830)
Children's ethnicity: Chinese	-	-48.17***
	-	(14.16)
Children's ethnicity: Indian	-	-57.12***
	-	(15.25)
Children's ethnicity: Malay	-	-39.09***
	-	(10.24)
Parents' ethnicity: Chinese	-	40.60***
	-	(14.78)
Parents' ethnicity: Indian	-	51.28***
	-	(15.78)
Parents' ethnicity: Malay	-	35.73***
	-	(11.09)
Year-month FE	Y	Y
Parent's postal sector FE	Y	Y
Child's postal sector FE	Y	Y
Observation	14,914	14,914
R-squared	0.113	0.125

Notes: The data are from the debit and credit card consumption records from a leading bank in Singapore from 2016:01 to 2017:12. The consumption items include transport, supermarket, entertainment, apparel, dining, travel, service, durable, bill payment, and others. Top and bottom 1% of the consumption/income ratio is trimmed.

Table 7: Intergenerational Correlation in Ratio of Consumption/Income
(Other than Housing Consumption)

Outcome Variable: Rank of Children's Consumption/Income Ratio		
	(1)	**(2)**
	Children at Least 30 Years	**Children at Least 20 Years**
Panel A. Full Sample		
Rank of parents' consumption/income ratio	0.066*	0.085***
	(0.035)	(0.023)
Age controls	Y	Y
Observation	876	1,859
R squared	0.010	0.058
Panel B. by Parents' Residential Type		
Rank of parents' consumption/income ratio	0.116**	0.108***
	(0.055)	(0.038)
Rank of parents' consumption/income ratio × I (HDB residence)	-0.099	-0.041
	(0.072)	(0.048)
Age controls	Y	Y
Observation	876	1,859
pair	0.013	0.058

Notes: The data are from the debit and credit card consumption records from a leading bank in Singapore from 2016:01 to 2017:12. The consumption items include transport, supermarket, entertainment, apparel, dining, travel, service, durable, bill payment, and others. Top and bottom 1% of the consumption/income ratio is trimmed. Child's and parent's consumption/income ratio is averaged across 2016:01 to 2017:12. Standard errors are clustered at the household level.

Appendix

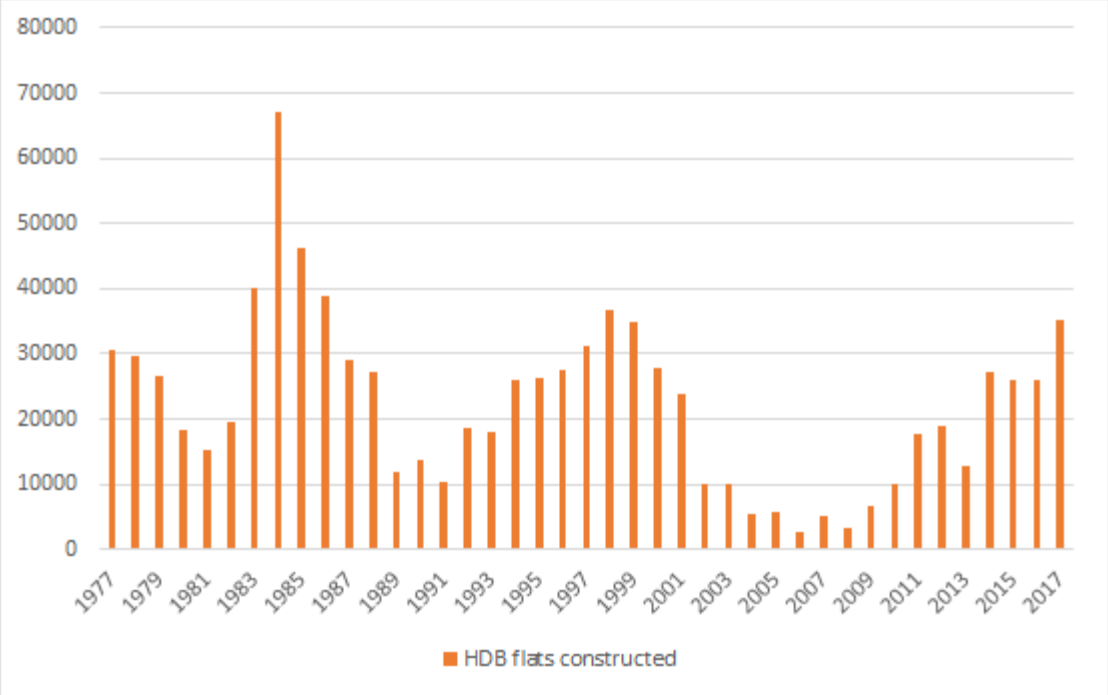

Figure A1: Number of Public HDB Flats Constructed from 1977 to 2017

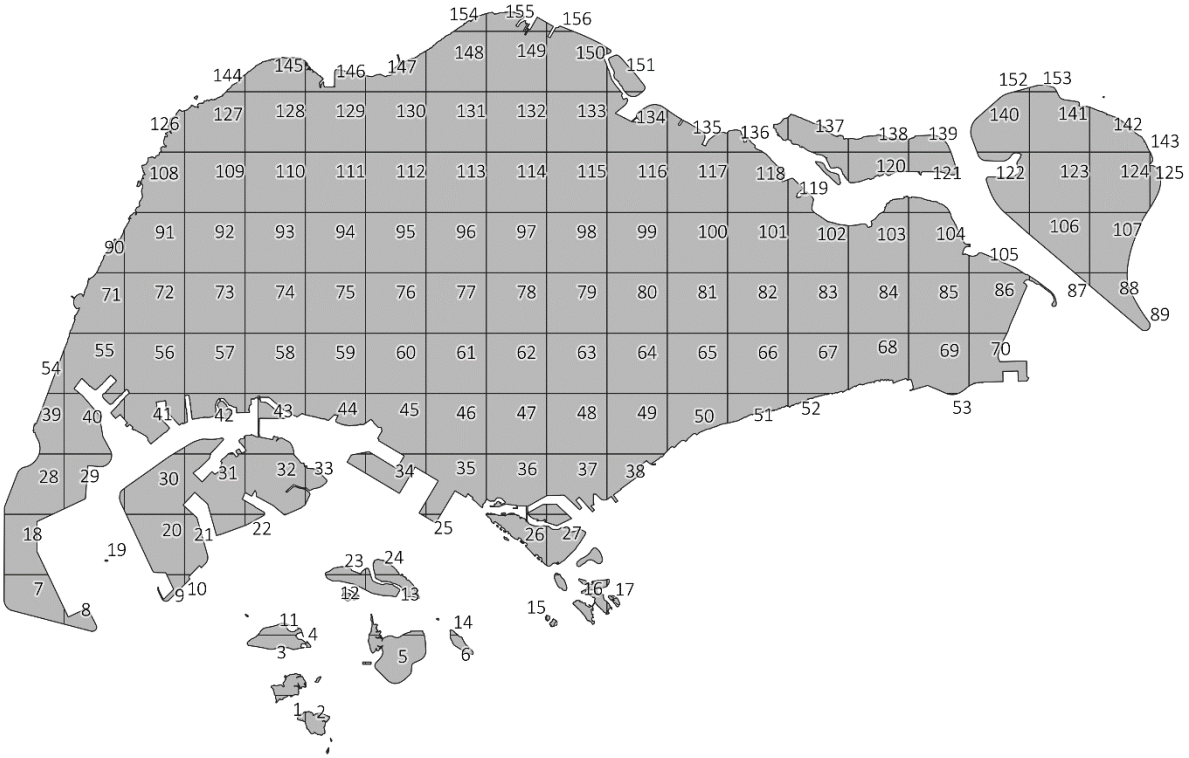

Figure A2: 156 Subzones in Singapore with Diagonals of 4 Kilometers

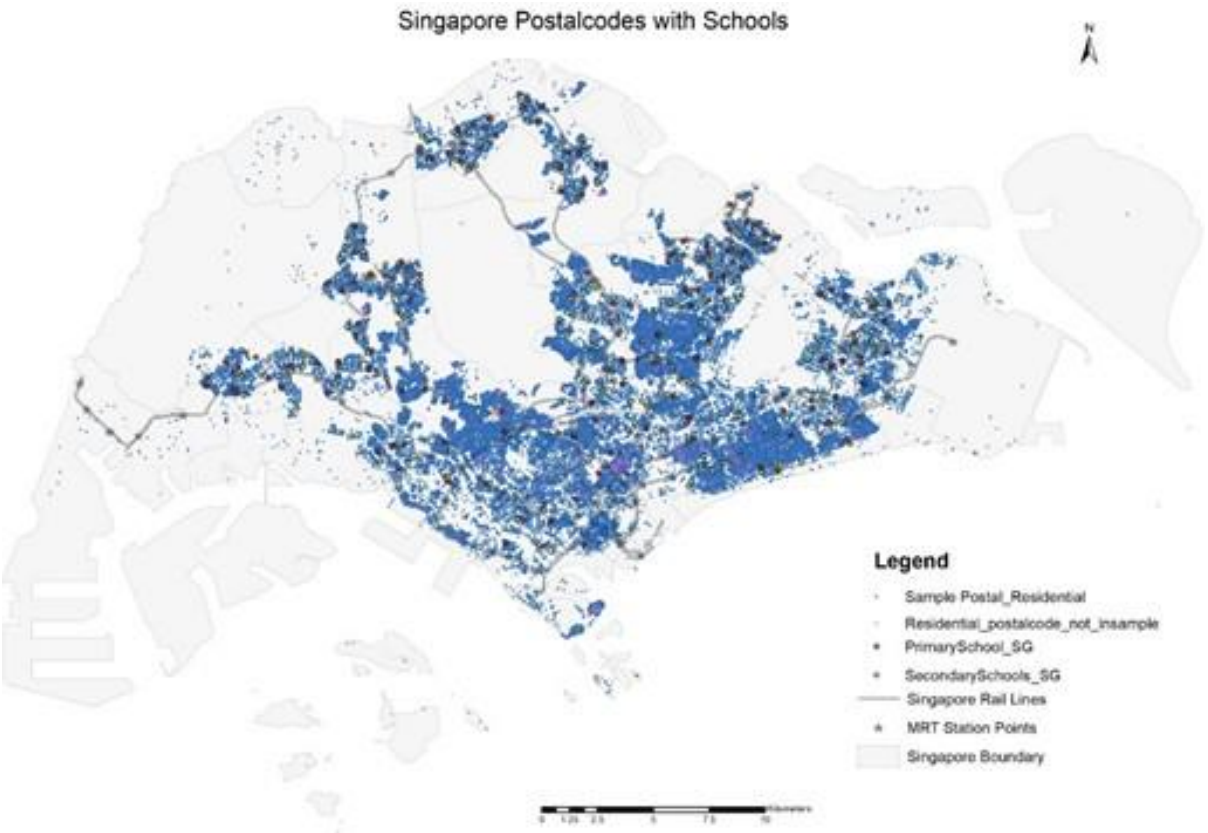

Figure A3: Residential Buildings Covered in the Data (89,624/90,370=99.2%)

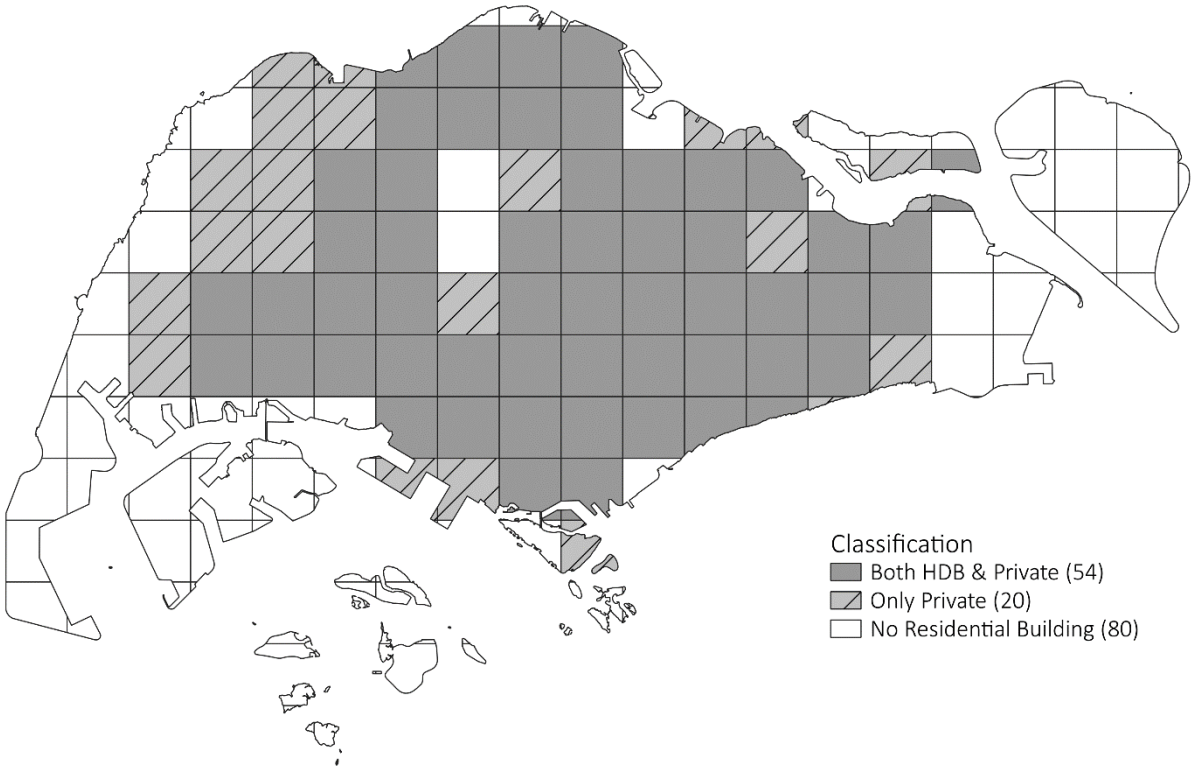

Figure A4: Distribution of Public and Private Housing across Constructed Subzones with Diagonal of 4 Kilometers

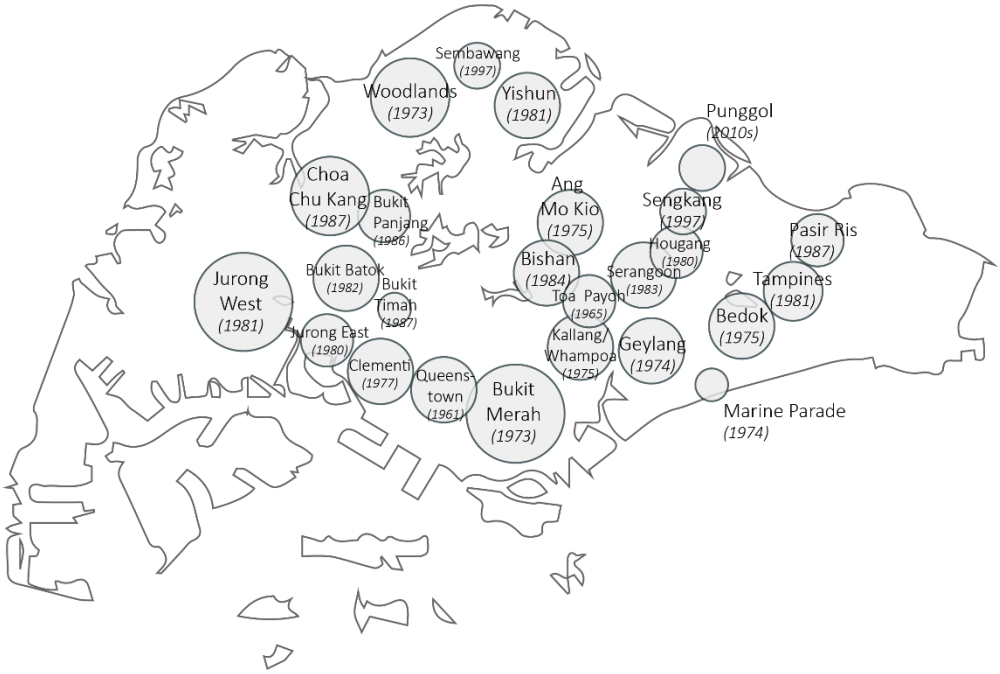

Figure A5: HDB Towns and Starting Years

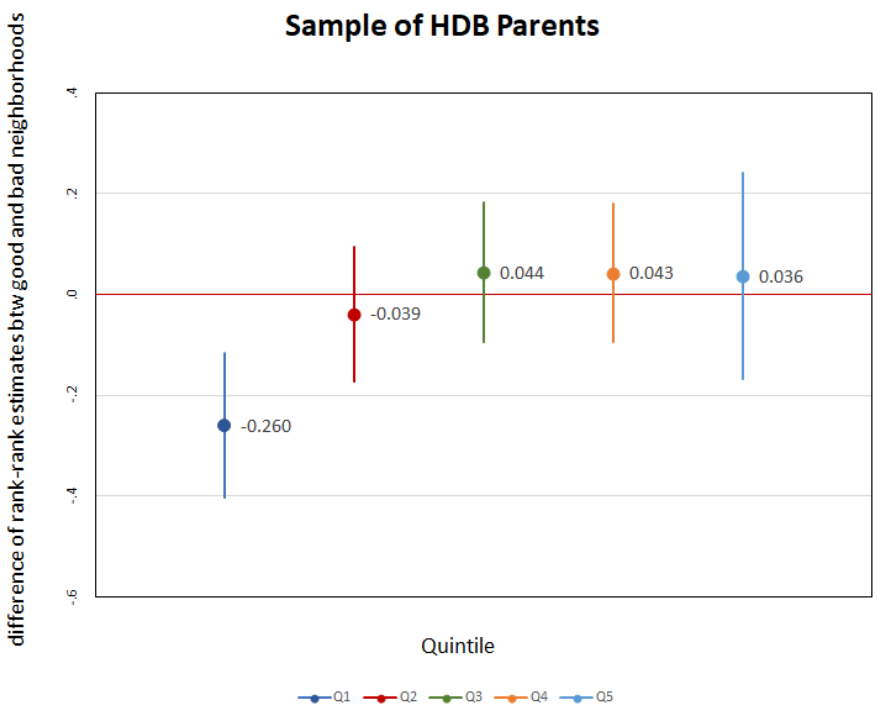

Figure A6: Difference in Rank-rank Correlation Coefficients between Good and Bad Neighborhoods Conditional on Parents' Housing Quartile

Table A1: Admission Criterion for Public Primary Schools at Different Phases

Phase	Criterion
Phase 1	Sibling currently studying in the school.
Phase 2A(1)	• Parent is a former student who joined the alumni's association, or • A member of the school's advisory management or committee.
Phase 2A(2)	• Parent or another child has previously studied in the school, or • Parent is a staff member, or • Child is in an MOE Kindergarten under the purview of and located within the preferred school.
Phase 2B	• Parent is a volunteer at the school and has completed at least 40 hours of service, or • Parent is a member endorsed by the church or clan directly connected to the school, or • Parent is endorsed as an active community leader.
Phase 2C	For those who were unsuccessful in earlier phases.
Phase 2C Supplementary	For those who were unable to get a place in the school of choice during Phase 2C.
Phase 3	For international students.

Note: the information is derived from Ministry of Education Singapore https://beta.moe.gov.sg/primary/p1-registration/registration-phases-key-dates/?pt=1 .

Table A2: Summary Statistics (Consumption Other than Housing)

Variable	Mean (Standard deviation)
Average consumption/income ratio of children	0.77 (1.82)
Average consumption/income ratio of parents	0.69 (1.63)
Children's average age	36.00 (4.24)
Parents' average age	65.10 (5.91)
Children's gender (male=1)	0.53 (0.50)
Parents' gender (male=1)	0.49 （0.50）
Children's type of residence (HDB=1, other=0) [a]	0.60 (0.49)
Parents' type of residence (HDB=1, other=0) [a]	0.59 (0.49)
Children's ethnicity (Chinese=1, Indian=2, Malay=3, Other=4)	1.08 (0.43)
Parents' ethnicity (Chinese=1, Indian=2, Malay=3, Other=4)	1.08 (0.43)
Observation	14,997
Parent-child pairs	876

Note: Children are at least 30 years old. Housing prices is adjusted to 2014 prices.
[a] The type of residence for children and parents are summarized based on 14,997 individual-month observations as the residential type can change over time. Other variables are summarized based on 876 parent-child pairs.

Table A3: Robustness Checks: Intergenerational Correlation in Housing Consumption

Outcome Variable: Housing Rank of Child		
	(1)	(2)
Panel A. Robustness Check 1. Additional Control Variables		
Parents' housing rank	0.176***	0.164***
	(0.004)	(0.004)
Age controls	Y	Y
Ethnicity of parents and children and children's gender	N	Y
Observation	149,745	149,745
R-squared	0.036	0.061
Panel B. Robustness Check 2. Standard Errors Clustered at Family Level		
Parents' housing rank	0.175***	0.176***
	(0.003)	(0.003)
Age controls	N	Y
Observation	149,745	149,745
R-squared	0.031	0.036
Panel C. Robustness Check 3. Children at Least 35 Years Old		
Parents' housing rank	0.177***	0.178***
	(0.004)	(0.004)
Age controls	N	Y
Observation	125,513	125,513
R-squared	0.031	0.036

Notes: Standard errors are clustered at the parents' postal code in Panels A and C.

Table A4: Heterogeneity in Intergenerational Correlation in Housing Consumption: by Family Size and Ethnicity

Outcome Variable: Housing Rank of Child		
	(1)	**(2)**
Panel A. by Family Size		
Parent's housing rank	0.182***	0.186***
	(0.007)	(0.007)
Parent's housing rank × I (family with 2-3 children)	-0.008	-0.010
	(0.008)	(0.008)
Parent's housing rank × I (family with 4 children or more)	-0.018*	-0.020**
	(0.010)	(0.010)
Age controls	N	Y
Observation	135,301	135,301
R-squared	0.036	0.040
Panel B. by parents' ethnicity		
Parent's housing wealth rank (baseline = Malay parents)	0.132***	0.134***
	(0.007)	(0.007)
Parent's housing wealth rank × I (Chinese parents)	0.038***	0.037***
	(0.008)	(0.008)
Parent's housing wealth rank × I (Indian parents)	0.032**	0.029*
	(0.016)	(0.016)
Parent's housing wealth rank × I (other parents)	0.036	0.033
	(0.032)	(0.032)
Age controls	N	Y
Observation	149,745	149,745
R-squared	0.055	0.059

Notes: Additional regressors in Column (1) include dummy variables for family size. Additional regressors in Column (2) include age and age squared of child and parents, and dummy variables for family size. Standard errors are clustered at the parents' postal code. Ethnicity is defined as father's race. If there is no information on the father's ethnicity, mother's ethnicity is used instead.

Table A5: Intergenerational Correlation in Housing Consumption by Neighborhood Quality (HDB Sample)

Outcome Variable: Housing Rank of Child		
	(1)	**(2)**
	HDB parents	**HDB parents**
Parents' housing rank	0.141***	0.344***
	(0.005)	(0.048)
Parents' housing rank × I (good neighborhood)	-0.016**	-0.260***
	(0.008)	(0.074)
Parents' housing rank × I (2nd quintile)	-	-0.316***
	-	(0.065)
Parents' housing rank × I (3rd quintile)	-	-0.149**
	-	(0.065)
Parents' housing rank × I (4th quintile)	-	-0.194***
	-	(0.067)
Parents' housing rank × I (5th quintile)	-	0.096
	-	(0.083)
Parents' housing rank × I (good neighborhood) × I (2nd quintile)	-	0.221**
	-	(0.102)
Parents' housing rank × I (good neighborhood) × I (3rd quintile)	-	0.304***
	-	(0.102)
Parents' housing rank × I (good neighborhood) × I (4th quintile)	-	0.303***
	-	(0.102)
Parents' housing rank × I (good neighborhood) × I (5th quintile)	-	0.296**
	-	(0.128)
Age controls	Y	Y
Observation	134,679	134,679
R-squared	0.022	0.025

Notes: Good neighborhood is defined as subzones with above-median quality of primary schools. Quality of primary schools is measured by the cumulative take-up rate at the end of phase 2B in 2006. Standard errors are clustered at the parents' postal code.

Table A6: Fixed Effects Estimates in Intergenerational Correlation in Ratio of Consumption/Income (Other than Housing Consumption)

Outcome Variable: Rank of Children's Consumption/Income Ratio		
	(1)	**(2)**
	Children at Least 30 Years Old	**Children at Least 20 Years Old**
Panel A. Full Sample		
Rank of parents' consumption/income ratio	0.033***	0.035***
	(0.010)	(0.008)
Age controls	Y	Y
Observation	14,951	33,162
pair	830	1769
Panel B. by Parents' Residential Type		
Rank of parents' consumption/income ratio	0.035***	0.042***
	(0.016)	(0.013)
Rank of parents' consumption/income ratio × I (HDB	-0.002	-0.012
	(0.020)	(0.016)
Age controls	Y	Y
Observation	14,951	33,162
pair	830	1769

Notes: The data are from the debit and credit card consumption records from a leading bank in Singapore from 2016:01 to 2017:12. The consumption items include transport, supermarket, entertainment, apparel, dining, travel, service, durable, bill payment, and others. Top and bottom 1% of the consumption/income ratio is trimmed. Standard errors are clustered at the parent-child pairs.

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