Scaling Up the American Dream: A Dynamic Analysis *

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Abstract

The Moving to Opportunity (MTO) program implemented in the '90s offered vouchers to low-income people living in high-poverty neighborhoods to move to richer neighborhoods. We use a dynamic general equilibrium model with residential choice and endogenous local spillovers to explore the quantitative effects of scaling up this policy and compare them to those of alternative neighborhood-specific policies. We first contrast the MTO policy to a place-based policy that offers a transfer to all families living in a high-poverty neighborhood. The MTO program generates larger income gains for the children of the recipient families. However, as we scale up the policy, general equilibrium effects both dampen these gains and impose large welfare losses for the non-recipient families. The transfer place-based policy has overall higher average welfare gains, but it is less successful in reducing income inequality and residential segregation. We then introduce an alternative place-based policy that invests resources in local institutions, such as public schools, to directly improve the neighborhood spillover. This type of policy is less effective on impact, but realizes larger welfare gains over time, while also reducing both inequality and residential segregation.

Keywords: Income inequality, Residential segregation, MTO, Place-Based policies, Local externalities
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1 Introduction

In the last decades, the US has experienced, at the same time, a steady increase in income inequality and a rise in residential segregation by income within metro areas. In the mid '90s, the US Department of Housing and Urban Development ran a Moving To Opportunity program (MTO) offering vouchers to low-income people living in high-poverty neighborhoods to move to richer neighborhoods. Chetty et al. (2016) have shown that the program has been successful in improving the outcomes for young children of voucher-recipient families. Given the success of the program, a natural question is whether would be a good idea to implement a scaled-up version of this experience.

In this paper, we use a general equilibrium model with residential choice and local spillovers, building on Fogli et al. (2022), to explore the macroeconomic effects of scaling up a voucher program similar to the MTO and to compare it to alternative neighborhood-specific policies.

The main elements of the model are the following. There is a city with three neighborhoods, inhabited by overlapping generations of agents, who live for two periods. In the first period, an agent is a child, and in the second, she becomes a parent. Parents care about their own consumption and their children's expected future income, and choose how much to consume, in which neighborhood to raise their children, and how much to invest in their children's education. Children have heterogeneous ability and their future wages are affected by the neighborhood where they grow up because the model features an endogenous local spillover, which depends on the distribution of families who live in the neighborhood. We choose a flexible formalization of the spillover to capture a variety of local effects: quality of local public schools, peer effects, social norms, networks, and so forth. In particular, we assume that the local spillover depends on the average expected income of the children growing up in that neighborhood, which means that the spillover tends to be higher in neighborhoods with richer parents and with children with higher ability. We assume that the spillover is complementary to both education and ability, so that living in a neighborhood with higher spillover generates higher returns to education, especially for the more talented children. The presence of the local spillovers generates residential sorting, as richer parents tend to choose to live in the neighborhood with the highest spillover to give their kids the best opportunity for success. We also assume that there is a government, which collects proportional income taxes to finance a public assistance program that provides free housing and a minimum level of consumption for poor families.

We calibrate the model to a representative US metro area in 1980. The key ingredient of the model is the strength of the local spillover. To discipline this moment, we use the micro estimates by Chetty and

Hendren (2018b) for the local exposure effects on children's outcomes. We then introduce a small scale voucher scheme that mirrors the MTO program. The program offers housing vouchers to subsidize poor families to move to a low-poverty neighborhood and is financed with proportional income taxes on the whole population. As a validation, we show that our model can generate a take-up rate for the MTO program similar to the data, and an income gain of the children of voucher-recipient families close to the estimate in Chetty et al. (2016).

Our objective is to compare the effects of the MTO policy, for different scales, with the effects of two alternative neighborhood-specific policies, which we label place-based-transfer policy (PBT) and place-based-investment policy (PBI). To compare these policies to the MTO, we keep the total amount of taxes needed to finance each scale of the MTO constant and use them to finance the alternative policies. The PBT policy uses the resources to offer a transfer to all families living in the neighborhood with the lowest spillover. The PBI policy uses the same resources to finance local institutions, such as public schools, and directly increase the local spillover.

We first explore the effects of scaling up the MTO policy. As the scale increases, general equilibrium effects become sizeable: as a larger fraction of poor families living in the poorest neighborhood receive a voucher to move to the richest neighborhood, the size of the spillover in the three neighborhoods endogenously change, as they depend on the distribution of families living there. In particular, the size of the spillover in the richest neighborhood decreases with the scale of the program. This dampens the income gain for the children of voucher-recipient families and generates income losses for children of families who used to live in that neighborhood.

We then move to analyzing the effects of the PBT policy. Given that this policy prescribes a transfer to all families living in the poorest neighborhood, the size of the transfer going to each family is much smaller than the voucher under the MTO policy. This implies smaller welfare gains for the recipient families. Moreover, the general equilibrium effects are drastically different. In particular, the PBT policy incentivizes families to move to the neighborhood with the lowest spillover to receive the transfer. This implies that the poorest families living in the richest neighborhood move out, hence making that neighborhood even richer. This feeds back into an even higher spillover. It follows that under PBT policy, both non-recipient and recipient families experience welfare gains. So, overall the average city-wide welfare gains end up being larger than under the MTO policy, even though the welfare gains for the recipient families are smaller than under the MTO. However, as the general equilibrium effects generate more sorting by income across neighborhood, the PBT policy is less successful in reducing income inequality and residential

income segregation.

Finally, we explore the effects of the PBI policy that uses the same finances to invest directly in increasing the size of the local spillover (for example, by investing in public schools) and financing a minimum level of education for the poorer families. To discipline the design of this policy, we use the estimates about return from capital investment in public schools from Biasi et al. (2025). The PBI policy is not as successful as the others in improving city-wide welfare on impact. However, the effect of the spillover cumulates over time and generates larger welfare gain in the long run, and, at the same time, succeeds in reducing both inequality and residential segregation by income.

Related Literature

Our model builds on the theoretical literature that studies inequality and residential segregation in general equilibrium models with local spillovers and residential choice, going back to Benabou (1993), Benabou (1996a), Benabou (1996b), Durlauf (1996b), Durlauf (1996a), Fernandez and Rogerson (1996), and Fernandez and Rogerson (1998).

Using these types of models, there has been a recent growing body of work studying the effect of different neighborhood-specific policies. The paper that is closest to ours is Chyn and Daruich (2022) that also explores the effects of housing vouchers and place-based policies in a general equilibrium model with endogenous neighborhood externalities. Our papers are complementary. Their model is richer in the description of the skill-accumulation technology and focuses on how endogenous labor supply responds to policies and how this affects parents' investment in child development. Our model features three neighborhoods instead of two, which allows us to generate richer moving patterns, as families living in the policy destination neighborhoods may decide to move out into middle-income areas. Moreover, we model parents' investment in children's education in terms of economic resources rather than time. Given the different modeling choices, we analyze different types of place-based policies, with particular focus on the effects on residential segregation by income.

From a more micro perspective, other two related papers studying the MTO experiment using a location-choice model are Galiani et al. (2015) and Davis et al. (2021). Galiani et al. (2015) use the MTO experiment to identify structural parameters of a location-choice model and run a counterfactual to understand the role of mobility counseling in increasing take-up rates. Then they use the quantitative model to study the effect of restricting the criteria to use the voucher. In particular, they show that forcing voucher receivers to move to neighborhoods with even lower poverty rates, would reduce the take-up rates and possibly back-

fire. In a similar spirit, Davis et al. (2021) estimate preferences in a dynamic location-choice model and emphasize the trade-off of restricting criteria to use the voucher to move to lower poverty neighborhoods: on the one hand, households who use the voucher end up in better locations, but on the other hand, less families end up taking up the voucher. They are closer to our paper in focusing on the general equilibrium effect of the policy. In particular, they emphasize a trade-off of restricting the use of the voucher to lower poverty neighborhoods: the endogenous increase in rental rate in high opportunity locations induces some households who used to live there to move to lower opportunity areas dampening the net benefit effects of the policy.

There is a number of papers that use general equilibrium models similar to ours to study different types of neighborhood-specific policies. Among the others, Rossi-Hansberg et al. (2010) propose a model of housing externalities, where the value of land is affected by the houses in the surrounding areas that affect the intensity of non-market interactions. They estimate how housing externalities decline with distance and use these estimate to evaluate the effect of the Neighborhoods-in-Bloom program, which is an urban revitalization program implemented in Richmond, Virginia, between 1999 and 2004.[1] Aliprantis and Carroll (2018) propose a two-neighborhood model with residential choice and local human capital externalities. They then calibrate a version of the model with no residential choice to data from Chicago in 1960 to map the initial racial composition of the two neighborhoods, and use it to explore the effects of eliminating legal racial discrimination for neighborhood selection. Diamond et al. (2019) use a dynamic model with neighborhood choice disciplined with quasi-esperimental variation in assignment of rent control to evaluate the benefits of rent controls for covered tenants and the welfare losses from decreased housing supply. More related to our paper, Agostinelli et al. (2020) focus on how parents affect the choice of peer groups. Their parenting style decision is close in spirit to our residential choice decision and is affected by the return to education. In a similar spirit to the MTO, they use this model to explore the effects of policy interventions to move children to better neighborhoods. Agostinelli et al. (2021) develop and estimate a spatial equilibrium model with residential sorting and school choice to study the effects of school bus transportation to have talented children from poor neighborhoods attending high-quality schools in richer neighborhoods. As in our paper, they have an endogenous school quality as well as heterogenous skill distribution, and they show that scaling up the policy may have general equilibrium effects that dampen its beneficial effects. Gaubert et al. (2021) explore the efficiency and equity consequences of place-based redistribution policies.

[1]There is a vibrant empirical literature developing different strategies to estimate the strength of neighborhood externalities, including Redding and Sturm (2016) and Diamond and McQuade (2019) among others.

Our paper is connected to a large empirical literature that study the effects of the MTO program on both non-economic and economic objects. Initial research, including Katz et al. (2001), Kling et al. (2007), Clampet-Lundquist and Massey (2008), Ludwig et al. (2013), did not find significant impact of the housing vouchers on the future income and employment status of the children of the voucher recipient families. More recently, Chetty et al. (2016), using more recent administrative data including the adult income of individuals who were children when their families participated in the program, have found significant economic effects for children who moved to lower poverty neighborhoods when they were below 13 years old. Bergman et al. (2019) use a randomized controlled trial with housing voucher recipients in Seattle and King Country to show that barriers in the housing search process are an important driver of residential segregation by income.

2 Recent Evidence on Neighborhood Policies

In this section, we describe some of the recent evidence on the Moving to Opportunity (MTO) program.

The MTO program is a randomized experiment conducted by the US Department of Housing and Urban Development (HUD) to improve opportunities for children of low-income families living in poor neighborhoods. This program run from 1994 to 1998 in five cities: Baltimore, Boston, Chicago, Los Angeles, and New York.

To be eligible for the program, families had to satisfy a number of criteria: 1) they needed to have children below 18 years old of age; 2) they had to live in high-poverty neighborhoods (with more than 40% of population below the poverty line); 3) they had to live in public housing developments or project-based assisted housing, which required them to be low income families (below 50% of the local median).

The public housing authority (PHA) in each city outreached to all eligible families and gave them the opportunity to pre-apply for the program. After a preliminary eligibility screening, families were randomly ordered into a waiting list. Then, small groups of families from the top of the list were called to attend a visit at the PHA, where they were told the rules of the experiment and then they had to decide whether they wished to go forward with the application. If they decided to apply, they were randomly assigned to one of three groups:

1. the experimental group was given housing vouchers that could be used only to move to census tracts with 1990 poverty rates below 10%;

2. the Section 8 group received regular Section 8 housing vouchers that could be used without any specific relocation constraint;

3. the control group received no assistance through the MTO program, but continued to be eligible for housing assistance and other welfare programs.

Voucher recipients were required to contribute 30% of their annual household income towards rent and utilities and received housing vouchers that covered the difference between their rent and the family's contribution, up to a maximum amount, defined as the 40th percentile of rental costs in a metro area (Fair Market Rent). Families remained eligible for these vouchers indefinitely as long as their income was below 50 percent of the median income in their metro area.

Table 1 shows some statistics about the MTO enrollment. The first two columns report for each site, respectively, the total population in 1990 and the estimated number of eligible families, as reported in Feins et al. (1996). The table also reports the number of families that were effectively enrolled in the MTO program according to Sanbonmatsu et al. (2011) and their assignment to the three different groups. The enrolled families are a bit less than one third of the eligible families. This is because, given the total finances available and the estimate of compliance rates, the program was designed to target an enrollment of 4,436 families, which is roughly the number of families who ended up being enrolled. As we explained above the criterion to select the families from the waiting list was random. However, there was selection in the families who effectively pre-applied for the program and also for the ones who decided to apply after their visit to the PHA. Moreover, one of the eligibility criterion was to be eligible for the Section 8 program. While the main criterion for Section 8 eligibility is to be a "low-income" family (that is, with income not higher than 80% of the median), the program explicitly targets poorer families.[2]

Finally, the table also shows the compliance rate, that is the share of enrolled families in the experimental and section 8 group who actually used the voucher. As further investigated by Bergman et al. (forthcoming), many frictions might have prevented some families to actually use the voucher, including housing availability, landlords' skimming, liquidity constraints. The compliance rate is higher for the section 8 group, as the families were not constrained to find housing in a restricted set of neighborhoods.

[2]From the website https://www.cbpp.org/research/policy-basics-section-8-project-based-rental-assistance: "*For each participating housing development, at least 40 percent of the subsidized units that become available annually must go to families with "extremely low incomes" (up to the poverty line or 30 percent of the local median, whichever is higher). Most of the remaining units are restricted to families or individuals with incomes not above half of the local median.*"

Table 1: Eligible, enrolled, and compliant families

MTO Site	Population in 1990	All Groups		Experimental Group		Section 8 Group	
		Eligible Families	Enrolled Families	Enrolled Families	Compliance Rate	Enrolled Families	Compliance Rate
Baltimore	736,014	2,300	572	252	53.50%	123	79.80%
Boston	574,289	4,500	868	366	43.60%	176	51.10%
Chicago	2,783,660	2,415	825	460	33.40%	133	67.40%
Los Angeles	3,485,499	3,900	929	340	60.50%	200	71.60%
New York	7,322,564	2,430	948	401	46.40%	252	45.20%
All Sites	13,902,026	15,545	4,142	1,819	47.40%	844	61.60%

Initial research evaluating the effects of the MTO program (e.g. Katz et al. (2001), Kling et al. (2007), Clampet-Lundquist and Massey (2008), Ludwig et al. (2013)) did not find significant impact of housing vouchers on future income and employment outcomes of children of recipient families. They found only effects on non-economic measures of well-being, such as physical and mental health.

However, Chetty et al. (2016) have recently revisited the economic impact of the MTO program, using more recent administrative data that include adult labor market outcomes of individuals who were young children when their families participated in the program. Motivated by their previous work on causal effects of neighborhood exposure, they split the sample of families who participated in the MTO program into two groups: those with children younger than 13 years old at the time of the program and those with older children. With this distinction, they find significant economic effects for children who moved to lower poverty neighborhoods. In particular, they look at the treatment-on-the-treated (TOT) effect, which is the change in adult income for children of voucher recipient families who used the voucher relative to the control group. For children who were younger than 13 when their family took up an experimental voucher, they estimate an increase in adult annual income by the time they reached their mid-twenties of $\$3,477$, which corresponds to a 31% increase relative to a mean of $\$11,270$ in the control group. For children younger than 13 of families in the Section 8 group, they estimate an increase in income of 15% relative to the control group. Instead, they find negligible or slightly negative effects for the children who were older than 13 years old when their families used the voucher. They also find significant effects for college attendance for children younger than 13.

3 Model

In this section, we present a general equilibrium model with residential choice and local spillovers, building on Fogli et al. (2022). Parents choose the neighborhood where to live, taking into account that different local spillovers affect their children's future income. A key element of the model is that the local spillovers are endogenous and depend on the sorting of families into neighborhoods. We also assume that a skill premium shock is the primary source of the rise in inequality.

We use the model to think about the effects of different types of policies designed to improve the outcomes of children growing up in poor neighborhoods. We start by looking into a voucher policy similar to the one implemented with the MTO program and then explore place-based policies such as school capital investment and the Head Start Program. We first analyze the effects of scaling up these types of policies both on recipient and on non-recipient families, and on aggregate outcomes like welfare, inequality, residential segregation, and intergenerational mobility. We then focus on the dynamic effects of the same policies and explore long run implications as the neighborhoods evolve endogenously over time.

3.1 Environment

The economy consists of three neighborhoods, denoted by $k \in \{A,B,C\}$, and is populated by overlapping generations of agents who live for two periods. An agent is a child in the first period and a parent in the second period. A parent at time t earns a wage $w_t \in [\underline{w},\overline{w}]$, has one child with ability $a_t \in [\underline{a},\overline{a}]$, and was born in neighborhood $b_t \in \{A,B,C\}$. The ability of a child is correlated with the ability of the parent. In particular, $log(a_t)$ follows an AR1 process

$$log(a_t) = x + \rho log(a_{t-1}) + \nu_t,$$

where ν_t is normally distributed with mean zero and variance σ_ν, $\rho \in [0,1]$ is the autocorrelation coefficient, and x is a constant normalized so that the mean of a_t is equal to 1. The joint distribution of parents' wages, children's abilities, and birth neighborhoods evolves endogenously and is denoted by $F_t(w_t,a_t,b_t)$, with $F_0(w_0,a_0,b_0)$ taken as given.

There is a continuum of landlords who build houses every period and rent them out to the parents. Each period the houses fully depreciate. All houses are of the same dimension and quality and the rent in neighborhood k at time t is denoted by R_{kt}. The construction cost in each neighborhood k is pinned down

to generate an upward-sloping housing supply curve at each time t, given by

$$H_{kt} = \lambda_k R_{kt}^{\phi_k},$$

where ϕ_k represents the housing elasticity in neighborhood k, and λ_k is a shift parameter in the same neighborhood. At the end of each period, the landlords pool their profits Π_t and redistribute them to the parents with income in the top x-th percentile of the city-wide income distribution, in proportion to their income. In particular, the total landlord's profits Π_t are equal to

$$\Pi_t = \sum_{k=A,B,C} \left\{ R_{kt} H_{kt} - \frac{\phi_k}{1+\phi_k} \lambda_k^{-\frac{1}{\phi_k}} H_{kt}^{1+\frac{1}{\phi_k}} \bar{w}_t \right\},$$

where

$$H_{kt} = \int\int\int_{n_t(w_t,a_t,b_t)=k} F_t(w_t,a_t,b_t) dw_t da_t db_t.$$

Parents with wage $w_t \geq \bar{w}_t$, where $F_t(\bar{w}_t) = 1-x$, get a fraction of the total profits Π_t equal to $s(w_t,a_t,b_t) = f_w(w_t)/[1-F_w(\bar{w}_t)]$. From now on we pick $x = .8$ and we do robustness check in the quantitative analysis.

A parent with income w_t, child's ability a_t, and birth neighborhood b_t chooses consumption, $c_t(w_t,a_t,b_t)$, the neighborhood where to raise their children, $n_t(w_t,a_t,b_t)$, and how much to invest in their children's education, $e_t(w_t,a_t,b_t)$. Parents who choose a neighborhood n_t different from their birth neighborhood b_t, incur in a utility cost μ. The educational choice is continuous and the cost of education is equal to τe_t^{γ}, with $\tau > 0$ and $\gamma > 0$.

The future wage of a child with parent (w_t,a_t,b_t) who grows up in neighborhood n_t and receives education e_t is equal to

$$w_{t+1} = \Omega(w_t,a_t,e_t,S_{n_t t},\varepsilon_t) \equiv (y + a_t e_t \eta_t(\beta_0 + \beta_1 S_{n_t t}^{\xi})) w_t^{\alpha} \varepsilon_t, \tag{1}$$

where ε_t is an iid noise with cdf Ψ, normally distributed with mean one and standard deviation σ_ε, $\eta_t > 0$ captures a skill premium shock, and $S_{n_t t}$ is the strength of a local spillover in neighborhood n_t at time t that affects the returns to education. The wage equation shows that a child's wage is increasing in her ability, in her education level, in her parent's income, and is affected by the neighborhood where she grows up because of the local spillover.[3]

The strength of the spillover effect in neighborhood k at time t is equal to the expected future income of the children growing up in that neighborhood:

$$S_{kt} = \frac{\int\int\int\int_{n_t(w_t,a_t,b_t)=k} W_{t+1}(w_t,a_t,b_t,\varepsilon_t) F_t(w_t,a_t,b_t) \Psi_t(\varepsilon_t) dw_t da_t db_t d\varepsilon_t}{\int\int\int_{n_t(w_t,a_t,b_t)=k} F_t(w_t,a_t,b_t) dw_t da_t db_t}, \tag{2}$$

[3]Parents' wages affect children's wages both directly and indirectly through the educational and residential choices.

where we define $W_{t+1}(w_t, a_t, b_t, \varepsilon_t) \equiv \Omega(w_t, a_t, e_t(w_t, a_t, b_t), S_{n_t(w_t,a_t,b_t)t}, \varepsilon_t)$, that is, the children's wage given optimal education and residential choices of the parents. Given that wages are increasing in ability and in parents' wage, neighborhoods with higher spillovers are neighborhoods with both richer parents and children with higher ability. This formalization allows us to capture a number of different sources of local spillovers, from pecuniary ones, such as the quality of public schools, to non-pecuniary ones, such as social norms, peer effects, information externalities and so forth. We chose this general specification because we are going to discipline quantitatively the strength of the local externalities with the estimates of neighborhood exposure effects in Chetty and Hendren (2018b), who do not distinguish among different channels. From now on, we define the neighborhood with the highest and lowest spillover as $\bar{n}_t \equiv \arg\max_{k \in A,B,C} S_{kt}$ and $\underline{n}_t \equiv \arg\min_{k \in A,B,C} S_{kt}$.

Parents care about their own consumption and about their child's future income.[4] We also introduce two types of preference shocks over neighborhoods to capture the role of fixed amenities (e.g., waterfront, parks, and so forth) as well as idiosyncratic preference for different locations (e.g., family network). We assume that neighborhood A has better amenities than B, and B has better amenities than C and that only a random fraction π of parents care about amenities. Hence, the utility from consumption for a parent who chooses neighborhood n is given by $log(\theta_n c)$, where $\theta_A > \theta_B = 1 > \theta_C$ with probability π and $\theta_A = \theta_B = \theta_C = 1$ with probability $1 - \pi$.

The preferences of parent (w_t, a_t, b_t) can be written as

$$log(\theta_{n_t t} c_t) + log[w_{t+1}] + \sigma_\zeta \zeta_{n_t t} - \mu I_{n_t \neq b_t}$$

where $\zeta_{n_t t}$ is the idiosyncratic shock, which follows a Type-I Extreme Value distribution with scale parameter σ_ζ. This shock introduces some additional randomness that is not systematically related to some particular ranking of the neighborhoods and helps making the model analytically tractable. Moreover μ is the utility cost of moving neighborhood.

We assume that the government runs a public assistance (PA) program for the parents with low income to ensure everybody a minimum level of consumption $\underline{c}$. The program is financed with a proportional income taxation at the city level with tax rate κ_t. Parents are eligible if they have income below the cut-off $\hat{w}_t = (R_{\underline{n}_t} + \underline{c})/(1 - \kappa_t)$. Eligible parents have to live in the neighborhood with the lowest spillover $\underline{n}_t$.

[4] This assumption is common in this class of models. The assumption that agents cannot save (if not by investing in housing or kids'education) is for simplicity. The assumption that agents cannot borrow is for realism, given that typically people cannot borrow against children's future income. An alternative specification could have parents getting utility directly from their children's consumption, but with the introduction of a borrowing constraint.

If their income is higher than the rental rate in that neighborhood, they have to pay for it and they will receive a consumption transfer (e.g. food stamps) such that they achieve a minimum level of consumption $\underline{c}$. If their income is below the rental rate, the government will cover the remaining portion of the rent and transfer $\underline{c}$ to them. To sum up, a parent with $w_t < \hat{w}_t$ will receive a transfer in terms of consumption equal to $T_t(w_t) = \underline{c} - \max\{(1-\kappa_t)w_t - R_{\underline{n}_t}, 0\}$.[5] For each eligible parent with $w_t < \hat{w}_t$, the government will need resources equal to $R_{\underline{n}_t} + \underline{c} - (1-\kappa_t)w_t$.[6] The government's budget balance condition at each time t is then given by

$$\int\int\int_{w_t<\hat{w}_t} (R_{\underline{n}_t t} + \underline{c} - (1-\kappa_t)w_t) dF_t(w_t, a_t, b_t) \leq \kappa_t \left(\int\int\int w_t dF_t(w_t, a_t, b_t) \right). \tag{3}$$

To summarize, the optimization problem for a parent (w_t, a_t, b_t) with $w_t \geq \hat{w}_t$ at time t can be written as:

$$\begin{aligned} U(w_t, a_t, b_t) = \max_{c_t, e_t, n_t} & \; log(\theta_{n_t t} c_t) + E_t[log(w_{t+1})] + \sigma_\zeta \zeta_{n_t t} - \mu I_{n_t \neq b_t} \\ s.t. \;\; & c_t \leq (1-\kappa_t)w_t + s_t(w_t)\Pi_t I_{w_t > \bar{w}_t} - R_{n_t t} - \tau e_t^\gamma \\ & w_{t+1} = \Omega(w_t, a_t, e_t, S_{n_t t}, \varepsilon_t), \end{aligned} \tag{P1}$$

taking as given spillovers and rental rates in the two neighborhoods, $S_{n_t t}$ and $R_{n_t t}$ for $n_t = A, B, C$.

Instead a parent (w_t, a_t, b_t) with $w_t < \hat{w}_t$ will have to live in the neighborhood with the lowest spillover $n_t(w_t, a_t, b_t) = \underline{n}_t$, and her optimization problem will be[7]

$$\begin{aligned} U(w_t, a_t, b_t) = \max_{c_t, e_t} & \; log(\theta_{\underline{n}_t} c_t) + E_t[log(w_{t+1})] + \sigma_\zeta \zeta_{\underline{n}_t t} - \mu I_{n_t \neq b_t} \\ s.t. \;\; & c_t \leq (1-\kappa_t)w_t - \min\{(1-\kappa_t)w_t, R_{\underline{n}_t t}\} - \tau e_t^\gamma + T_t(w_t) \\ & T_t(w_t) = \underline{c} - \max\{(1-\kappa_t)w_t - R_{\underline{n}_t t}, 0\} \\ & c(w_t, a_t, b_t) \geq T_t(w_t) \\ & w_{t+1} = \Omega(w_t, a_t, e_t, S_{\underline{n}_t t}, \varepsilon_t). \end{aligned} \tag{P2}$$

All parents with after-tax income below the rental rate in the neighborhood will have consumption $c_t(w_t, a_t, b_t) = \underline{c}$, and no resources for education, so $e_t(w_t, a_t, b_t) = 0$. Parents who have leftover income after paying the rent could choose some positive level of education.

[5] Given that this transfer is in terms of consumption, a parent with transfer $T_t(w_t)$ will have to choose $c(w_t, a_t, b_t) \geq T_t(w_t)$.

[6] If the eligible parent has a wage smaller than the rental rate, then the government has to pay for the residual rental rate on top of the transfer.

[7] Notice that there are no landlords' profits in the budget constraint because $\bar{w}_t < \hat{w}_t$.

In our analysis, we assume that there are complementarities between the spillover and ability, education, and wages, and between education and ability, and education and wages.

Assumption 1 *The composite function $\Omega(w,a,e,S,\varepsilon)$ has increasing differences in a and S, in e and S, in w and S, in a and e, and in w and e.*

These complementarities assumptions drive residential segregation by income and ability in equilibrium. Although it is hard to get direct estimates of innate ability, the complementarity between innate ability and education and between innate ability and neighborhood spillover reflect some of the findings of the recent empirical literature. [8]

3.2 Equilibrium

We are now ready to define an equilibrium.

Definition 1 *For a given initial wage distribution $F_0(w_0,a_0,b_0)$, an equilibrium is characterized by a sequence of educational and residential choices, $\{e_t(w_t,a_t,b_t)\}_t$ and $\{n_t(w_t,a_t,b_t)\}_t$, a sequence of rents and spillover's sizes in the three neighborhoods, $\{R_{kt}\}_t$ and $\{S_{kt}\}_t$ for $k=A,B,C$, a sequence of tax rates $\{\kappa_t\}_t$, and a sequence of distributions $\{F_t(w_t,a_t,b_t)\}_t$ that satisfy:*

1. *agents' optimization: for each t and given R_{kt} and S_{kt} for $k=A,B,C$*
   (a) *for (w_t,a_t,b_t) with $w_t \geq \hat{w}_t$, e_t and n_t solve problem (P1);*
   (b) *for (w_t,a_t,b_t) with $w_t < \hat{w}_t$, $n_t = \underline{n}_t$ and e_t solves problem (P2);*
2. *spillovers' consistency: for each t, equation (2) is satisfied for $n=A,B,C$;*

[8] Our assumptions of complementarity between innate ability and education and between innate ability and neighborhood spillover are consistent with the latest research on technology of skill formation. Cunha et al. (2010) show that the higher the initial conditions for cognitive and non-cognitive skills of children, the higher the return to parental investment in children at later stages in life. As they highlight, "Family environments and genetic factors may influence these initial conditions." In our model, parental investment in children's future outcomes takes place both through educational investment and through residential choice. Moreover, the recent human capital literature, reviewed in Sacerdote (2011), also highlights the presence of non-linearity in peer effects, which are one of the forces behind our spillover effects. In particular, Sacerdote (2001), Imberman et al. (2012), and Lavy et al. (2012) find that high ability students are the ones who benefit the most from peer effects of other high ability students. Another paper that speaks more specifically to the complementarity between ability and spillover effects is Card and Giuliano (2016), which shows that high achievers from minority and disadvantaged groups show high returns when included in school tracking programs.

3. *market clearing: for each t and $k \in \{A,B,C\}$, R_{kt} is such that*

$$\lambda_k \left(\frac{R_{kt}}{\bar{w}_t} \right)^{\phi_k} = \int \int \int_{n_t(w_t,a_t,b_t)=k} G_t(w_t,a_t,b_t) dw_t da_t db_t; \tag{4}$$

4. *wage dynamics are consistent with optimal choices: for each t,*

$$w_{t+1} = \Omega(w_t, a_t, e_t(w_t,a_t,b_t), S_{n_t(w_t,a_t,b_t)t}, \varepsilon_t). \tag{5}$$

5. *budget balance: for each t, κ_t is such that equation (3) is satisfied.*

In equilibrium, the presence of local spillovers, together with assumption 1, generate residential segregation by income and ability.[9] Talented children from poor families who grow up in the poorer neighborhoods do not have the same opportunities as children of richer families who can afford a neighborhood with higher spillover. Moreover, since higher local spillovers increase the return to education, parents who live in poorer neighborhoods, everything else equal, end up investing less in education than parents who live in richer neighborhoods. This amplifies future inequality and segregation and further reduces intergenerational mobility.

4 Neighborhood Policies

We now consider different types of neighborhood-specific policies to mitigate the rise in inequality and residential segregation and allow for a higher degree of intergenerational mobility. In particular, we focus on three alternatives: an housing voucher policy (MTO policy), a place-based transfer policy (PBT), and a place-based investment policy (PBI). We now describe how we formalize them.

4.1 MTO Policy

The first policy that we consider is a housing voucher policy that mimic the MTO program implemented in the US. We assume that the policy is permanent and is unexpectedly introduced at time $\bar{t}$. For each $t \geq \bar{t}$, let $\chi(w_t,a_t,b_t)$ denote the eligibility indicator, with $\chi_t(w_t,a_t,b_t) = 1$ if the parent is eligible for the program and equal to 0 otherwise. To map the MTO policy eligibility criteria, we require that families need to: 1) live in the neighborhood with the lowest spillover, and 2) belong to the poorest $p-th$ percentile of the

[9] Residential segregation by income is also driven by the presence of local amenities.

metro income distribution. That is, we assume that $\chi(w_t, a_t, b_t) = 1$ if $b_t = \underline{n}_t$ and $w_t \leq \tilde{w}_t$, where $\tilde{w}_t$ is such that

$$F_w[\tilde{w}_t] = p.$$

In our model the neighborhood with the lowest spillover is also the one where the poorer families live. However, given that local spillovers are endogenous and evolve over time, and so does the composition of the neighborhood, the worst neighborhood may change in response to the policy.

Eligible families are offered a housing voucher to cover the difference between their rent and the family's contribution, equal to a fraction q of their income, with a cap $\bar{r}$. We focus on the "experimental group" and assume that families accepting the voucher have to move to the neighborhood with the highest spillover, $\bar{n}_t$. We assume that the policy is financed with income taxes on the whole population and that the government budget has to balance. The public assistance program is still in place and if a family is eligible for both, she will get the housing voucher transfer from the MTO program, with the same contribution rules, and the same consumption transfer $T_t(w_t)$ from the public assistance program. The eligibility cut-off for the public assistance program is unchanged, so that families who were eligible without the MTO program in place, are still eligible afterwards.[10] The government budget balance condition can be written as

$$\int\int\int_{v_t=1} min\{(R_{\bar{n}_t t} - qw_t), \bar{r}\} dF_t(w_t, a_t, b_t) + \int\int\int_{w_t<\hat{w}_t \& v_t=0} (R_{\underline{n}_t t} + \underline{c} - (1-\kappa_t)w_t) dF_t(w_t, a_t, b_t)$$
$$\int\int\int_{w_t<\hat{w}_t \& v_t=1} [\underline{c} - \max\{(1-\kappa_t)w_t - R_{\underline{n}_t t}, 0\}] dF_t(w_t, a_t, b_t) \leq \kappa_t \left(\int\int\int w_t dF_t(w_t, a_t, b_t) \right).$$

Parents who are eligible for the program take up the voucher if the utility from using it is larger than the one from not using it. Define $v_t(w_t, a_t, b_t)$ as the voucher take-up indicator. Let us first consider the case of experimental policy. For all parents such that $\chi_t(w_t, a_t, b_t) = 0$, $v_t(w_t, a_t, b_t) = 0$, while for all parents such that $\chi_t(w_t, a_t, b_t) = 1$ with $w_t \geq \hat{w}_t$, $v_t(w_t, a_t, b_t)$ solves

$$max_{v_t}\{U^V(w_t, a_t, b_t), U^N(w_t, a_t, b_t)\}, \tag{6}$$

where

$$\begin{aligned} U^V(w_t, a_t, b_t) \quad = \quad & \max_{e_t} \log[\theta_{\bar{n}_t}((1-\kappa_t)w_t - \max\{qw_t, R_{\bar{n}_t t} - \bar{r}\} + s_t(w_t)\Pi_t I_{w_t \geq \bar{w}_t} - \tau e_t^{\gamma})] \\ & + \log[\Omega(w_t, a_t, e_t, S_{\bar{n}_t t}, \varepsilon_t)] + \sigma_\zeta \zeta_{\bar{n}_t t} - \mu I_{n_t \neq b_t}, \end{aligned} \tag{7}$$

[10] Notice that families who are eligible for both the MTO and the PA programs, may end up consuming more than $\underline{c}$.

and

$$U^N(w_t,a_t,b_t) = \max_{e_t,n_t} \log[\theta_{n_t}((1-\kappa_t)w_t + s_t(w_t)\Pi_t I_{w_t\geq \bar{w}_t} - R_{n_t t} - \tau e_t^\gamma] + \\ + \log[\Omega(w_t,a_t,e_t,S_{n_t t},\varepsilon_t)] + \sigma_\zeta \zeta_{n_t t} - \mu I_{n_t \neq b_t}, \quad (8)$$

where $U^V(w_t,a_t,b_t)$ is the value of taking up the voucher, $U^N(w_t,a_t,b_t)$ the value of not taking it up, and $\Omega(w_t,a_t,e_t,S_{n_t t},\varepsilon_t) = (y + a_t e_t \eta(\beta_0 + \beta_1 S_{n_t t})^\xi) w_t^\alpha \varepsilon_t$. A parent taking up the voucher has to move to the neighborhood with the highest spillover and has to use a fraction q of her income to contribute for the rent. The voucher covers the difference between $R_{\hat{n}t}$ and her contribution up to the cap $\bar{r}$. A parent not taking up the voucher has to pay the full rent, pay taxes on the total income, but can choose the optimal neighborhood. For a parent with $w_t < \hat{w}_t$, the value of taking up the voucher is the same as in (7), except that she will get a transfer $T_t(w_t) = \underline{c} - \max\{(1-\kappa_t)w_t - R_{\underline{n}_t}, 0\}$ that she is forced to consume. Moreover, the value of not taking it up is equal to (8), except that she now is subject to the standard rules of the PA program, that is, she has to choose neighborhood $\underline{n}_t$, she has to use her income to pay as much as she can of the rent, and she gets a transfer $T_t(w_t) = \underline{c} - \max\{(1-\kappa_t)w_t - R_{\underline{n}_t}, 0\}$ that needs to be consumed.[11]

There are two main reasons why the model can generate a take-up rate smaller than 100%. First, the rental rate in the worse neighborhood may be lower than the required down-payment to move to the best neighborhood, as required if accepting the voucher. Moreover, the required down-payment may be higher than 30% of the income if the voucher cap is binding. Second, the moving costs together with the idiosyncratic preference shocks may be such that some eligible families may prefer to remain in their original neighborhood.

4.2 PBT Policy

We now introduce the "place-based transfer policy" (PBT from now on), that is, a policy that introduce a transfer to all the families living in the poorest neigborhood $\underline{n}_t$. In particular, we assume that such a policy is also unexpectedly introduced at time $\bar{t}$, and gives at any time $t \geq \bar{t}$ a transfer $\tilde{T}_t$ to all parents choosing to live in the neighborhood with the lowest spillover $\underline{n}_t$. As for the case of the MTO, the public assistance program is still in place and if a family is eligible for both, she will get the transfer $\tilde{T}_t$ on top of the PA transfer $T_t(w_t) = \underline{c} - \max\{(1-\kappa_t)w_t - R_{\underline{n}_t}, 0\}$. As before, the government finance both the PA and the

[11] The equilibrium definition is the natural generalization of the equilibrium defined in section 3.2.

PBT programs with income taxes and the budget balance condition at time t is now given by

$$\int\int\int_{w_t<\hat{w}_t}(R_{\underline{n}_t t}+\underline{c}-(1-\kappa_t)w_t)dF_t(w_t,a_t,b_t)+\tilde{T}_t\left(\int\int\int_{n_t=\underline{n}_t}dF_t(w_t,a_t,b_t)\right)$$
$$\leq \kappa_t\left(\int\int\int w_t dF_t(w_t,a_t,b_t)\right).$$

To compare the effects of the two different policies, for each scale p of the MTO program, we pick the transfer such that the total taxes collected are the same as the ones collected with the MTO. First, we find the tax rate κ_t such that the total tax revenues used under PBT are equal to the total tax revenues used under the MTO program for each scale p.[12] We then back up as a residual the place-based transfer $\tilde{T}_t$. However, given that parents make their residential choice knowing that the policy is in place, this becomes a fixed point problem.

4.3 PBI Policy

We now consider an alternative type of place-based policy, where the same finances are used to directly invest into improving the spillover of the neighborhood, i.e. investment in public school, crime reduction, information diffusion. Given that in this model, a higher spillover is beneficial for the families living in the neighborhood because it increases the returns to education, the effectiveness of this policy relies on parents investing in education. We then assume that the government also subsidizes the cost of some basic level of education for those families that are so poor that would not have otherwise afforded it.

As we did for the analysis of the PBT, for each scale of the MTO policy p, we compare a place-based investment policy that uses the same total finances. The funds are used to pay for a basic level of education $\underline{e}$ for families living in $\underline{n}_t$ that belong to the lowest x-th percentile of the city-wide income distribution.[13] Let us define $\hat{\hat{w}}_t$ the cut-off such that $F(\hat{\hat{w}}_t)=x\%$. The remaining resources $\bar{I}_t$ are used to increase directly the spillover of neighborhood $\underline{n}_t$, and, once it reaches the level of the second highest spillover, to further increase both the second highest and the lowest spillovers. The government budget balance condition is

[12] At time $\bar{t}$, this means simply that we keep the tax rate $\kappa_{\bar{t}}$ the same as under MTO. However, for the following periods $t>\bar{t}$, the tax rate might be different because the distribution $F_t(w_t,a_t,b_t)$ evolves endogenously in a different way under the two policies.

[13] In this exercise we set the basic level of education to 0.19, which is equal to the average steady state level of education in neighborhood $\underline{n}_t$.

now

$$\int\int\int_{w_t<\hat{w}_t}(R_{\underline{n}_t t}+\underline{c}-(1-\kappa_t)w_t)dF_t(w_t,a_t,b_t)+\tau\underline{e}^{\gamma}\left(\int\int\int_{n_t=\underline{n}_t \& w_t<\hat{\hat{w}}_t}dF_t(w_t,a_t,b_t)\right)$$
$$+\bar{I}_t\leq\kappa_t\left(\int\int\int w_t dF_t(w_t,a_t,b_t)\right),$$

where the right-hand-side is the total level of finances equalized to the finances used under MTO for each scale p, and $\bar{I}_t$ is the residual amount of resources after paying for basic education and PA programs. The effective spillover in neighborhood n at time t, S^*_{nt}, is now

$$S^*_{nt}=S_{nt}+I^{\zeta}_{nt},$$

where S_{nt} is the standard spillover, as defined in equation 2, and I_{nt} is the amount of resources used to increase the spillover in neighborhood n at time t. In particular, $I_{\underline{n}_t t}=\bar{I}_t$ if $S^*_{\underline{n}_t t}\leq S_{\tilde{n}_t t}$ where $\tilde{n}_t$ is such that $S_{\underline{n}_t t}<S_{\tilde{n}_t t}<S_{\bar{n}_t t}$. If instead, this is not true, then the total resources $\bar{I}_t$ are split among the two neighborhoods $\underline{n}_t$ and $\tilde{n}_t$ so that $S^*_{\underline{n}_t t}=S^*_{\tilde{n}_t t}$, as long as $S^*_{\underline{n}_t t}<S^*_{\bar{n}_t t}$. If this is not the case either, then the resources are split among the three neighborhoods so as to equalize the total spillovers.

5 Quantitative Analysis

In our quantitative analysis, we map our model to the average US metro area and explore the effects of alternative neighborhood-specific policies.

5.1 Calibration

First we calibrate the model assuming that the US economy with public assistance program in place, but without neighborhood-specific policies, is in steady state in 1980. In order to replicate the pattern of increasing inequality in the US data, we introduce a skill premium shock in 1990 so to match the increase in the college premium between 1980 and 1990.

In order to map our model to the data, we interpret one period as ten years, given our focus on the education investment.[14] Moreover, to define the three neighborhoods, we rank census tracts in each MSA according to the number of families living there who belong to the top 20th percentile of the income distribution ("rich families" from now on). For each MSA, we define neighborhood A as the group of census tracts with more

[14]The schooling age could be interpreted as 10 or 15, years depending on which level of education one targets. Another factor in our choice of 10 years is that census data are available every 10 years.

than 30% rich families, neighborhood C as the group of tracts with less than 17% rich, and neighborhood B as the residual. Then we map the neighborhoods in our model to the average neighborhoods A, B, and C across all US MSAs in our sample, weighting by population.[15] The cut-offs chosen to define the neighborhoods imply that in 1980 roughly 50% of the US population lives in neighborhood C and the rest is roughly split between A and B. Given our interest in studying the scaling up of MTO policies, this definition of C allows us to have enough room to expand the policy to a progressively larger number of families targeted by the program. Table 2 shows the targets of our baseline calibration, which we are now going to discuss.

Table 2: *Calibration Targets*

Description	Data	Model	Source
Dissimilarity index by income	0.334	0.333	Census 1980
Gini coefficient	0.376	0.377	Census 1980
Income 25th/75th p	0.667	0.712	Chetty and Hendren (2018b)
Rank-rank correlation	0.335	0.352	Chetty et al. (2014)
Return to spillover 25th p	0.06	0.06	Chetty and Hendren (2018b)
Return to spillover 75th p	0.05	0.05	Chetty and Hendren (2018b)
Return to college 1980	0.391	0.397	Goldin and Katz (2009)
Return to college 1990	0.549	0.563	Goldin and Katz (2009)
Neighborhood A size 1980	0.194	0.193	Census 1980
Neighborhood A size 1990	0.217	0.209	Census 1990
Neighborhood B size 1980	0.301	0.301	Census 1980
Neighborhood B size 1990	0.250	0.277	Census 1990
Share of rich in A 1980	0.437	0.444	Census 1980
Share of rich in B 1980	0.225	0.227	Census 1980
College share A 1980	0.340	0.336	Census 1980
College share B 1980	0.178	0.211	Census 1980
Rent ratio R_A/R_B 1980	1.253	1.257	Census 1980
Rent ratio R_B/R_C 1980	1.277	1.279	Census 1980
Average rent ratio 1990	1.300	1.304	Census 1990
Average city housing elasticity	1.75	1.75	Saiz (2010)
SNAP population share 1980	0.07	0.08	USDA Food Nutrition Service

The first three targets in Table 2 are measures of residential segregation by income and income inequality at the metro area level. For all these measures, we restrict the sample to families with children because our mechanism emphasizes the parental decision to invest in the children' future. First, we target the 1980 value of the dissimilarity index by income as a measure of segregation. We calculate the dissimilarity

[15] See Appendix for summary statistics.

index for each MSA and then take the average, weighting by population.[16] Second, we target the value of the Gini in 1980 as a measure of income inequality. Using Census data, we calculate the Gini coefficient for each metro area and then we average them, weighting by population. Third, as an additional measure of income inequality, we target the ratio of the average income for families in the top 25th percentile of the income distribution to the average income for families in the bottom 25th percentile.

In addition, we target the level of intergenerational mobility, measured as the rank-rank correlation between log wages of parents and children estimated using administrative records by Chetty et al. (2014). In particular, they use children born between 1980 and 1982, calculate parental income as mean family income between 1996 and 2000 and children's income as mean family income between 2011 and 2012, when the children are approximately 30 years old. Given that this correlation is calculated over several decades, we map it in the model to the average rank-rank correlation across 1980, 1990, and 2000.

An important target for our exercise is the "return to spillover", that is, the effect of the neighborhood exposure on children's income in adulthood. To measure this effect, following Fogli et al. (2022) we rely on the results from the quasi-experiment in Chetty and Hendren (2018b), who use tax returns data for all children born between 1980 and 1986, to estimate the effect of local spillovers on children's future income, by looking at movers across US counties.[17] We target their estimates which imply that for a child with parents at the 25th (75th) percentile of the national income distribution, growing up in a 1 standard deviation better county from birth would increase household income in adulthood by approximately 6.2% (4.6%). [18] In our model, we consider parents at the 25th percentile and at the 75th percentile of the income distribution who decide to live in a neighborhood different from their birth neighborhood and calculate the ratio of the standard deviation of the expected future wage of their children divided by the average wage of the parents. Given the timing of the estimates from the data, we again map these numbers to the average "spillover effects" in the model across 1980, 1990, and 2000.

As we mentioned before, we choose η to target the increase in US college premium between 1980 and 1990 (from Goldin and Katz (2009)). In the model, we map the skill premium to the steady state difference

[16] We define the dissimilarity using rich and poor as the mutually exclusive groups, where rich are again the families in the top 20th percentile of the MSA income distribution and poor are all the others. Moreover, we use the grouping of census tracts in neighborhoods A, B, and C as described above as the geographic subunit of analysis.

[17] Chetty and Hendren (2018b) control for selection effects by looking at families who move from one county to another with kids of different age, so that they were exposed for different fractions of their childhood to the new county. We focus on their estimations for families moving across counties within the same commuting zone, given that we use the metro area as our geographic unit of analysis.

[18] See table II in Chetty and Hendren (2018b).

between the average log wage of college-educated individuals and the average log wage of the others. To define college-educated individuals, given that the educational choice is continuous, we define a cut-off $\hat{e}$ such that individuals with an education level above $\hat{e}$ are college educated, and the ones with education below are not. We choose $\hat{e}$ so that, in 1980, 17.8% of the population is college educated, as in the Census data and keep it constant.[19]

In our model, the size of the three neighborhoods are endogenous. We use micro data on census tracts' population, to target the size of the three neighborhoods both in 1980 and 1990. It is useful to use both years, to recover both the housing supply shifters and the housing supply elasticities for the three neighborhoods. We also target the share of rich families in the different neighborhoods in 1980, where rich are again defined as families in the top 20th percentile of the income distribution. Moreover, we use Census tract data to calculate the number of people above 25 years old who completed college residing in neighborhood A, B, and C for the average MSA.

Two other key objects in the model are the ratio of rental rates in neighborhood A to neighborhood B and in neighborhood B to neighborhood C in 1980. We use housing values in 1980 at the census tract level from the Census data and convert them into rental rates.[20] We also target the average ratio of rental rates (A/B and B/C) in 1990 so that the growth rate in rental rates help us pinning down the moving costs μ.

Finally, we map the minimum level of consumption $\underline{c}$ guaranteed by our public assistance policy to the food stamps in the Supplemental Nutrition Assistance Program (SNAP). In 1980, about 7% of US households were receiving SNAP benefits.[21] We pick the value of $\underline{c}$ to match the share of families receiving public assistance.

Moreover, we feed the empirical time series for the population growth of the average metro area. In particular, we set the population growth in each decade from 1980 to 2020 to be equal to the empirical counterpart from the CBO data and to the projections from the CBO from 2030 onwards.[22]

Table 3 shows our calibrated parameters, their calibrated value, and their description. We normalized the mean of the ability process and the mean of the noise shock to the wage process to be all equal to 1 in

[19] To calculate this number, we look at the number of people above 25 year old who completed college at the census tract level.

[20] We use a standard coefficient of 0.05 for the conversion.

[21] Pew Research Center analysis of data from USDA Food and Nutrition Service, https://www.pewresearch.org/short-reads/2023/07/19/what-the-data-says-about-food-stamps-in-the-u-s/

[22] We adjust the population growth values from the CBO that cover the whole US population to match the average population growth between 1980 and 2010 in our sample of metros using Census data.

Table 3: *Parameters*

Parameter	Value	Description
ρ	0.47	Autocorrelation of log ability
σ_ν	1.11	St. dev. of log ability
σ_ε	0.60	St. dev. of log wage noise shock
α	0.24	Wage function parameter
β_0	0.15	Wage function parameter
β_1	0.15	Wage function parameter
ξ	1.16	Wage function parameter
b	1.04	Wage fixed component for no-college
γ	5.70	Education cost parameter
θ_A	1.28	Preference shock for neighborhood A
θ_C	0.42	Preference shock for neighborhood C
π	0.46	Preference shock probability
σ_ζ	0.20	St. dev. of idiosyncratic preference shock
λ_A	0.68	Shift parameter of housing supply in A
λ_B	0.31	Shift parameter of housing supply in B
ϕ_A	1.94	Elasticity of housing supply in A
ϕ_B	0.05	Elasticity of housing supply in B
ϕ_C	3.26	Elasticity of housing supply in C
η	2.81	Skill premium 1990
μ	0.29	Moving cost
$\underline{c}$	0.004	Minimum Consumption

steady state and τ to be equal to 6. Moreover, λ_C is pinned down by normalizing the average wage to be equal to 1 in 1980.

Our calibrated model is able to generate dynamic patters for income inequality and segregation by income roughly in line with the data. In particular, it matches very closely the gini index, while it generates slightly higher growth in the dissimilarity index. The gini grows by 25% between 1980 to 2010 in the model relative to 24% in the data, while the dissimilarity index grows by 40% in the model and by 33% in the data. Recall that by calibration design, we match the level of inequality and segregation in 1980 and the increase in the college premium between 1980 and 1990, which we consider the primary source for the increase in inequality in the data. Our model generates an amplification effect due to the endogenous feedback between inequality and segregation. As the skill premium increases, the return to live in neighborhoods with higher spillover increases, pushing up the house prices in those neighborhoods and generating more residential segregation by income. In turns, this further amplify future inequality.

6 Policy Experiments

6.1 MTO Program

Given the success of the MTO program, a natural question is whether we can scale up this type of programs to further reduce inequality and improve intergenerational mobility. While for the small scale experiment, the general equilibrium effects are negligible, the natural challenge when we scale up the policy is to consider that the general equilibrium effects may become sizeable and affect the efficacy of the program.

First, we introduce in 1990 an housing voucher policy calibrated to the actual MTO experiment (implemented in 1994-1998). In particular, we need to choose three parameters: the eligibility percentile p, the income share paid by the recipient families $1-q$, and the voucher cap $\bar{r}$. We calculate that the average share of eligible families in the five cities where the MTO was introduced is equal to 0.001, as the number of families effectively enrolled in the MTO program (4,142), as described in Table 1, relative to the total population in the five cities (13,902,026), assuming that they were the poorest of the eligible families and that each family had on average 4 members. Given that the eligibility criteria required also to live in the neighborhood with the lowest spillover, as shown in the first column of Table 4, this corresponds to an eligibility percentile out of the city-wide income distribution equal to $p = 0.0015$.[23] We set $q = 0.7$, as prescribed by the program, and $\bar{r}$ equal to 80% of the rental rate in neighborhood A in 1990, to match the data. Panel (a) in Table 5 summarizes the value and description of the three additional parameters we need for the MTO analysis.

The model is able to generate a voucher take-up rate and an income gain for the children of voucher recipients that are roughly in line with the data. Table 1 shows that of the $4,142$ families that applied, only 47% ended up taking up the voucher, which is close to a take-up rate of 48% generated by the model. As discussed in Section 2, Chetty et al. (2016) estimate an increase in adult annual income of 31% for children younger than 13 at the time when their family took up the MTO voucher in the experimental group relative

[23] The effective income cutoff required for eligibility according to the MTO manual is less stringent than $p = 0.0015$, as 15,545 families were estimated to be eligible for the program (Table 1). However, our stringent threshold captures that the enrolled families were only a fraction of the eligible, and they were among the poorest. Targeting the poorest of the eligible families is a reasonable assumption because of three reasons: 1) the tracts effectively targeted by the program had average poverty rate of 57% (see Appendix B in the MTO Congress Report), which is stricter than what the eligibility criterion would have required; 2) one of the criterion to be enrolled for the MTO program was to live in public housing developments or project-based assisted housing, which give priority to the poorer families as emphasized in Section 2; 3) the families who enrolled in the MTO program were poorer than families living in the same public housing developments who did not enroll in the MTO (see Table 5 from Goering et al. (1999)).

Table 4: MTO Eligible Families for different scales p

	0.0015	0.03	0.06	0.09	0.12	0.15
1990	0.001	0.019	0.039	0.053	0.071	0.105
2000	0.001	0.021	0.040	0.053	0.068	0.097
2010	0.001	0.020	0.038	0.059	0.076	0.106

to the control group, while they find negligible or slightly negative effects for children older than 13. In our model, the income gain of the children of voucher recipient families is calculated as the percentage difference between the adult expected income of children in families who received the voucher relative to the adult expected income of the same children if there were no policy in place.[24] Given that our model does not distinguish between young and old kids, we compare our model implied statistic with a simple average income gain of young and old kids in the data, which is equal to 15.5%. Our model generates an income gain of 17%, which is a good validation for the model. Panel (b) in Table 5 summarizes the two statistics we use to validate the model.

Table 5: *MTO Policy*

.8— *Panel A. Parameters* —			
Parameter	Value		Description
p	0.0015		MTO eligibility income percentile
q	0.70		MTO income share after down-payment
$\bar{r}$	0.80		Voucher cap as a fraction of R_A
— Panel B. Validation —			
Description	Data	Model	Source
Voucher take-up rate	0.47	0.48	MTO manual
Income gain of recipient children	0.16	0.17	Chetty and Hendren (2018b)

We then use our model to study the effects of scaling up the MTO program. To do so, we relax the eligibility requirements for voucher assignment by increasing the income threshold for families living in the worst neighborhood. In particular, we explore the effects of increasing the percentile of eligible families from the scale $p_0 \equiv 0.0015th$ that corresponds to the program implemented in the 1990's, which from now on we are going to call "effective scale" up to $15th$ percentile. In our analysis, we focus on the

[24] Given that the policy is very small, general equilibrium effects are negligible.

results for the experimental group and leave the analysis of the section 8 policy to the appendix. Table 4 shows the proportion of families eligible for the voucher over time for different income cutoffs. It is important to notice that as we scale up the program, we also change the distribution of ability and income of the families who receive the voucher.[25]

As we explore the effects of scaling up the MTO program, it is important to consider the role of the endogenous change in the neighborhoods' spillovers and rental rates, due to the re-sorting of families across neighborhoods in response to the policy. While these general equilibrium effects are negligible for the effective scale of the MTO program implemented in the 1990s, they become larger the larger is the scale. Panel (a) in Figure 1 shows the impact response of the spillover in the three neighborhoods to the introduction of the policy, as a function of its scale. As the scale increases, there is a larger share of eligible families who take up the voucher and move from neighborhood C to neighborhood A. This reduces the spillover in neighborhood A, while increases the spillover of neighborhood C, reducing the gain of moving from C to A. At the same time, as the spillover in neighborhood A decreases, more families decide to move from neighborhood A to neighborhood B, increasing the spillover in B. As we scale up the policy, such a process gets more pronounced until it can lead to a switch in the ranking of the neighborhoods' spillovers. In particular, when the cutoff is larger than the 12th percentile, the spillover in B becomes larger than the spillover in A, making B the most desirable neighborhood.[26]

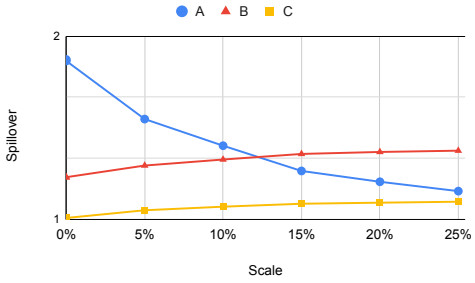
Moreover, panels (b) and (c) in the same figure show, respectively, the rental rates and the sizes of the three neighborhoods as a function of the policy's scale. The decline in the spillover of neighborhood A tends to decrease demand to live there. However, the increase in demand because of the voucher receivers moving to A dominates and makes overall demand for neighborhood A higher. This translates into both an increase in the rental rate in A and an increase in the size of the neighborhood. Demand to live in B also increases because of the increase of families who decide to move from A to B, due to the fact that the gap in spillover declines, while the rental rate in A increases. This increases the rental rate and also slightly the size of neighborhood B. The demand to live in neighborhood C decreases because of the voucher receivers who are moving to A, although this effect is partially offset by the increase in the spillover due to the improvement of the composition of families living there. As a result, both the size and the rental rate in

[25] An alternative way of scaling up the policy is to choose a higher eligibility percentile and then randomly assign vouchers to an increasing proportion of eligible families. This would eliminate selection effects, but would target a less poor portion of the population, while Section 8 eligibility criteria that need to be satisfied for the MTO seem to target the poorest families in the eligible pool.

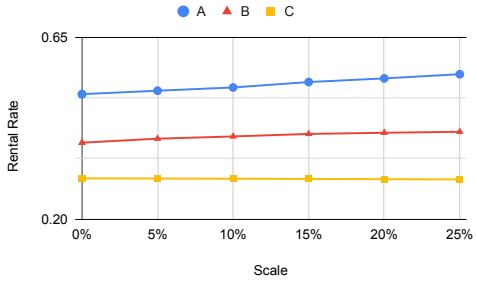
[26] If the scale of the program increases further, the spillover in A further decreases to the point that for some parameters and a scale large enough, it can become even lower than the spillover in C.

Figure 1: MTO: General Equilibrium Effect

(a) Spillovers



(b) Rents



(c) Sizes

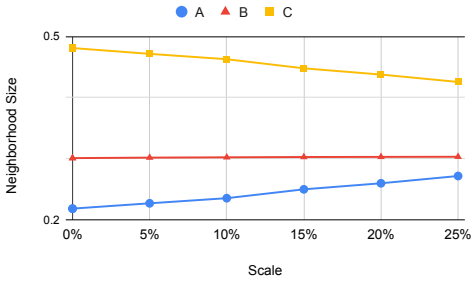
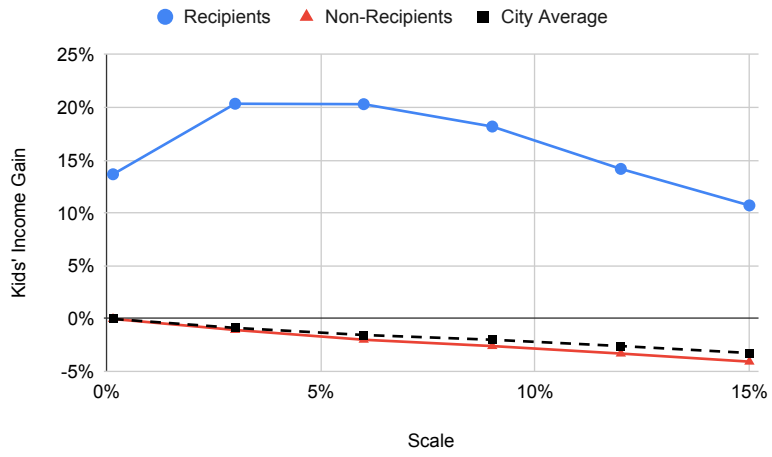


Figure 2: MTO: Effect on Children Income



neighborhood C decline. The increase in rental rate in A and the decrease in rental rate in C further reduce the advantage of moving from C to A.[27]

To evaluate how the effectiveness of the policy changes with the scale, we first explore the policy's impact on children's future income. In particular, as the scale increases and the general equilibrium effects become sizeable, the policy is going to have effects on the future income not only of the children of recipient families, but also on all other children. The blue solid line in Figure 2 shows the income gain of the children of voucher recipient families, who benefit from growing up in a neighborhood with a higher spillover, as a function of the policy scale. As the scale increases, the average income gain increases at first, but then it starts to decline. This is due to different forces working in opposite directions. As the income cutoff of the eligible families increases, richer families will be able to take up the voucher. On the one hand, given the positive correlation between wage and ability, this also means that recipient families will tend to have more talented kids. Due to the complementarity between local spillover and education, between spillover and parents' wage, and between spillover and ability, richer families will have a larger income gain from moving to a neighborhood with higher spillover. Moreover, the presence of a cap on the voucher policy contributes to most of the increase in income gain going from p_0 to $p = 5\%$.[28] On the

[27]Notice that rental rates do not move much in C as it is the neighborhood with highest housing supply elasticity.

[28]When the scale is small, a large fraction of the eligible families are so poor that they end up not taking up the voucher. The reason is that the housing cost is higher than 30% of their income and is beyond the cap imposed by

other hand, children of richer families have a smaller gain from the voucher policy because their parents would have invested in education even in the absence of the voucher. This second effect dominates when the scale of the policy becomes large enough, generating the inverted U shape. On top of these effects, as we scale up the policy, the general equilibrium effect that we have shown in Figure 1 further reduces the income gain of the voucher receivers' children, as the spillover gain from moving to A declines and the rental cost increases.

The red dashed line in Figure 2 shows how the policy affects the future income of children of families who are not voucher recipients. When the scale of the policy is equal to the effective scale p_0, there is virtually no effect on the future income of children of non-recipient families, as the general equilibrium effects are negligible. However, as we scale up the policy and the general equilibrium effects kick in, children of non-recipient families suffer an income loss, the larger the larger is the scale. This is mainly due to children of families growing up in A, who are now exposed to a smaller spillover relative to when there is no policy. Moreover, these families have to pay higher rental rates, which reduces their investment in their children's education. Finally, the black dotted line in Figure 2 shows the average children's income gain at the city level. For the effective scale of the program, the city-wide income gain is quite small but negative, because, although the recipient families enjoy a large income gain, they are a small fraction of the population and everybody else is paying taxes to cover the program, reducing investment in education. As the scale becomes bigger the city-wide average income loss becomes larger because of the general equilibrium effect just described.

Given these results, we will now explore alternative types of place-based policies that use the same financing to improve the opportunities for families who live in neighborhood C, without moving them to a different neighborhood.

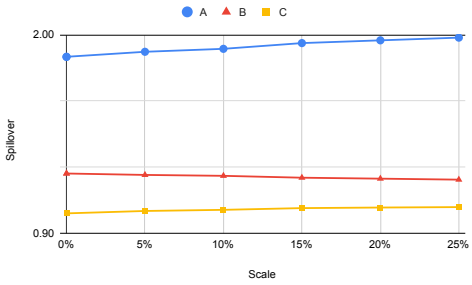
6.2 Place-Based Transfer Policy

We now consider a place-based transfer policy (PBT from now on) that gives a transfer to all families living in the neighborhood with the lowest spillover, neighborhood C. For each scale of the MTO policy, we consider a PBT policy that levies the equivalent total amount of taxes.

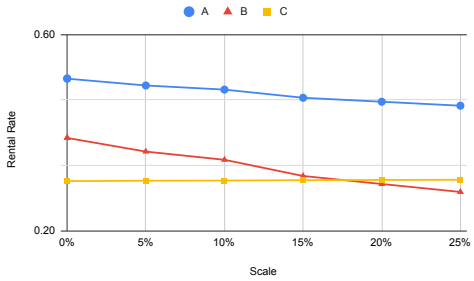
the policy. This means that these families would have to pay additional out-of-pocket expenses to move to A and a large of fraction of them end up deciding not to take up the voucher, even if they have high ability children. When the scale increases, a larger fraction of families take up the voucher, so more high ability children have a chance to move to A and, given the complementarity between ability and spillover, the average income gain becomes larger.

Figure 3: PBT: General Equilibrium Effect

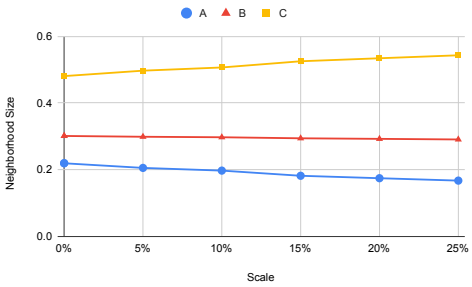
(a) Spillovers



(b) Rents



(c) Sizes



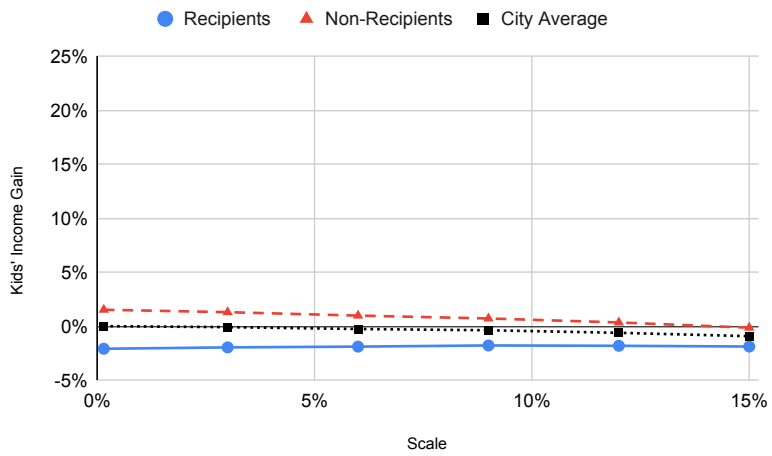
The general equilibrium effects of this policy are quite different from those generated by the MTO policy. In particular, panel (a) in Figure 3 shows the behavior of the spillover in the three neighborhoods under the place-based policy, as a function of the policy's scale. The figure shows that the spillover effects are quite different from the case of the MTO policy. In particular, under the place-based policy, neighborhood C becomes more attractive because families living there obtain a subsidy. This implies that some of the poorer families living in neighborhood A will move to neighborhood C, making A more selective and increasing A's spillover. This is very different from the MTO policy we analyzed, where the spillover in neighborhood A was deteriorating as an effect of the policy. At the same time, the spillover in neighborhood B declines, because, although some of the poorer families move to C, there are fewer families moving into the neighborhood from A. This is also in contrast with what happens under the MTO policy, where neighborhood B was attracting more families from A. Finally, the spillover in neighborhood C increases, as under the MTO policy, but for different reasons: under MTO it was because the poorer families were moving out, while under the place-based policy it is because families from richer neighborhoods move in to receive the transfer.

Panels (b) and (c) in Figures 3 show respectively what happens to the rental rates and the sizes of the three neighborhoods as a function of the scale of the policy. The place-based policy incentivizes families to move to C. As the scale of the policy increases, families receive a larger transfer if they live in neighborhood C, and hence more families want to move there. Given the elastic housing supply, this translates in part in an increase in the rental rate of neighborhood C and in part in an increase in its size. At the same time, there is less demand for neighborhoods A and B, which translates into a reduction of both interest rates and sizes in those neighborhoods.

Let us now explore the effects of the PBT policy on children's future income. Figure 4 shows the effect on the children income as a function of the policy's scale.

In particular, the blue solid line shows the change in income of the children growing up in C under the PBT policy relative to the income the same children would obtain in absence of the policy. Differently from the MTO policy, the figure shows that the children of recipient families suffer an income loss under the PBT policy. This is because their families are incentivized to move to C to enjoy the transfer, reducing the opportunity for their children to be exposed to a higher spillover. As we will show below, these families still have higher expected utility but because of the higher parental consumption. The red dashed line shows the effect on the income of children growing up in A or B, whose families do not receive the transfer, relative to the income of the same children under no policy. Although these families pay taxes to

Figure 4: PBT: Effect on Children Income



finance the PBT policy and so have less resources both to consume and to invest in education, the overall effect on their children income is positive, because of the general equilibrium effect working through the increase in the spillover of A and B. The income gain becomes smaller as the scale increases because the increase in the GE effect is dominated by the increase in the taxes that reduce investment in education. The black dotted line shows the city-wide average of the children income change in response to the policy and shows that the overall effect is negative, although very small.

To sum up, the MTO policy is more effective than a place based transfer policy in increasing the expected income of the children in the recipient families, but it also generates larger negative effects on the non-recipient children.

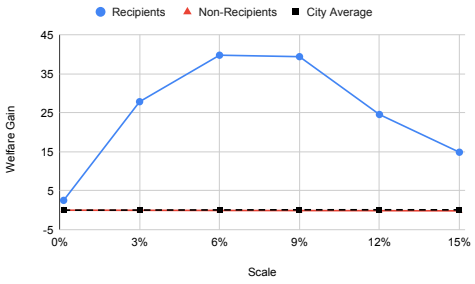
6.3 Aggregate Effects

In this subsection, we explore the aggregate effects of the MTO and the PBT policy. In particular, we look at the effects of the policies on welfare, income inequality and residential segregation.

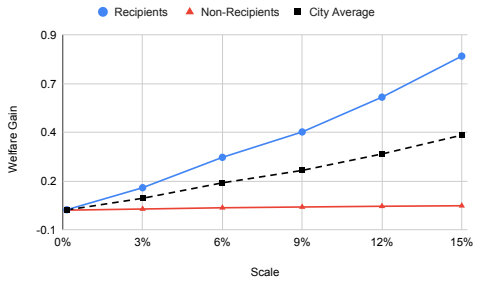
Let us first study the welfare implications of the two policies. For simplicity, we use the utilitarian welfare criterion and assign the same weight to the utility of all parents at each point in time. Parental utility depends on the children's expected future income, but also on their own consumption and preferences.

Figure 5: Welfare Gains: MTO vs PBT

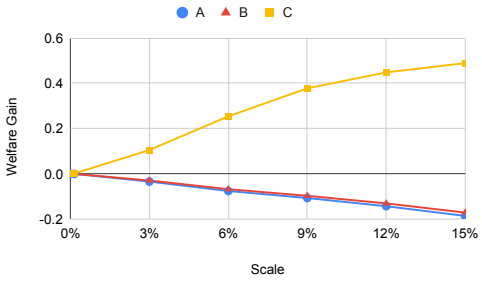
(a) MTO: Recipients vs Non-Recipients



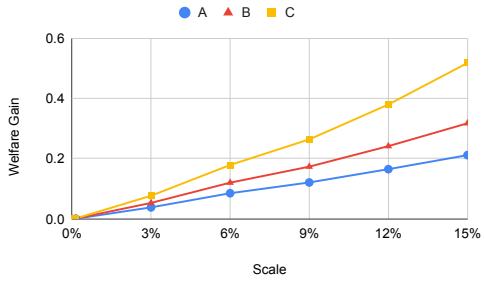
(b) PBT: Recipients vs Non-Recipients



(c) MTO by Neighborhoods



(d) PBT by Neighborhoods



The left two panels in figure 5 refer to the welfare effects of the MTO policy and the right two panels to the welfare effects of the PBT policy.

In particular, the blue solid line in Panel (a) of figure 5 shows the average consumption-equivalent welfare percentage gain for the recipient families under the MTO policy relative to a scenario with no policy, as a function of the policy's scale. The first thing to notice is that the MTO policy has generates a very large welfare gain for the recipient families. This is due both to the effect on the future income gain of their children, which we have shown in figure 2, and to the fact that they can substantially increase their consumption, as the housing voucher now covers large part of their rents. The non-monotonicity across the scale of these welfare gains is in part due to the non-monotonicity of the children income gain that we have already discussed, but also due to the non-monotonic effect on their consumption. When the scale is very small, the recipient families are very poor and PA policy covers their rental expenditures. However, when the scale increases the marginal recipient family is less poor and, in absence of the MTO policy, it would have to pay for rent, making the consumption effect of the MTO larger. Then, as the scale increases further, the share of income used to pay rents decreases and the effect becomes smaller again.

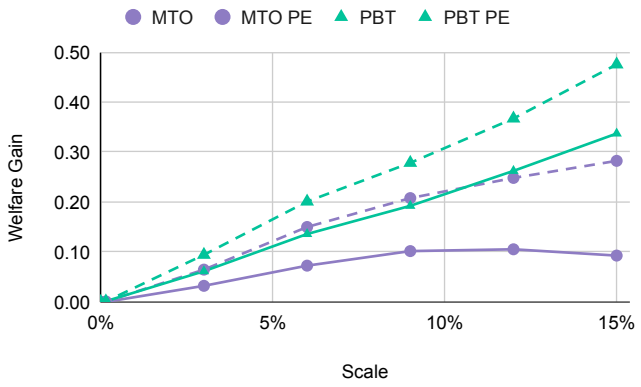
The dashed red line in the same panel shows the average welfare gain for the non-recipient families under the MTO program. The figure shows that on average these families suffer welfare losses. This is due both to the fact that these families are paying taxes to finance the policy and to the general equilibrium effects. In particular, families living in neighborhoods A and B have now to pay higher rents and families living in A are also exposed to a smaller spillover relative to the no policy environment. This is evident from Panel (c) in figure 5, which shows the average consumption-equivalent welfare gains from the MTO policy for all families depending on their birth neighborhoods and shows that families born in A and B suffer average welfare losses. Families born in C obtain average welfare gains because they include the families who receive the policy housing voucher. The share of recipient families out of the families born in C is increasing with the policy scale, making their average welfare gains monotonically increasing.

Finally, the dotted black line in panel (a) represents the average welfare gain for the city and shows that the overall effect is positive, although quite small. While average welfare gains for the recipient families are very large, the share of recipient families in the city is small and the non-recipient families suffer welfare losses dampening the overall positive effect of the policy, especially for smaller scales.

Panel (b) and (d) in figure 5 show the analogous graphs to panel (a) and (c) for the PBT policy. The blue line in Panel (b) shows that the average recipient family enjoys welfare gains from the PBT policy that are increasing with the scale. However, these gains are much smaller than the ones obtained by the average recipient family under the MTO policy because under the PBT policy all families living in C receive the transfer, while under the MTO the same finances are used to give housing voucher to a much smaller fraction of the population. Moreover, the red line shows that under the PBT policy, the average non-recipient family does not suffer a welfare loss like under the MTO policy. This is because, even if taxes are higher to finance the policy, the general equilibrium effect for families not living in C is welfare enhancing, as rental rates both in A and B decrease, as more families move to C. Moreover, the spillover in A increases, while the one in B barely changes. This is confirmed in Panel (d), that shows that families born in all neighborhoods benefit from the policy.

The aggregate welfare gains from the two policies are presented in Figure 6. The MTO policy has a positive partial equilibrium effect on welfare because of the recipient families: they both have more resources to consume and invest in children's education given that the voucher pays large part of their rents, and they expect higher future income for their children who are now exposed to a larger spillover. This effect is monotonically increasing with the scale of the policy. However, in general equilibrium both spillovers and rental rates adjust and dampen the positive effect on welfare.

Figure 6: Welfare



Similarly, the partial equilibrium effect on welfare of the PBT policy because the recipient families can invest more in education and consume more because of the transfer. Notice, that the welfare gap in partial equilibrium is increasing with the scale, given that under the PBT policy the transfer increases with the scale, while under the MTO policy more people receive the transfer but, as they are progressively richer, their marginal gain is lower.

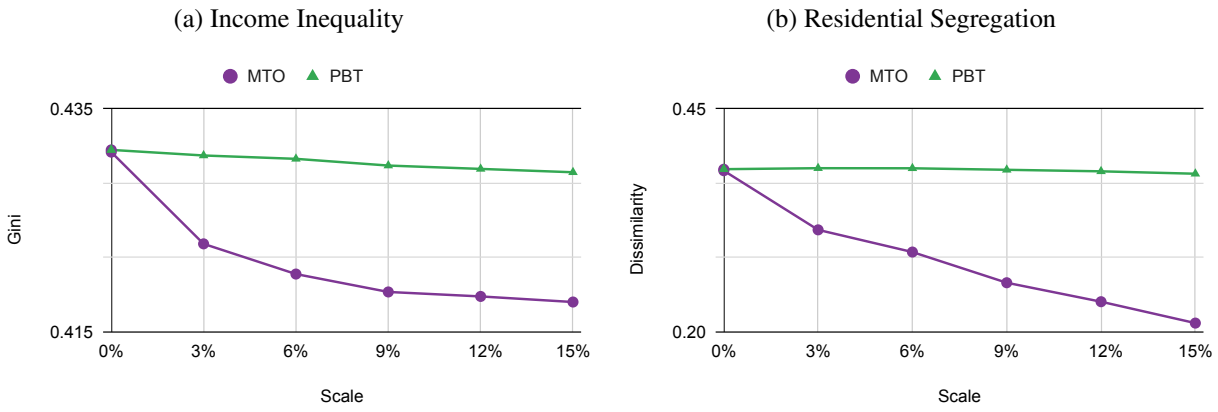
When we move to general equilibrium, both spillovers and rental rates adjust endogenously. In general equilibrium welfare is smaller than in partial equilibrium with both policies and the gap increases even more with the scale. This is because, as we have seen in the previous subsection, with both policies the average future expected income of children in the city declines, but it declines substantially more under the MTO policy relative to the PBT policy. On top of that, the taxes paid by the households to finance the policy are larger the larger is the scale.

6.4 City-Wide Policy Effects: Inequality and Segregation

In this section, we compare the implications of the two policies for income inequality and residential segregation by income.

Panel (a) Figure 7 compares the level of income inequality, measured by the Gini coefficient, for the experimental MTO policy (purple line) and the PBT policy (green line). The figure plots the Gini coefficient in the period in which the policy is implemented as a function of the scale of the policy. When the scale

Figure 7: Income inequality and residential segregation



of the policy is 0.001, as in the effective MTO experiment, the aggregate effects of the policy are null and inequality is at the same level as if there was no policy. However, as the scale increases all three types of policy are successful in reducing inequality and the more so, the larger is the scale. The figure shows that the PBT policy is the least effective in reducing inequality. This is not surprising, given that we have already seen that the kids' income gain is very small under that type of policy, as we discussed in the previous subsection.

To confirm this intuition, panel (b) of Figure 7 compares for the same policies the level of residential segregation by income in the period in which the policy is implemented, measured by the dissimilarity index, where we define the rich as the parents in the 80th percentile of the distribution. Similarly to inequality, when the scale of the policy is 0.001, residential segregation is at the same level as if there was no policy. However, as the scale increases, the MTO policy is successful in reducing residential segregation. This is because the MTO policy impose voucher receivers to move to the best neighborhood and this has two effects: it implies that their kids are exposed to the highest spillover, but also implies that neighborhood A becomes more mixed. On the contrary, the PBT policy is not successful in this dimension and, if anything, it causes a slight increase in residential segregation. There are two opposing forces behind this result. On the one hand, the PBT policy reduces segregation because neighborhood C attracts richer families from other neighborhoods and becomes more mixed, but, on the other hand, neighborhood A becomes more selective and segregated. This second effects seems to dominate.

7 Place-Based Investment Policy

We now consider the effects of the PBI policy, where the same finances are used to directly invest into improving the spillover of the neighborhood, i.e. investment in public school, crime reduction, information diffusion. We set the basic education parameter $\bar{e} = 0.19$, which is equal to the average education in C in the baseline model without policy. In addition, we set the basic education eligibility at an income percentile of $x = 0.135$, which is equal to the poverty line in the US in 1990. To further discipline the design of the PBI policy, we use the estimates about return from capital investment in public schools from Biasi et al. (2025). In particular, they show that that a cumulative $1,000 increase in per pupil capital expenditures raises test scores by 0.8 sd for children in disadvantaged districts. Combining these estimates with the mapping from children test scores to their incomes as adult from Chetty et al (2014), we calculate that capital investment in public schools has an internal rate of return (IRR) of 4.1%. We then target this IRR to calibrate the PBI parameters, by running the PBI policy at a scale equivalent to the study of Biasi et al. (2025). Table 7 shows that our model can match the IRR from the data, delivering a calibration for the parameter $\zeta = 0.15$. Table 6 summarizes the calibration of the PBI parameters.

Table 6: *PBI Policy*

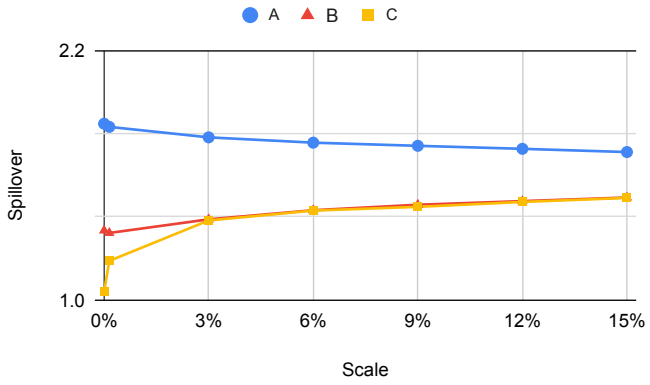
— *Panel A. Parameters* —		
Parameter	Value	Description
ζ	0.15	PBI effective spillover coefficient
$\bar{e}$	0.19	Basic education level
x	0.135	Basic education eligibility percentile

Table 7: *PBI Calibration Targets*

Description	Data	Model	Source
School Capital Investment IRR	4.1%	4.1%	Biasi et al. (2025)

Next, for each scale of the MTO policy, we compare a place-based investment policy that uses the same total finances by taxing families in the whole city proportionally to their income. The funds are used in part to pay for some basic level of education for families living in C and with income in the lowest $13.5th$ percentile. The remaining resources are used to increase the spillover in the high poverty neighborhood S_C until it reaches S_B; any remaining resources are then used to increase both spillovers until they reach S_A. After that, resources are distributed across the three spillovers so to keep the effective spillovers S^* in the

Figure 8: Neighborhood Spillovers under the PBI Policy



three neighborhoods equalized. This implies a larger share of the resources going to neighborhoods *C* and *B* to compensate for the lower amenities in those neighborhoods which dampen the endogenous spillovers. Figure 8 shows the resulting spillover level for the three neighborhoods for various policy scales.

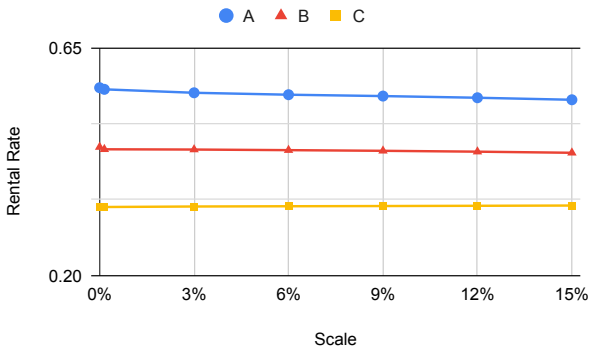
Similarly to the PBT policy, this policy is also making neighborhood *C* more attractive. Families move from *A* and *B* into *C* in response to the higher spillover. This pattern is visible in Figure 9, which shows that the rental rate (panel (a)) and the size of neighborhood *C* (panel (b)) increase in response to the policy. As families move out of *B* and *A* the rental rate in these neighborhoods declines and their sizes shrink.

Since under this policy funds are directly invested in public goods that increase kids' returns to education, like schooling, crime reduction, and so forth, welfare gains are realized only through gains in children's future income and are conditional on investing in education. Figure 10 (panel (a)) compares the expected future income of children of recipient-families under the the three policies. The figure shows that the MTO policy is more effective because the gap between spillovers in the poorest and richest neighborhood is large. As we have shown, the gains in expected income for children under MTO are large but concentrated to a small fraction of the population. On the other hand, gains under PBT are small but obtained by all the families living in *C*. The PBI policy realizes sizable income gains for the children of receiver families that are also enjoyed by all families in *C*. However, this policy is less effective in increasing overall welfare on impact as shown in Figure 10 (panel (b)).

Families living in *C* can only take advantage from a higher spillover by increasing their investment in their children's education and reducing current consumption. Conversely, under PBT, parents living in *C* could use the transfer to increase their own consumption. Similarly, under MTO, the recipient families have

Figure 9: Neighborhood Rental Rates and Sizes under the PBI Policy

(a) Rents



(b) Sizes

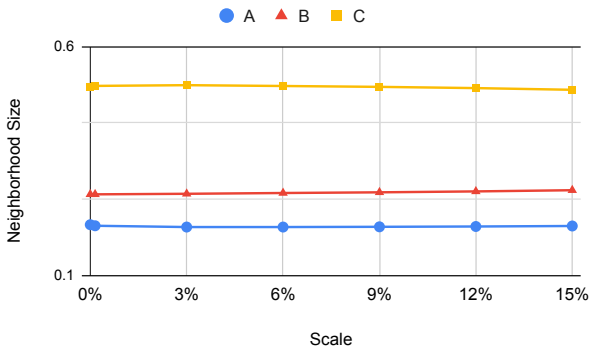
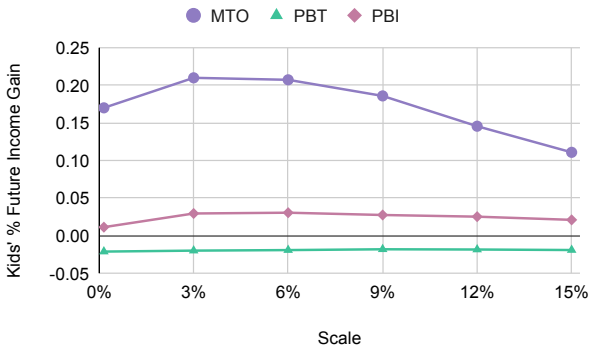
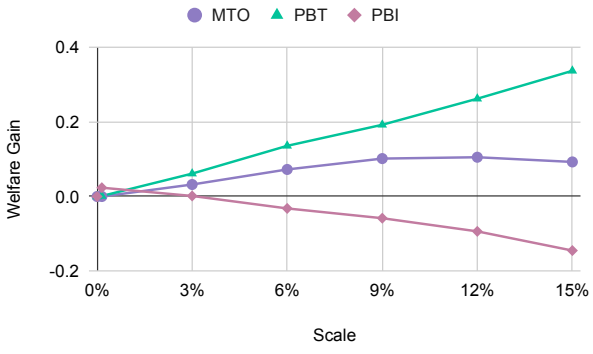


Figure 10: Income Gain and Welfare across policies

(a) Income Gain



(b) Welfare



more resources for consumption as they receive a housing voucher. This differential impact on current and future generations has interesting dynamic implications.

8 Dynamic Implications

Panel (a) in Figure 11 compares the city-wide welfare gains over time under the different policies for the 3% MTO scale. For this scale the spillovers in B and C are equalized under PBI.

The figure shows that the PBT policy generates significantly higher welfare gain on impact (1990) compared to the other two policies. However, already in the following period (2000), the PBI policy generates the largest gains. This is due to the fact that the new generation of parents have more resources for consumption and investment as they received more education and were exposed to a higher spillover when growing up under the policy. Moreover, the overall welfare under this policy keeps increasing over time as more talented kids from other neighborhoods move to C and parents in C increase the educational investment of their children to take advantage of the higher spillover, generating further increases over time in the endogenous component of the spillover. It follows that welfare increases generation after generation.

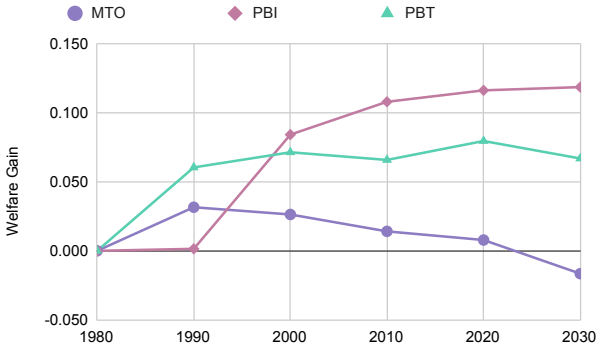
On the other hand, PBT only realizes static welfare gains as most of the transfer is used for consumption of the parents' generation and does not translate into more resources for future generations. The spillover in C initially increases as families from other neighborhoods, on average richer than those in C, move to the neighborhood to enjoy the transfer. However, since the transfer is mostly used to increase current generation's consumption, the policy does not translate in sustained dynamic gains.

Panel (b) in Figure 11 shows the dynamic implications for residential segregation of the different policies. Under the PBT policy, segregation increases over time as the poorest families from the richer neighborhoods move to C to receive the transfer. This makes the selection of people in A even richer and increases segregation. Under the PBI policy, the spillovers in B and C are equalized, reducing the incentive to segregate by income between them and generating a level of segregation that is close to the one obtained under the MTO policy.

Figure 12 shows the dynamics of inequality and intergenerational mobility under the three policies. Under the PBT policy, inequality and inter-generational mobility are very close to the benchmark similarly to the dynamics of segregation. This is due to the dynamic relationship between segregation and future inequality. On the other hand, MTO and PBI are more effective in reducing segregation and this translates in lower inequality and higher inter-generational mobility relative to the benchmark.

Figure 11: Welfare and Segregation Dynamics

(a) Welfare



(b) Segregation

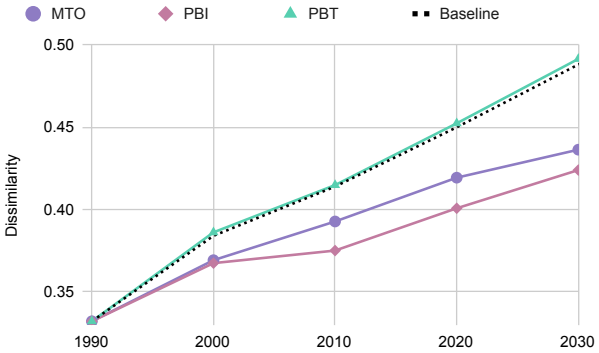
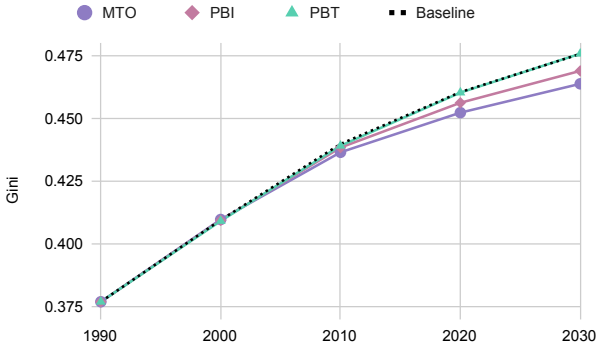
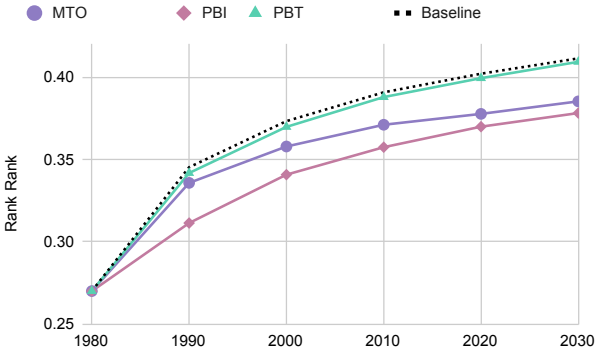


Figure 12: Inequality and Intergenerational Mobility Dynamics

(a) Inequality



(b) Intergenerational Mobility



9 Concluding Remarks

US cities have become progressively more segregated by income over time generating large differences in opportunities for children growing up in different neighborhoods. Recent literature has shown that MTO policies can be effective in improving the long term income of children as they move from high to low poverty neighborhoods. However, this experiment involved a small number of families.

In this paper we develop a general equilibrium model with residential choice and endogenous local spillovers, to explore the effects of scaling up the MTO. We show that, as the scale of the policy increases, general equilibrium effects reduce the gain from the policy. Moreover, the MTO generates welfare gains for the recipient families, but also significant welfare losses for all the other families as the spillover changes endogenously and poor people move to low poverty neighborhoods.

We compare this policy to a PBT policy that, using the same finances, provides transfers to families living in the poor neighborhood. We find that this policy generates larger welfare gains overall as, on average, families in all neighborhoods gain from the policy: either directly through the transfer or indirectly through the general equilibrium effects. However these policies have very different implications for segregation and inequality: while the MTO policy reduces income segregation by moving poor families to low poverty neighborhoods, the PBT policy induces more segregation as poor families from richer neighborhoods move to poor neighborhood to take advantage of the transfer.

We next explore a PBI policy, that directly invests in local public goods to reduce the gap in spillovers across neighborhoods. This type of policy is less effective in increasing welfare in the short run, as it does not increase current resources available (as transfers and housing vouchers do). However, it generates a strong incentive to invest in the education of children, increasing resources available to the next generation and improving the spillover over time. As the spillover accumulates, welfare gains also accumulate, and the policy becomes more successful over time both in terms of increasing welfare and in terms of reducing segregation and improving the opportunities for the poor to experience the American dream.

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