The Effects of Increasing the Tenant Rent Contribution in the Housing Choice Voucher Program

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Abstract

This study examines the effects of a rent reform in the Santa Clara County Housing Authority (SCCHA) on Housing Choice Voucher (HCV) program residents' employment rates, average earnings, and housing subsidies using a quasi-experimental design. In the face of federal budget cuts to the HCV program in 2013, SCCHA reduced subsidies for all households rather than cutting some households from the program. The primary component of its rent reform was to increase the tenant rent contribution rate from 30 percent of adjusted income (equivalent to about 27 percent of gross income) to 35 percent of gross income (eliminating all deductions and allowances) for all subsidy households. A risk was that if tenants reduced their earnings in response to the higher "tax" rate (since they keep a smaller portion of their earnings under the new policy), their subsidies would increase, counteracting the housing agency's expected savings from increasing tenant rent contributions. A second rent reform component changed the voucher size policy, which resulted in a smaller voucher size (fewer bedrooms) for some households. The findings indicate that, on average, the SCCHA rent reform did not affect residents' employment rates and average earnings throughout the 4 years following the implementation of the rent reform. Thus, the rent reform reduced households' average housing subsidies as intended, and SCCHA was able to meet its projected savings. Since households did not increase their earnings to compensate for the reduction in their subsidies, these findings suggest that households absorbed their increased housing costs; however, whether they did so by reducing spending on necessary goods or by increasing debt and whether they experienced increased material hardship is unknown.

Introduction

This study contributes to an emerging body of evidence on the effects of alternative rent policies in subsidized housing by evaluating the impact of a rent reform at the Santa Clara County Housing Authority (SCCHA). In 2013, federal budget cuts significantly reduced the SCCHA budget for housing choice vouchers (HCVs), and SCCHA no longer had sufficient funds to continue subsidies

to all households at the same level as before. To avoid ending subsidies for some households, SCCHA chose to increase the tenant rent contribution rate from 30 percent of household adjusted income to 35 percent of gross income.[1] It also changed the voucher size policy—the rules used to determine the number of bedrooms on which a household's subsidy is based—which resulted in a smaller voucher size for 17 percent of all SCCHA's HCV households and 23 percent of SCCHA's nonelderly, nondisabled households, the SCCHA households included in the study cohort.[2]

A central question of this study is how the rent reform implemented by SCCHA affected households' employment and earnings. There were three possible effects of the rent reform: (1) the increased tenant contribution rate would act as a disincentive that would cause households to decrease their earnings; (2) households would increase earnings to cover their increased housing costs; or (3) there would be no effect on earnings or employment because households would adjust spending in other areas to cover their higher housing costs, increase their debt, or experience increased material hardship. If there had been a reduction in household earnings, it would have led to an increase in housing subsidy amounts, counteracting the intended savings from the increase in the tenant contribution rate. These policy changes affected all HCV households, regardless of elderly or disability status, but the study focuses on nonelderly, nondisabled households because elderly and disabled households would not have had the same flexibility to change their work behavior in response to the policy changes.

The present study found no evidence that these policy changes had any effects, on average, with respect to the employment and earnings of nonelderly, nondisabled SCCHA residents. Because households' earnings did not decrease in response to the policy change, SCCHA realized its projected savings. Nonelderly, nondisabled households received approximately $1,600 less in housing subsidies, on average, during the first year, $1,550 less in the second, and $1,330 less in the third year after the rent reform than they would have received without the rent reform. There was also no evidence that the rent reform caused households to lose their housing subsidies, on average.

This article summarizes the study's rationale, research questions, analytic approach, and findings. A longer report published earlier this year, "Evaluating the Effects of Santa Clara County Housing Authority's Rent Reform," includes a more comprehensive discussion of the methodology, comparison group selection, and additional sensitivity analyses (Castells, 2020).

Background

The HUD HCV program is the nation's primary rental subsidy program, assisting approximately 2.2 million low-income households in paying for housing in the private rental market. HCV households generally pay 30 percent of their income toward rent, and HUD subsidizes the remaining amount of the households' rent up to the payment standard, a threshold based on area housing costs. This rent policy aims to protect assisted households from excessive rent burden, but critics of the policy argue that pegging tenant contributions to income can disincentivize work.

[1] This change was tempered in 2014 when the rate was reduced to 32 percent of gross income, although this is still substantially higher than the previous rate.

[2] HUD defines an elderly household as one where the head of household, spouse, or co-head is at least 62 years old, and a disabled household as a household where the head of household, spouse, or co-head is a person with a disability (Code of Federal Regulations, 24 CFR 5.403).

Launched in 1996, HUD's Moving to Work (MTW) demonstration grants selected public housing agencies (PHAs) special statutory authority to change many HCV program rules, including rent rules.[3] As an MTW agency, SCCHA could respond to budget cuts by increasing the proportion of income that HCV households paid toward their rent.

HCV is a housing subsidy paid directly to the landlord by the agency on behalf of the participating household. The subsidy amount is called the Housing Assistance Payment (HAP) and is equal to the difference between the Total Tenant Payment (TTP) and the payment standard. TTP is typically 30 percent of the household's adjusted income, after accounting for various allowable deductions. The household is responsible for their TTP, plus any amount by which the gross rent exceeds the local payment standard.[4, 5] As a result, when tenants' earnings increase, their share of the rent is increased by 30 percent of the additional amount they earn.

Exhibit 1

Definitions of Housing Subsidy Terms

Adjusted Income: A household's gross income minus deductions for the following: allowances for dependents, status as an elderly family or family with members with disabilities; unreimbursed childcare expenses; unreimbursed medical expenses (for elderly families and families with members with disabilities only); and unreimbursed disability assistance expenses.

Fair Market Rent (FMR): HUD publishes, annually, an FMR schedule for the FMR area in which the PHA has jurisdiction. FMRs are based on the 40th percentile of rents charged for standard rental housing in the FMR area.

Gross Income: A household's total income before taxes and other deductions, received by all members of the household. It includes total income from wages, social security payments, retirement benefits, military and veteran's disability payments, unemployment benefits, welfare benefits, and asset income. It excludes certain forms of income, such as earnings from minors and income from live-in aides.

Gross Rent: The total contract rent paid to the landlord plus any utility allowances.

Payment Standard: Payment standards are used to calculate the housing assistance payment (HAP) that the PHA pays to the owner on behalf of the family leasing the unit. Each PHA has latitude in establishing its schedule of payment standard amounts by bedroom size. A PHA may set its payment standard amounts from 90 percent to 110 percent of the published FMRs for the area and may set them higher or lower with HUD approval.

Port-Out: A household relocating to a unit within another PHA jurisdiction.

Utility Allowance: The utility allowance is an estimate of the amount needed for a household to cover its reasonable utility costs, based on the unit's number of bedrooms, which utilities the tenant is responsible for outside the contract rent, the type of utilities (for example, gas versus oil heat), and other unit characteristics such as structure type.

Voucher Size: The number of bedrooms on a household's voucher, calculated based on the household composition. For determining the payment standard applicable to the household, the HCV program uses the lower of (1) the number of bedrooms on a household's voucher, or (2) the number of bedrooms of the actual unit rented.

Minimum Rent: The minimum amount set by the PHA that households must contribute towards rent and utilities.

[3] Subject to public notification, approval of each PHA's Board of Directors, and HUD approval.

[4] The payment standard is the maximum subsidy a PHA can pay on behalf of a household, and payment standards are set by the PHA between 90 and 110 percent of the area's fair market rents (FMRs). HUD sets FMRs annually at the 40th percentile of gross rents in the area.

[5] See exhibit 1 for definitions of relevant housing subsidy terms.

The rule that households pay 30 percent of adjusted income pre-dates the Section 8 program's enactment in 1974 and was based on a judgment about reasonable housing cost burden at the time (Schwartz and Wilson, 2008). It was initially set at 25 percent by the 1969 Brooke Amendment to the 1968 Housing and Urban Development Act and was raised to 30 percent in 1981. This 30-percent-of-income rule is also now known as the Brooke Rent.[6] Variations of this tenant contribution rate—such as the one implemented by SCCHA—have so far not been rigorously tested. If increasing the tenant portion of rent does not affect households' employment decisions and does not significantly increase tenants' material hardship, but does succeed in reducing HAP expenditures, this could be one way of providing housing assistance to more families within a fixed budget amount.

Exhibit 2

General Housing Policy Terms

Brooke Amendment: The Brooke Amendment to the 1968 Housing and Urban Development Act was enacted in 1969. It amends the United States Housing Act of 1937 to cap subsidy households' tenant rent share at 25 percent of their adjusted income. This percentage was raised to 30 percent in 1981.

Brooke Rent: Thirty percent of adjusted income that households pay toward their gross rent.

Section 8 Housing Choice Voucher Program (HCV): The HCV program is the federal government's primary rental subsidy program, assisting approximately 2.2 million low-income households in paying for housing in the private rental market. HCV households generally pay 30 percent of their income toward rent, and HUD subsidizes the remaining amount of the households' rent up to a certain threshold based on area housing costs. The HCV program was enacted as Section 8 of the United States Housing Act of 1974.

The Santa Clara County Housing Authority Rent Reform

Until September 2013, SCCHA required its tenants to pay 30 percent of adjusted income for rent (plus any amount over the payment standard). Then, in response to federal budget cuts resulting from the sequestration in March of that year, SCCHA increased tenants' share to 35 percent of gross income. Under traditional rent rules, income is first adjusted by subtracting various allowances and deductions—including dependent and childcare allowances and deductions for medical expenses—and then multiplying the adjusted income by 30 percent to arrive at the TTP. Under the new rules, TTP was a flat 35 percent of the household's gross income with no allowances or deductions.[7] SCCHA estimated that this changed households' rent contributions from 27 to 35 percent of gross income (HACSC, 2013). In addition to eliminating deductions and allowances, SCCHA also eliminated utility allowances, so that households do not receive an extra subsidy for utilities that are not included in their contract rent.[8] In effect, those households were paying more than 35 percent of their gross income. In September 2014, when the budget situation improved,

[6] See exhibit 2 for definitions of general housing policy terms used in this report.

[7] SCCHA has a minimum tenant rent contribution of $50 that was in place before the rent reform (and before the beginning of the study period). Under both traditional and new rent rules, the tenant rent share is the greater of the calculated percentage of income or the $50 minimum rent.

[8] Under the traditional rent rules, for units where utilities are not included as part of the contract rent, a utility allowance is added to the contract rent amount to calculate the gross rent. The HAP calculation is then based on this gross rent amount rather than the contract rent amount and equals the gross rent minus the household's TTP (assuming the unit does not exceed the payment standard). Using the new rent calculation rules, HAP is calculated as the contract rent minus the household's TTP (again, assuming the unit does not exceed the payment standard).

the percentage of gross income to be contributed was reduced from 35 to 32 percent. As a result of the policy change, therefore, the overall tenant contribution was drastically increased in 2013, then slightly decreased a year later.

Exhibit 3 shows TTP as a percentage of gross income in the last month before the policy change and over the followup period for the study cohort (all nonelderly, nondisabled households), which is the measure that most directly reflects the rent policy changes over time.[9] This measure reflects the *treatment* whose effects are evaluated in this study. In the month before the rent reform was implemented, the 30 percent of adjusted income that households were paying toward rent (up to the unit's payment standard) under the traditional rent rules translated, on average, to 27 percent of gross income. The actual percentage during this month was 30.6 percent because this average includes households for whom 30 percent of adjusted income (or 10 percent of gross income) is less than the PHA's minimum rent. At the end of the first year after rent reform, tenants' TTP was on average equal to 37.8 percent of their gross income.[10] It decreased slightly to 35.1 percent in Year 2 because of the reduction in TTP from 35 to 32 percent of gross income 1 year after the rent reform was first implemented.

Exhibit 3

Total Tenant Payment as a Percentage of Monthly Gross Income Among Nonelderly, Nondisabled Households Receiving Subsidies 2013 to 2016

TTP Among Households Receiving Subsidies (% of Monthly Gross Income)	SCCHA
Last Month of Baseline	30.6
Last Month of Year 1	37.8
Last Month of Year 2	35.1
Last Month of Year 3	34.3
Sample Size	7,109

SCCHA = Santa Clara County Housing Authority. TTP = total tenant payment.

Notes: Samples consist of households headed by adults who were not elderly or adults with disabilities. Sample sizes may vary by year because of missing values. TTP is the minimum amount a family must contribute toward rent. Outcomes shown describe only those households receiving any housing subsidies in the specified month.

Source: MDRC calculations using HUD Public and Indian Housing Information Center data

While SCCHA increased the tenant contribution rate, it also changed its policy for determining a household's voucher size. The new policy allocated one room for the head of household (with spouse or partner) plus one additional bedroom for every two persons regardless of age, generation, relationship, or gender. Before this policy change, the household members of different generations (such as grandparents and their grandchildren), of the opposite sex over the age of 5, and unrelated adults (other than significant others) were allocated separate bedrooms. For example, a household that included a household head, her 7-year-old daughter, and her 9-year-old son would have had a voucher size of three bedrooms using the old rule and a voucher size of

[9] This measure is only available for households in the study cohort who are receiving subsidies at the time.

[10] Again, this percentage is higher than 35 percent because for some households, 35 percent of gross income was below the minimum rent.

two bedrooms under the new policy. This policy change decreased the voucher size for 23 percent of nonelderly, nondisabled households served by SCCHA. In other words, under the new policy, 23 percent of the study cohort's voucher households were housed in a unit where the number of bedrooms exceeded the number of bedrooms on their vouchers. For these households, if they did not move before the effective date of the new policy, their expected tenant contribution would sharply increase because their subsidy was now based on the fair market rent (FMR) for a smaller unit than the one they occupied.

In anticipation of the potential hardship that HCV households might face because of the rent reform, SCCHA offered two means of assistance: hardship exemptions for households that experienced a sharp increase in rent share because of the new rent calculation, and financial and legal assistance for households at risk of eviction due to the rent reform.

The hardship exemption policy allowed households to have childcare or medical deductions temporarily included in the calculations for their TTP. These expenses were deducted from the household's gross income (the exemption did not include other deductions, such as the dependent deduction). A household was eligible to apply for a hardship exemption if its monthly rent portion increased by at least $50 because of the new rent calculation method. Since the households with larger deduction amounts were most affected by the rent reform, eligible households consisted mostly of households with children under the age of 13 that were paying for childcare, or elderly and disabled households. Hardship exemptions were granted to 414 households (out of 754 requested), most of them immediately after the rent reform went into effect.[11] Households that were granted the exemption paid the lower TTP for 90 days, after which it was reset to the regular amount under the new rent rules, based on 35 percent of the household's gross income with no deductions.

SCCHA also collaborated with the Law Foundation of Silicon Valley and other local organizations to create the Sequester Eviction Prevention Program (SEPP) to assist HCV households that were facing eviction because of the SCCHA rent reform. The program provided financial assistance to cover unpaid rent or to cover a security deposit if a household had to move because of the rent reform. The program also included free legal services to prevent eviction. While the program was primarily designed to assist households affected by the voucher size rule change, the program was open to any household facing eviction because of an inability to pay the higher rent under the new rent policy. Households that experienced a substantial increase in their rent share (at least $300 monthly), or that were otherwise at risk of eviction because of the rent reform, were eligible to receive assistance from the program. SCCHA committed $500,000 of MTW funds for SEPP, which was supplemented with additional funds from the county of Santa Clara, the city of San Jose, and the Housing Trust Silicon Valley, for a total funding commitment of $1,820,000. Of this committed funding, $808,078 was spent on the program, and all payments were made by August 2014. The program assisted 293 households comprising 805 people, including 260 households in the study cohort.

[11] The total of 414 hardship exemptions includes exemptions for all households regardless of elderly or disabled status. SCCHA did not track the elderly and disabled status of households granted hardship exemptions, so it is unknown how many of these households are in the study sample, which only includes nonelderly, nondisabled households and individuals.

To avoid terminating the participation of some households in the HCV program due to budget cuts, SCCHA chose to increase the tenant contribution rate.[12] SCCHA assumed that this would not reduce tenants' employment and earnings, which would have made the policy change counterproductive.[13] In fact, SCCHA did not know how its policy would affect HAP expenditures, households' employment decisions, and hardships, and SCCHA could not rely on previous experience. The present study is the first study of the effects of increasing the tenant contribution rate in a housing subsidy program.

Existing Evidence About the Effects of Housing Subsidies on Employment and Earnings

Given the increase in the percentage of income that tenants paid toward rent under the new SCCHA rent policy, there was a risk that tenants might reduce their earnings, which would have resulted in SCCHA having to increase the subsidy levels, effectively counteracting the HAP savings the housing agency hoped to achieve. The economic theory behind these expectations is not straightforward, however. Economic theory suggests that, on the one hand, increasing the percentage of income that tenants pay toward rent can reduce employment in response to the increased "tax" on their earnings (the "substitution effect" in labor economics). The tenants would gain less disposable income with each extra hour of work than they would have in the absence of that tax. On the other hand, households might increase their employment to compensate for the reduction in their subsidy and maintain the level of disposable income they had before the policy change (the "income effect" in labor economics).

Before this study, existing evidence was limited to studies about providing housing vouchers to households that had not been receiving housing subsidies. For such households, both the income and substitution effects point to housing subsidy receipt as a work disincentive.[14] The income effect suggests that providing housing subsidies can reduce employment among recipients by increasing households' disposable income because the subsidy covers a large part of the housing costs for which households were previously paying. The substitution effect suggests a further disincentive to work by imposing an implicit "tax" on their earnings since the 30-percent-of-income rule for determining tenant rent share means that households would only "take home" 70 cents for every dollar they earn. (This tax is in addition to the explicit taxes that earnings bring.) This "tax" is effectively an increase from 0 to about 30 percent of the households' income when they begin receiving subsidies.

Three large-scale random assignment studies conducted in the past decade provide reliable evidence on new housing subsidies' effects on households' employment behavior and suggest some disincentive effect on employment and earnings consistent with the economic theory described

[12] SCCHA also put a freeze on issuing new vouchers at the time of the 2013 rent reform, so households that left the program after the rent reform was first implemented were not replaced in the subsidy program for a few years. There were two exceptions: an allotment of 500 vouchers issued to waiting list applicants in 2015 and an allotment of 500 vouchers issued to the chronically homeless in 2016. The voucher freeze was lifted at the end of February 2017.

[13] It was confirmed in phone calls with the executive staff at SCCHA that the estimates of HAP savings that they calculated before implementing the rent reform did not account for any potential reductions in earnings from the reform.

[14] See Shroder (2012) for a discussion of these and other factors and a literature review up to 2012.

above. The first of these recent studies is the random assignment evaluation of the Welfare to Work Voucher (WtWV) program, which studied the effects of receiving housing vouchers for households selected from the HCV waiting list that were receiving or had received Temporary Assistance to Needy Families (TANF). The study found that households randomly assigned to receive a housing voucher worked less than households that were randomly assigned to the control group, but only during the first year following random assignment (Mills et al., 2006). A later study leveraged a lottery used by the Chicago Housing Authority Corporation to allocate newly available housing vouchers in 1997 (Jacob and Ludwig, 2012). This natural experiment found more persistent negative impacts on labor supply. The study found that receiving a voucher caused subsidy recipients to reduce their employment by 6 percent (4 percentage points) and reduce their quarterly earnings by 10 percent ($329 in 2007 dollars). The Chicago study found that the impacts were significantly larger for households that were not receiving TANF than for those that were, which may be an important reason their results differed from those of WtWV (whose sample consisted of all TANF recipients and found less negative impact on employment).[15]

The most recent of the three studies, the Family Options Study, offered vouchers to homeless families as one arm of the intervention. This study also found that housing vouchers reduced employment for voucher recipients. In the short-term, 11 percentage points fewer households who were randomly assigned to receive housing vouchers were working than was the case for households that were randomly assigned to the study's control group. (Fifty percent of the intervention group had any employment during the first year after random assignment compared with 61 percent of the control group.) After 3 years, this difference fell to 6 percentage points (64 percent of treatment group members had any employment in the prior year and a half compared with 58 percent in the control group) (Gubits et al., 2015, 2016).

In all three of these studies, randomly selected households were given access to housing subsidy programs that used the traditional 30-percent-of-income rent rule. Therefore, as described earlier, these studies estimated the effects of providing housing assistance to households that were not yet receiving any assistance. That research question is somewhat distinct from the question addressed by this SCCHA study, which examines the effects of changing rent policies for households that are already receiving housing assistance under the traditional rent rules. Also, while the earlier studies provide evidence for a potential work disincentive from obtaining a housing voucher at least in the short term, this evidence does not necessarily imply that reducing the housing subsidy (as in the SCCHA rent reform) would provide an incentive to work.

The SCCHA rent reform provided an opportunity to bring empirical evidence to bear on these economic theories. Would nonelderly, nondisabled adults respond to the increased tenant contribution rate by working less, because they could keep less of their earnings? Or would they increase their earnings to compensate for lost income? The net outcome would depend on which of the two effects is dominant. Households may also respond by maintaining their earnings levels and

[15] Both the WtWV and Chicago studies found that estimated effects varied according to several baseline characteristics, including household size and age of the household head. In Chicago, Jacob and Ludwig (2012) used their employment and income findings to estimate an income elasticity of -0.09 and a compensated wage elasticity of 0.15. In this case, the response of individuals determined by the elasticity of substitution was more important than the one caused by the elasticity of income.

managing higher housing costs by reducing other spending or incurring debt. The present study is the only study to date to assess the effects of increasing the percentage of income that tenants pay toward rent in a housing subsidy program. It estimates the effects on tenants' employment behavior and housing subsidies and examines tenants' rent burden levels after the policy change was implemented.

Research Design

This study aimed to answer the question: *How does an increase in tenant rent share affect HUD-assisted tenants' work and earnings, and how does it affect housing?* This overarching question can be answered through careful consideration of the following specific research questions:

1. What was the effect of the SCCHA rent reform on household members' employment and earnings?
2. What was the effect of the SCCHA rent reform on housing assistance subsidy amounts and continued housing subsidy receipt?
3. Was there any suggestion of potential effects of the SCCHA rent reform on households' housing decisions?
4. To what extent did SCCHA households experience selected housing-related hardships after the rent reform?

These research questions are first addressed for the full study sample of nonelderly, nondisabled adults living in HCV-subsidized households. The study then explores whether these effects differ for households only affected by the increase in the tenant contribution rate (77 percent of the study sample) and for the households affected by the change in the voucher size policy in addition to the increase in the tenant contribution rate (23 percent of the study sample).

Effects on Employment and Earnings

The primary research question for this study is: "How did the SCCHA policy changes affect HCV subsidy recipients' employment and earnings?" Adults in subsidy households who were able to work could have responded to the rent reform by changing their work behavior to adjust their earnings (and therefore adjust their tenant contribution amount and net income) in three ways:

1. Households may have *increased* their employment and hours worked in response to the policy change. Doing so could increase their earnings, compensating for all or part of the reduction in disposable income so they would experience less change in their standards of living.
2. Households may have *maintained* their current levels of employment and hours worked (by choice or not), either finding a way to manage with less disposable income or perhaps experiencing increased material hardship.
3. Households may have *reduced* their employment and earnings in response to the increased disincentive to work, namely the increased "tax" on earnings, reflecting the fact that they got to keep less of each dollar they earned than they did under the former policy.

In the first two scenarios, HAP expenditures would have decreased in the amount estimated by SCCHA, and their expected savings would have been realized.[16] If instead, households reduced their employment in response to an increase in the percentage dedicated to rent (the third scenario), HAP expenditures would not have decreased as much as expected, and SCCHA would not have met its budgetary targets. Depending on the extent of the reduction in employment, HAP expenditures might even be greater than previous levels, and the policy change would have been counterproductive.

These different forces could have immediate effects (someone could reduce the number of hours worked because of the increased implicit tax on earnings), or they could affect employment decisions later in the followup period (someone could choose not to accept an opportunity to increase working hours because the increase in net income would not be as large as it would have been under the previous rent policy). It is also possible that households responded to the increased tenant contribution rate differently over time. For example, households may have first responded to the unanticipated income shock by working more to compensate for the lower-income and to maintain longer-term financial commitments, but over time they may have reduced their employment as they adjusted to the change, possibly down to their pre-2013 employment level, or even lower, in response to the increased "tax" on earnings. This study estimates the effects of the SCCHA rent reform on employment and earnings for the 4 years after the rent reform was implemented and therefore can capture both immediate and longer-term effects.

Effects on Average Housing Subsidy Amounts and Continued Housing Subsidy Receipt

As described in the previous section, the SCCHA rent reform could have led to various changes in households' employment behavior. If many households had reduced their earnings in response to the rent reform, then average household HAP amounts may not have decreased substantially. In other words, the rent reform could have directly affected households' subsidy levels through its change in the tenant contribution rate and indirectly affected households' subsidy levels through households' employment responses to the changes in their housing costs.[17]

[16] The elimination of utility allowances may contribute to the income effect (as households may have to increase income to cover increased utility costs) but would not contribute to the substitution effect (reducing earnings would not increase HUD coverage of utility costs; it would only increase HAP to cover rent).

[17] See exhibit 4 for definitions of subsidy outcomes included in the present study.

Exhibit 4

Definitions of Housing Subsidy Measures Used in This Study

Housing Assistance Payment (HAP): The amount that the public housing agency (PHA) provides in subsidy to pay for rent and utilities. It is calculated as the lower of (1) the payment standard for the family's unit minus TTP, or (2) the gross rent minus TTP. Under the Santa Clara County Housing Authority (SCCHA) new rent calculation rules, HAP is calculated as the lower of (1) the payment standard for the family's unit minus TTP, or (2) the contract rent minus TTP.

Total Tenant Payment (TTP): The minimum amount that the household must contribute towards rent and utilities. Under traditional rent rules, it is calculated as the greatest of (1) 30 percent of monthly adjusted income, (2) 10 percent of monthly gross income, and (3) the PHA minimum rent. Under the SCCHA new rent rules, it is calculated as the greater of 35 percent (or 32 percent, after July 2014) of monthly gross income and (2) the PHA minimum rent.

Tenant Rent Share: The household's total contribution toward the contract rent. For households living in units with contract rents at or below the payment standard, the tenant rent share is equal to the household's TTP. For households with contract rents that exceed the payment standard, the tenant rent share is calculated as TTP plus the amount by which the contract rent exceeds the payment standard.

Continued Subsidy Receipt: A household is classified as receiving housing subsidies if their HAP amount is greater than zero (in any PHA). If a household's income increases to the threshold where their HAP amount is zero because their calculated TTP is greater than the gross rent, they have a grace period of 180 days during which they are not receiving any subsidies but are still considered active in the program. If their income drops before their grace period ends, they can have their TTP recalculated and will begin receiving subsidies again. A household whose HAP is $0 and is in their grace period is not classified as receiving any housing subsidies at that time.

Rent Burden: Rent burden is typically defined as the portion of a household's income used toward total housing costs, including rent and utilities. Because data on utility costs were not available for two PHAs in the sample, the present study uses an alternative measure of rent burden, which is calculated as the monthly tenant rent share (rent only, not including utilities) divided by the household's monthly gross income.

The SCCHA rent reform might also have caused households to leave the HCV program. The increase in the tenant contribution rate might have driven some households' HAP down to zero, leading them to exit from the HCV program. If the rent reform increased employment and earnings, some households might have "earned their way off of" housing subsidies (if their increased income effectively reduced their subsidy payments to $0). Households whose HAP was significantly reduced, but not reduced fully to $0, might have chosen to leave the HCV program because they found the smaller subsidy no longer justified the burden of staying in the program and complying with program rules. While there were strong reasons to expect direct effects on average household housing subsidy amounts (as discussed before), effects on receiving *any* housing subsidy ("attrition" from the program) would have been less direct.

Households' Housing Decisions While in the Voucher Program

In contrast with the housing subsidy amounts and receipt, which are near-term outcomes of the SCCHA rent reform, households' housing decisions are more removed, and the effects on these outcomes are less direct. The tenant contribution rate change could have encouraged households to seek other housing, if their gross rent was above the payment standard, in order to offset the increase in housing costs. The study explored whether households moved to smaller units, moved to different types of neighborhoods, or relocated to units outside the jurisdiction of SCCHA (defined as "porting out") and whether they changed their housing composition by adding or removing family members.

Household Rent Burden While in the Voucher Program

Because the policy change effectively reduced the subsidy amounts provided to households for rent, an important research question is whether the rent reform led to housing-related hardship. Due to data limitations, the study was able to examine rent burden over time on a descriptive level, but it could not measure other aspects of material hardship, such as rent arrears, evictions, food insecurity, inability to pay utility bills or medical expenses, and other important expenses. The study relied on conversations with SCCHA leadership and internal agency documents to explore the types of assistance SCCHA provided to alleviate housing-related hardship and prevent eviction due to the rent reform.

Effects for Households Affected by the Tenant Contribution Rate Change Only Versus Households Also Affected by the Voucher Size Rule Change

The hypotheses described earlier relate to the potential effects of the tenant contribution rate change. As noted earlier, 23 percent of the study sample of nonelderly, nondisabled HCV households in SCCHA were immediately affected, not only by the change in subsidy levels but also by the new voucher size policy. The new voucher size policy enforced a minimum of two family members per bedroom, excluding the head of household's bedroom, regardless of age, generation, gender, or relationship of the household members.

All households in both subgroups were affected by the tenant contribution rate increase; therefore, all households faced the potential earnings and employment incentives and disincentives, and all households whose rent exceeded the payment standard faced some incentive to move to a less expensive unit to offset higher housing costs. It is possible, however, that the rent reform's effects on employment and earnings for the subgroup of households affected only by the tenant contribution rate increase may have differed from the effects for the subgroup of households affected by both policy changes. Households also affected by the voucher size rule change might have stayed in their current units, and faced much steeper out-of-pocket housing costs, because they had to fully cover the difference between the new lower payment standard and the previous one, or they might have moved to a smaller unit whose gross rent exceeded the area payment standard by a larger amount than their previous larger unit. For these reasons, households in the double policy change subgroup could have had stronger incentives to change their employment behavior in addition to stronger incentives to move to a new unit. Furthermore, if double policy change households who did not move to smaller units were unable to afford their much higher rent shares, and this hardship led them to leave the subsidy program (either by voluntarily moving to a more affordable housing situation, like moving in with other family members or through eviction), the turmoil of their housing situation may also have affected households' employment and earnings.

Study Sample

The analysis sample includes all nonelderly, nondisabled households and individuals who were receiving HCV subsidies at the time of the SCCHA policy change in July 2013 from SCCHA or from one of the three selected comparison PHAs: the Housing Authority of the County of Alameda,

the Housing Authority of the County of San Mateo, and San Francisco Housing Authority.[18, 19] The main criteria for the Comparative Interrupted Time Series (CITS) method used in this analysis is that the housing authorities' voucher holders must be subject to similar labor and housing market forces as those in SCCHA. The study considered local labor and housing market information, baseline earnings and employment levels and trends, and the characteristics of households in candidate housing agencies to select the sample. The process used for selecting these PHAs for the comparison group is described later in this article.

Exhibit 5

HUD Definitions of Sample Terms

Adult: An individual who is 18 years of age or older or a minor under the age of 18 who has been emancipated to act on his/her own behalf, including the ability to execute a contract or lease.

Household with Disabilities: A household where the head of household, spouse, or co-head is a person with a disability.

Elderly Individual: A person at least 62 years of age.

Elderly Household: A household whose head, co-head, spouse, or sole member is at least 62 years of age.

Quarterly and annual effects on employment and earnings were estimated for the cohort of all nonelderly, nondisabled *individuals* who were living in households receiving HCV subsidies at the time of the rent reform (July 2013). Annual effects on household subsidy amounts and continued housing subsidy receipt were estimated for the cohort of all nonelderly, nondisabled *households* receiving HCV subsidies from study PHAs at the time of the rent reform.

A different sample was required for the subgroup analysis that compares intervention effects on households that experienced only a change in the tenant contribution rate with households that were also affected by the voucher size rule change. The subgroup of SCCHA households affected by the voucher size rule change was identified by comparing households' voucher sizes at baseline (in early July 2013, before the rent reform was implemented) with their voucher sizes under the new policy. Using actual subsidy data, a simulation applied the new voucher size rules to each household according to its baseline unit size and household composition. A household was included in the subgroup of households affected by the voucher size rule change if its new rent calculation would use the payment standard of a smaller voucher size under the new policy. All other households were included in the subgroup of households that were only affected by the tenant contribution rate increase.

At the time of the SCCHA rent reform, only one PHA in the study sample other than SCCHA—the San Francisco Housing Authority (SFHA)—had not yet moved to a more conservative voucher size policy. Therefore, only SFHA could be included in the comparison group for this subgroup analysis. The method described earlier was used to identify the subgroup of households (based on baseline voucher size, unit size, and household composition) in SFHA that *would have been affected* by the new voucher

[18] The study uses HUD's definitions of elderly and disabled households and adults. See exhibit 5 for definitions of these terms.

[19] As described earlier, the SCCHA policy changes affected all HCV households, regardless of elderly or disability status. The study focuses on nonelderly, nondisabled households because elderly and disabled households would not have had the same flexibility to change their work behavior in response to the policy changes.

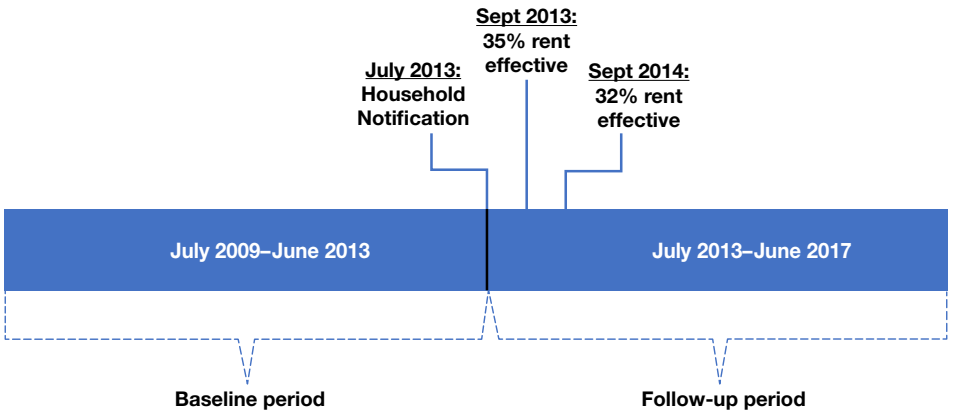
size rules if those rules had been applied to them. Twenty-three percent of nonelderly, nondisabled households in SCCHA, and 21 percent in SFHA, were identified for this subgroup analysis. The subgroup analysis also differs from the main analysis in that, due to data limitations, the sample was defined at the household (not individual) level. The subgroup analysis estimates effects for adults living in nonelderly, nondisabled households—this group includes a small number of disabled and elderly individuals (approximately 5 percent of the sample) and excludes some nonelderly, nondisabled individuals who were living in households headed by an elderly or disabled person.

Study Period

The CITS design used in this study (described in detail later) requires a sufficient number of time points (ideally, at least 4 years) before the policy change in order to reliably estimate baseline trends. As exhibit 6 shows, the SCCHA rent reform was implemented in early July 2013 (when SCCHA sent letters to subsidy households notifying them of the rent reform and their new tenant rent share under the new rent policy), and the baseline period is defined as the 4 years before the start of the SCCHA rent reform implementation: July 1, 2009, to June 30, 2013. The followup period includes the 4 years after the start of the SCCHA rent reform and is defined as July 1, 2013, to June 30, 2017. In other words, the analysis used 4 years of historical (pre-rent reform) and 4 years of followup (post-rent reform) data on the study cohort to estimate the effects of the rent reform.

Exhibit 6

Timeline of Policy Changes



Source: Housing Authority of the County of Santa Clara, 2013

Data Sources

The study primarily relies on two data sources for understanding the rent reform's effects on employment, earnings, housing subsidy receipt and amounts, plus housing characteristics: state unemployment insurance (UI) wage data and the HUD Inventory Management System/Public Indian Housing Information Center (IMS/PIC) data. It also uses other data sources—including U.S. Census Bureau data and internal SCCHA documents and discussions with SCCHA staff members—to provide context for these findings.

Employment and Earnings

Employment and earnings data obtained from the California Employment Development Department (EDD) consist of employer-reported UI wage data for all employment covered by UI in the state of California. These data do not include wage data for jobs outside of California, federal employment, or informal or self-employment not covered by UI.

The data are quarterly and were received in de-identified, aggregated form grouped to serve analysis purposes. The employment and earnings data for the main analysis (which estimates effects for all nonelderly, nondisabled adults receiving HCV subsidies) were grouped by PHA and whether individuals were elderly or disabled. These data were used to construct the average quarterly employment rate and average quarterly earnings measures. Since CITS analysis requires the calculation of a trend in the outcome over time, average quarterly earnings were adjusted for inflation to 2017 dollars using the U.S. Bureau of Labor Statistics Consumer Price Index (CPI).[20]

For the subgroup analysis, which looks at effects on employment and earnings for adults living in households that were only affected by the increased tenant contribution rate separately from households also affected by the new voucher size policy, the sample was defined at the household level. The data were grouped by PHA, household elderly or disabled status, and whether the payment standard on which the household's rent calculation was based was reduced because of the new voucher size determination rules. Therefore, this analysis estimated effects on earnings and employment for all adults (regardless of elderly or disabled status) living in nonelderly, nondisabled households that were subject to the voucher size policy change. Employment and earnings measures were constructed in the same way as for the main analysis.

Housing Subsidies and Housing Characteristics

Quarterly IMS/PIC snapshot data were used to identify the study sample, to describe household and individual characteristics at the time of the policy change, and to create covariates for the impact models. Snapshot files from the second and third quarters of 2013 were used to identify which households in the selected PHAs were receiving subsidies on July 1, 2013, just before the SCCHA rent reform was implemented.

IMS/PIC transactional data were used to investigate effects on housing subsidy amounts and housing subsidy receipt and to provide descriptive information on other housing variables, including rent burden and unit characteristics. The transactional files include a record for each certification that occurred during the study period. Monthly measures from July 2009 through June 2017 were created using these data. Data were acquired for all transactions recorded from January 1, 2009 (6 months before the study period) to establish baseline levels of all the housing-related measures.

The IMS/PIC data for the last year of the followup period (July 1, 2016, to June 30, 2017) did not benefit from updates recorded in the following year, nor from certifications that were recorded in the following year but effective during Year 4. Therefore, results using the fourth year of IMS/PIC data are not presented in this report, but the overall results using Year 4 data are reported in footnotes.

[20] All Urban Consumers (Current Series) database (https://www.bls.gov/cpi/data.htm).

MTW agencies have fewer 50058 reporting requirements and use a shortened 50058 form to collect data at each certification. It was necessary, therefore, to construct some measures that are available for traditional PHAs but are not included in HUD Form 50058 MTW: HAP, TTP, and family share. These measures rely on the payment standard at the time of the rent calculation, which is not included in the IMS/PIC data.[21] MDRC collected payment standard amounts for the full study period from SCCHA and from the Housing Authority of the County of San Mateo (HACSM), one of the MTW agencies selected for the comparison group.[22] Exhibit 7 describes how MDRC calculated the subsidy measures used in the analysis that were not already included in the IMS/PIC data.

Exhibit 7

Calculated Housing Subsidy Measures Used in this Study

Measure	Definition	Calculation Method Used to Construct Measures for Analysis	
		Traditional PHAs	MTW PHAs
TTP	The minimum amount that the household must contribute toward rent and utilities	No calculation needed / Included in the IMS/PIC data.	Under traditional rent rules, it is calculated as the greatest of (1) 30 percent of monthly adjusted income, (2) 10 percent of monthly gross income, or (3) the PHA minimum rent. Under the SCCHA new rent rules, it is calculated as the greater of 35 percent (or 32 percent, after July 2014) of monthly gross income or (2) the PHA minimum rent.
HAP	The amount that the PHA provides in subsidy for rent and utilities	No calculation needed / Included in the IMS/PIC data.	Under the traditional rent policy, it is calculated as the lower of (1) the payment standard for the family's unit minus the TTP or (2) the gross rent minus the TTP. For SCCHA households after the new rent policy went into effect, it is calculated as the lower of (1) the payment standard for the family's unit minus the TTP or (2) the contract rent minus the TTP.
Family Share	The household's total contribution (rent plus utilities) toward the gross rent	No calculation needed / Included in the IMS/PIC data.	For households with gross rent at or below the payment standard, the family share is equal to the household's TTP.
Tenant Rent Share	The household's total contribution toward contract rent	No calculation needed / Included in the IMS/PIC data.	TTP plus the amount over the payment standard that the household pays toward contract rent. (Contract rent is gross rent minus utilities.)
Rent Burden	Traditional definition: The total amount a household pays in rent and utilities (family share) as a proportion of household adjusted income	The total amount household pays in rent (tenant share) divided by household gross income.	

HAP = Housing Assistance Payment. IMS/PIC = HUD Inventory Management System/Public Indian Housing Information Center.
MTW = Moving to Work. N/A = data not available. PHA = public housing agency. SCCHA = Santa Clara County Housing Authority.
TTP = total tenant payment.

[21] The payment standard amounts and the household HAP, TTP, family share, and tenant share of contract rent amounts are included in the IMS/PIC data for traditional PHAs.

[22] The selection process for the comparison group is described in detail later in this chapter.

Accounting for utility allowances in this study posed measurement challenges. At traditional PHAs, if a tenant's contract rent does not cover utilities, the tenant receives a utility allowance from the PHA. The contract rent plus the utility allowance equals the gross rent for a unit, and HAP is calculated based on gross rent. MTW agencies have the option to eliminate or restructure their utility allowances, and one of the comparison agencies did so early in the study period.[23] Therefore, the calculation of HAP for that housing agency does not include utility allowances.[24, 25]

To ensure that the measure of rent burden is consistent over time—both before and after the SCCHA rent reform—and that this measure is comparable between SCCHA and the comparison group PHAs—an alternative measure of rent burden that does not rely on the measurement of utility allowances is used. This measure is the tenant rent share (equal to the TTP plus any amount by which the *contract* rent, not including tenant-paid utilities, exceeds the payment standard) divided by the household's gross income.[26]

A 40-percent rent burden is commonly used as the threshold for a high burden in the literature discussing HCV households (Dawkins and Jeon, 2017; Ellen and Torrats-Espinosa, 2017). The measure used in this study—the tenant rent share as a proportion of household gross income—departs from this standard definition in two ways. First, the threshold used is typically 40 percent of *adjusted* income—which would be a lower threshold than 40 percent of gross income. Second, the measure typically uses tenant rent share plus tenant-paid utilities as a proportion of household income. The measure in the present study uses tenant rent share and does not include tenant-paid utilities.

Neighborhood Poverty, Local Context, and Hardship Policies

To measure neighborhood quality, the study uses the census tract poverty rate. The poverty rate is the most widely used measure of neighborhood quality and distress (Galvez, 2010). The geocoded HUD IMS/PIC data were merged with U.S. Census Bureau data. The census-tract poverty rates (for individuals age 18 to 64 years) from either the 2007–2011 American Community Survey (ACS) 5-year estimates or the 2012–2016 ACS 5-year estimates, depending on the date that the record was entered, were merged with the census tracts in the IMS/PIC data. ACS data on county-level population and housing market data were used for comparison group selection. These measures included the median household income, median household rents, rental vacancy rates, housing unit density, population density, education levels, and racial and ethnic composition.

The study used two additional public data sources during the process of selecting the comparison group PHAs (described later). Public data from the California EDD website was one source for measures of labor information for 2012–2016 for the Bay Area counties where the PHAs

[23] HACSM restructured its utility allowances as part of a more comprehensive rent reform that introduced a tiered rent structure.

[24] SCCHA's elimination of utility allowances when it implemented its rent reform in 2013 does not pose problems for estimating impacts of the rent reform on housing subsidies because the calculations of HAP post-rent reform accurately reflect the exclusion of utility allowances.

[25] Several sensitivity analyses described in Castells (2020) confirm that results are not affected by the exclusion of utility allowances in the calculation of HAP at HACSM.

[26] For households whose tenant rent share (TTP plus the amount that the contract rent exceeds the unit's payment standard) exceeds their gross income, this measure is set to 100 percent.

in the present analysis were located.[27] The other source was 2013 data from the HUD Picture of Subsidized Households dataset, available publicly on the HUD website, to describe the characteristics of households living in candidate PHAs.

Lastly, the study relied on discussions with SCCHA leaders and internal SCCHA documentation to better understand PHA hardship policies and eviction assistance program and the overall policy and economic context at the time the rent reform was implemented.

Analytic Approach

A combination of analytic methods was used to assess the effects of the SCCHA 2013 rent reform, using the most rigorous approach feasible for each set of outcomes. Each method is explained narratively in what follows, and appendix B contains model specifications.[28] Exhibit 8 shows which outcome measures were used in each type of analysis, and which research questions they aimed to address.

Exhibit 8

Outcome Measures by Research Questions and Analytic Approach

Research Question	Outcomes by Analytic Approach		
	Comparative Interrupted Time Series	***Autoregressive Difference-in-Differences***	***Descriptive (Exploratory)***
What was the effect of the SCCHA rent reform on household members' employment and earnings?	Total annual earnings Average quarterly employment rate		
What was the effect of the SCCHA rent reform on housing assistance subsidy amounts and continued housing subsidy receipt?		Total Annual Housing Subsidy Received Any Housing Subsidies	Received Any Housing Subsidies Among Households Receiving Subsidies: • Total Tenant Payment (TTP) • Housing Assistance Payment (HAP) • Total Tenant Rent Share
Was there any suggestion of potential effects of the SCCHA rent reform on households' housing decisions?			Among Households Receiving Subsidies: • Neighborhood Poverty Rate • Total Number of Bedrooms • Ported Out to a Different PHA • Household Size
To what extent did SCCHA households experience selected housing-related hardships after the rent reform?			Rent Burden (Tenant Rent Share Contribution as Percent of Monthly Gross Income) Total Hardship Exemptions Granted (SCCHA only) Total Households Assisted with Eviction Prevention Assistance (SCCHA only)

PHA = public housing agency. SCCHA = Santa Clara County Housing Authority. Employment and Earnings—Comparative Interrupted Time Series

[27] Data were compiled from the "REPORT 400 C, Monthly Labor Force Data for Counties, Annual Average (Data Not Seasonally Adjusted)" reports, produced by the Labor Market Information Division of California EDD, available on the California EDD website: https://www.labormarketinfo.edd.ca.gov/data/unemployment-and-labor-force.html.

[28] See Castells (2020) for more details on each of the analyses used in the present study.

Employment and Earnings—Comparative Interrupted Time Series

The most rigorous method used is a CITS analysis, which is a quasi-experimental design, used in this study to estimate effects on the study's key outcomes: employment and earnings.

The CITS analysis measures the impact of the SCCHA rent reform on earnings or on employment as the difference between the post rent reform SCCHA *deviation* from its pre-rent reform trend and the corresponding comparison group deviation from its pre-rent reform trend.[29] The focus of the present analysis is whether the SCCHA rent reform caused a deviation in predicted employment rates or average quarterly earnings for SCCHA's study cohort that differed from any deviation from predicted employment rates and average annual earnings for the study cohort at comparison PHAs.

The SCCHA rent reform meets important criteria for a successful CITS analysis. First, the policy change or changes must be consequential, capable of producing a substantial impact in a relatively short time. The reform was consequential in that it was expected to increase the average tenant rent share from 27 to 35 percent of gross income and decrease HAP payments by 12 percent. Second, the policy change must be implemented all at once for the entire study cohort. The rent reform affected all HCV households, and, according to the SCCHA, all households were notified and therefore potentially affected at the same time. Letters were sent out to households in the first week of July, and the changes went into effect on September 1, 2013. Third, for the comparison with other housing authorities to be valid, those housing authorities' voucher holders must be subject to similar labor and housing market forces as SCCHA (the baseline levels of employment and earnings do not have to be the same). The study used a systematic comparison group selection process that identified comparison PHAs that faced similar local economic forces during the study period.

The first step in the CITS analysis was to measure the average earnings or employment trajectory of all the nonelderly, nondisabled adults in households receiving subsidies in the SCCHA HCV program over the 4 years before its policy changes in 2013. This baseline trend was then used to extrapolate what earnings levels or employment rates would have looked like in the absence of the policy changes in 2013. The second step was to measure the earnings levels or employment rates after these changes occurred to estimate the magnitude and direction of any subsequent deviations from this baseline trend. A parallel analysis was conducted for comparison PHAs. The final step of the design was to measure the magnitude and direction of the treatment and control group *difference* in these estimated deviations from the trend. These observed differences represent the estimates of the impact of the SCCHA rent reform on individual earnings and rates of employment.

Subsidy Amounts and Receipt of Subsidy—Autoregressive Difference-in-Difference

An autoregressive difference-in-difference model was used to estimate effects on the average amount of subsidy that households received, and the percentage of households in the sample still receiving subsidies each year after the SCCHA rent reform was first implemented. Difference-in-difference estimation is also a rigorous, quasi-experimental design, but unlike a CITS analysis, it does not account for differences in baseline trends.

[29] See Somers et al. (2013) for a review of this method.

While the lack of 4 full years of historical data for the full study cohort ruled out using a CITS analysis for these outcomes, the comparison group selection process provides a reasonable level of confidence that the comparison PHAs had similar baseline trends in housing subsidy receipt and amounts and were subject to the same labor and housing market forces. It is important to remember the caveat that if there were any differences in the trends of these housing outcomes before the rent reform, those differences, rather than the policy changes, could be the cause of estimated impacts, or they could mask a true effect when none is detected.

Conceptually, autoregressive difference-in-difference measures the difference between the outcome of interest at the time of the policy change and the outcome at specific points during the followup period (for example, 1 year after the policy change) for both the treatment and comparison groups, and then compares those differences. Unlike a simple difference-in-difference model, however, the models used for this analysis are autoregressive in that they also control for preintervention values of the outcome measure. The model estimating effects on average HAP includes four covariates representing HAP amounts in the 4 years before the rent reform (for those households not yet receiving HCV subsidies in each of the 4 years, these values of HAP are $0), along with four binary covariates indicating whether the household was receiving any HCV subsidy in each year before the rent reform. The model specifications for these autoregressive difference-in-difference models are provided in appendix B.

Descriptive Analysis of Rent Burden, Number of Bedrooms, Neighborhood Quality, and Household Size

The study describes outcomes that may reflect housing decisions that SCCHA households made in response to the rent reform and that reflect any subsequent housing-related hardship they may have faced, including rent burden, number of bedrooms, neighborhood quality, and household size. Average levels of these outcomes for the sample households in Santa Clara are compared with averages in the comparison group PHAs in the last month of baseline and annually thereafter. Discussions with SCCHA leadership provided information on safeguards that SCCHA offered to households severely affected by the rent reform.

The trends in the descriptive exhibits should be interpreted with caution because data are only available for households still receiving subsidies and therefore represent only a partial picture. Also, households that leave the subsidy program each year are likely to differ systematically from households that remain, meaning this picture gets less representative later in the study period as the percentage of households still receiving subsidies gets smaller.[30] The comparison group's outcomes are presented for context, but they should not be interpreted as counterfactual representations of the expected outcomes for SCCHA households in the absence of the rent reform.

The descriptive analysis serves two main purposes. First, it examines the averages in the housing subsidy outcomes as an additional check on the validity of the study. The SCCHA rent reform is

[30] Drawing conclusions from the patterns of these outcomes can be especially problematic if the rent reform had an effect on the proportion of households that lost their subsidies. While the analysis did not suggest an overall effect on households leaving housing assistance, the SCCHA rent reform may have influenced which types of households left the subsidy program during the followup, even if this change is not captured by the data on changes in the percentage of households receiving subsidies over time.

expected to have direct effects on households' housing subsidies. If there is no clear pattern of an increase in TTP and reduction in HAP (especially 1 year after the rent reform was implemented), the findings might call into question the face validity of the study—whether the SCCHA rent reform was implemented as expected and whether key outcomes are being measured correctly. Second, the analysis examines patterns in averages of housing outcomes during the followup period that may reflect households' responses to the SCCHA rent reform to see whether any stark deviations from pre-rent reform levels are evident, especially if this deviation does not exist in the comparison group. Even if such a stark difference is evident, however, it alone would not provide compelling evidence that the change was caused by the SCCHA rent reform. Instead, it would suggest that the rent reform may have led to changes in SCCHA households' housing decisions and may warrant further exploration in future studies with more rigorous methods directed to this question.

Single and Double Policy Change Subgroup Analysis

The subgroup analysis examines whether the effects of the SCCHA rent reform for the 77 percent of nonelderly, nondisabled households who were only affected by the tenant contribution rate increase (hereafter referred to as the "single policy change" subgroup) differed from that for the 23 percent of nonelderly, nondisabled households who were affected by both the increased tenant contribution rate and the reduction in voucher size (hereafter referred as the "double policy change" subgroup).

Only one of the comparison PHAs—SFHA—could be used for the subgroup analysis comparison group. Analyses reported in Castells (2020) confirm that SFHA by itself would provide a valid comparison group for the subgroup analysis of impacts on earnings and employment. The CITS method used to estimate impacts on employment and earnings in the full study sample was used to estimate impacts for each subgroup in the smaller sample of households drawn from only SCCHA and SFHA.

The analyses showed, however, that the autoregressive difference-in-difference model used to estimate impacts on average household HAP and whether households were still receiving subsidies in the full sample would not be valid for the subgroup analysis using only SCCHA and SFHA. As explained in Castells (2020), it is possible to estimate how the effects of SCCHA's rent reform differ (in direction and magnitude) between the single and double policy change groups. These differential effects can be estimated by examining the difference in the separate estimated effects for the two subgroups. This method is known as a difference-in-difference-in-difference design and is presented in this article as an exploratory analysis for the present study.[31]

Comparison Group Selection

One of the main conditions for a CITS design to be an effective method for measuring the impact of the SCCHA rent reform is that the CITS comparison group be subject to labor and housing market forces that are similar to those for SCCHA. Because the present study identified comparison PHAs in the Bay Area in counties with similar labor and housing markets, one can be reasonably

[31] See Wing, Simon, and Bello-Gomez (2018) for a description of this method.

confident that this condition is met.[32] This condition is important for a CITS analysis because the mean outcome of the comparison group does not serve as the counterfactual outcome for the treatment group, as it does in most quasi-experimental methods. Instead, the *deviation* in the mean outcome of the comparison group from its estimated baseline trend serves as the counterfactual for the deviation of the mean treatment group outcome from its estimated baseline trend. Consequently, the difference between these two deviations from the trend identifies the impact of the SCCHA rent reform on the employment and earnings of SCCHA subsidy recipients.

In addition, it is desirable for the CITS comparison group to have baseline trends for the primary outcome measures (employment and earnings) that are similar to those for SCCHA and for the characteristics of their households to be similar to those of SCCHA residents. While these similarities are not necessary for a CITS analysis to produce valid impact estimates (because the CITS design implicitly controls for these baseline differences), the closer the alignment between the treatment and comparison groups on baseline levels and trends of earnings and employment, and the more similar the households in the two groups, the more one can be confident that the groups would respond similarly to changing local economic conditions.

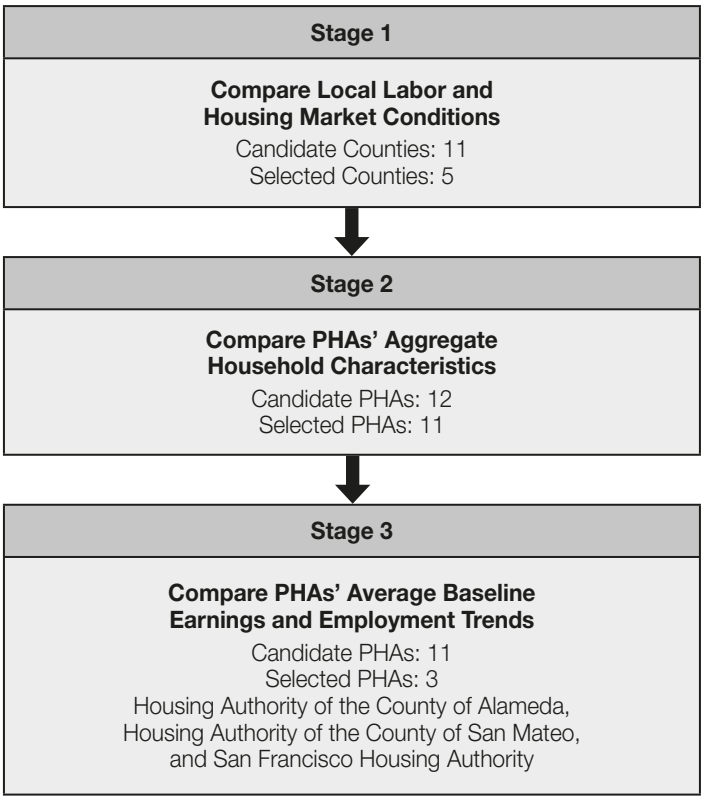
In contrast, the similarity of baseline trends is quite important for the difference-in-difference method used to estimate effects on housing subsidy levels and whether households continued to receive subsidies since this method does not account for any treatment and comparison group differences in baseline trends.

With the preceding considerations in mind, a three-stage process was used to identify PHAs to serve as the comparison group. As exhibit 9 illustrates, the first stage narrowed down the counties considered by examining the local labor market and housing market conditions. The map in appendix A shows the counties' locations in the Bay Area. The second stage examined characteristics of households in the remaining candidate PHAs to determine which differed appreciably from those in SCCHA. Last, baseline earnings and employment trends for the remaining pool of PHAs were examined to select those whose baseline trends were most closely aligned with the SCCHA baseline trends. Castells (2020) describes the details of each stage of the process, including the rationale for narrowing down the specific counties or PHAs at each stage.

[32] While it would have been possible to identify PHAs in areas with similarly tight housing markets and strong labor markets, like New York City or Los Angeles, that closely match SCCHA in baseline characteristics and employment and earnings trends, selecting the comparison group PHAs from locations outside the Bay Area increases the likelihood that the comparison group PHAs experienced economic forces or policy changes that were different from those that SCCHA experienced during the study's followup period.

Exhibit 9

Comparison Group Selection



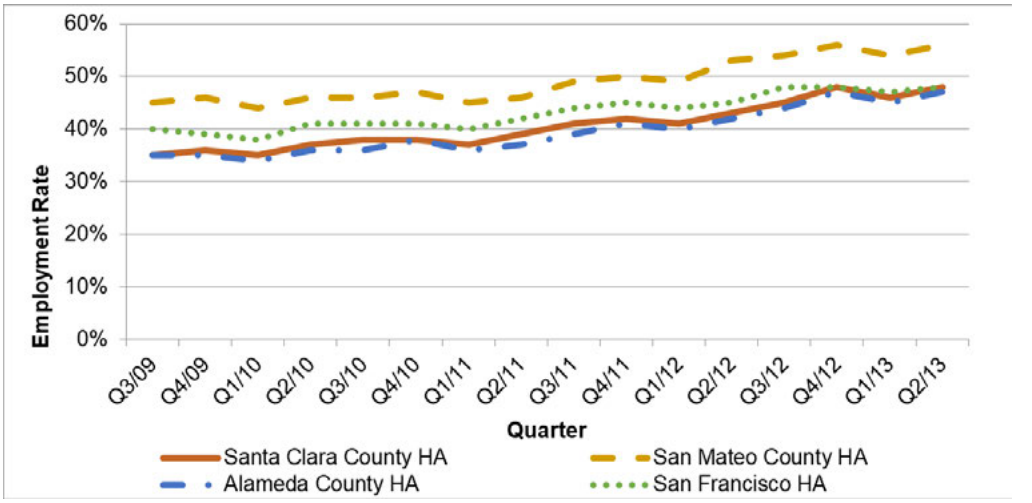
PHA = public housing agency.

Notes: Stage 1 conditions were calculated using county-level U.S. Census Bureau (2010), 2009–2013 American Community Survey 5-Year Estimates, and California Employment Development Department Monthly Labor Force Data for Counties (2012–2016) data. Stage 2 characteristics were calculated using HUD housing agency-level Picture of Subsidized Households (2013) data and HUD household-level Public and Indian Housing Information Center data. Stage 3 trends were calculated using California Employment Development Department's individual-level aggregate unemployment insurance data. Trends were calculated across the 4-year period from July 1, 2009, through June 30, 2013.

Based on local labor and housing market conditions in candidate counties, and aggregate household characteristics in candidate PHAs, and most importantly, patterns of baseline employment and earnings among residents in candidate PHAs before the SCCHA rent reform, the sample was narrowed down to the three PHAs with trends most similar to Santa Clara's: The Housing Authority of the County of Alameda, HACSM, and SFHA. Exhibits 10 and 11 present these trends for Santa Clara and the selected counties.

Exhibit 10

Baseline Trends in Quarterly Employment Rates of Nonelderly, Nondisabled Adults in the Santa Clara County Housing Authority and Selected Comparison Housing Agencies



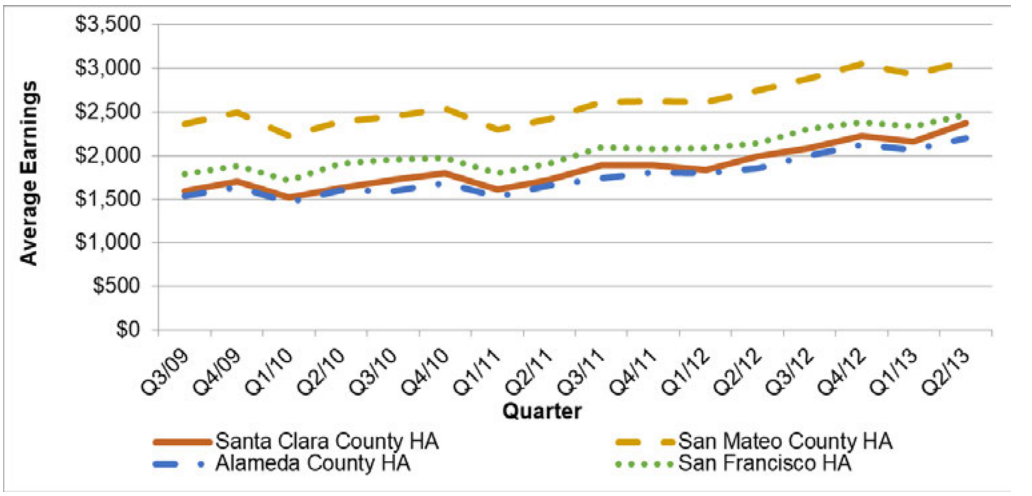
HA = housing authority.

Note: Sample consists of adults in the Housing Choice Voucher program who were not elderly or adults with disabilities.

Source: California Employment Development Department individual-level aggregate unemployment insurance data

Exhibit 11

Baseline Trends in Average Quarterly Earnings of Nonelderly, Nondisabled Adults in the Santa Clara County Housing Authority and Selected Comparison Housing Agencies



HA = housing authority.

Notes: Sample consists of adults in the Housing Choice Voucher program who were not elderly and did not have disabilities. Earnings not adjusted for inflation.

Source: California Employment Development Department aggregate unemployment insurance data

Exhibits 12 and 13 presents baseline characteristics for households and individuals in SCCHA and the three selected comparison PHAs in early July 2013, just before the rent reform was implemented.[33] It shows that households in both groups have, on average, two adults, with more than one-half having more than one adult in the household, and 65 percent in both groups have children in the household. About 62 percent of study households in SCCHA and 60 percent in comparison PHAs have at least one household member who is working. In both groups, 23 percent of households are receiving TANF.

Exhibit 12

Characteristics of Study Nonelderly, Nondisabled Households at Baseline

Characteristic	SCCHA	Comparison PHAs
Average Number of Family Members		
Adults[a]	1.9	1.8
Children	1.4	1.3
Families with More than One Adult (%)	58.3	50.7
Families with Any Children (%)	64.7	64.6
Current/Anticipated Annual Family Income ($)	17,368	18,525
Income Sources[b] (%)		
Wages	61.7	60.4
TANF	23.2	22.9
Social Security/SSI/Pension	12.8	16.5
Other Income Sources	29.1	35.5
Average Monthly Family Share[c] ($)	523	561
Average Monthly Housing Subsidy[d] ($)	1,397	1,244
Monthly Gross Rent Exceeds Payment Standard (%)	53.2	56.7
Neighborhood Poverty Rate[e] (%)		
0%–10%	41.5	41.8
11%–20%	40.1	47.2
21%–30%	14.3	8.1
More than 30%	4.1	3.0
Household Sample Size (Total = 15,499)	7,111	8,388

PHA = public housing agencies. SCCHA = Santa Clara County Housing Authority. TANF = Temporary Assistance for Needy Families. SSI = Supplementary Security Income.

[a]Adults are defined as individuals age 18 and older who were not classified on the HUD-50058 form as a live-in aide.

[b]Income source categories are as defined on the HUD-50058 form. Wages include one's own business, federal wages, PHA wages, military pay, and other wages. Other income sources include child support, medical reimbursement, Indian trust/per capita, unemployment benefits, and other nonwage sources.

[c]Family share is the family's contribution toward the gross rent.

[d]Housing subsidy is the full subsidy amount paid by the housing agency on the household's behalf. It includes any utility allowance payments made to the tenant in addition to rent paid to the owner by the housing agency.

[e]Poverty rate is defined as the percentage of individuals ages 18 to 64 years whose income in the previous 12 months was below the poverty threshold.

Notes: Samples consist of households that were not headed by elderly adults or adults with disabilities. Sample sizes may vary because of missing values. Rounding may cause slight discrepancies in sums and differences. The set of comparison group public housing agencies (PHAs) includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Housing subsidy characteristics represent monthly averages. Utility allowance data were not available for San Mateo and are therefore not included in San Mateo's housing subsidy measures. Averages for the comparison group are weighted based on each PHA's sample size.

Sources: MDRC calculations using HUD Public and Indian Housing Information Center and 2009–2013 American Community Survey 5-year estimates data

[33] A more detailed set of baseline characteristics are presented in Castells (2020).

Exhibit 13

Characteristics of Study Nonelderly, Nondisabled Adults at Baseline

Characteristic	SCCHA	Comparison PHAs
Female (%)	63.9	66.3
Average Age (Years)	35.6	35.4
Race (%)		
White, non-Hispanic	9.4	16.7
Black, non-Hispanic	14.7	40.6
Asian or Hawaiian or Pacific Islander, non-Hispanic	34.7	21.2
Hispanic	40.4	20.1
Other Race or More than One Race, non-Hispanic	0.8	1.4
Income Sources[a] (%)		
Wages	41.1	41.4
TANF	11.5	11.9
Social Security/SSI/Pension	1.8	4.2
Other Income Sources	14.3	21.0
Average Annual Income from Wages for Individuals with Any Wage Income ($)	16,840	19,247
Individual Sample Size (Total = 34,075)	16,133	17,942

PHA = public housing agency. SCCHA = Santa Clara County Housing Authority. SSI = Supplementary Security Income. TANF = Temporary Assistance for Needy Families.

[a]Income source categories are as defined on the HUD-50058 form. Wages include one's own business, federal wages, PHA wages, military pay, and other wages. Other income sources include child support, medical reimbursement, Indian trust/per capita, unemployment benefits, and other nonwage sources.

Notes: Samples consist of adults who were nonelderly and did not have disabilities. Sample sizes may vary because of missing values. Rounding may cause slight discrepancies in sums and differences. The set of comparison group PHAs includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Averages for the comparison group are weighted based on each PHA's sample size.

Source: MDRC calculations using HUD Public and Indian Housing Information Center data

The two groups are also quite similar at the individual level. Exhibit 13 presents the baseline characteristics of nonelderly, nondisabled adults in the HCV program in SCCHA and the comparison PHAs. The sample is majority female (64 percent in SCCHA and 66 percent in comparison PHAs), and the average age is about 36 years old in SCCHA and 35 in comparison PHAs. Forty-one percent of adults in both groups were working during the last month of the baseline period, and 12 percent in both groups were receiving TANF. Average annual earnings were higher in the comparison PHAs: $19,247 compared with $16,840 in SCCHA.

Although both groups are racially and ethnically diverse, there are differences in their racial and ethnic compositions. SCCHA has a larger Asian population (35 percent compared with 21 percent in the comparison group) and a larger Hispanic population (40 percent compared with 20 percent in the comparison group). The comparison group PHAs have a higher White (17 percent compared with 9 percent in SCCHA) and Black (41 percent compared with 15 percent in SCCHA) population. As mentioned, while there are some differences in racial and ethnic composition between SCCHA and the comparison group, the fact that the trends in employment and earnings throughout the 4-year baseline period are similar provides assurance that households in both groups respond similarly to local economic forces despite these differences.

The fact that households in both groups live in tight housing markets is evident by their high level of average household subsidies: $1,397 monthly for SCCHA households and $1,244 for the comparison PHAs. Also, 53 percent of households in SCCHA and 57 percent in comparison PHAs have a gross rent that is greater than the payment standard. On average, households pay a total of $523 monthly in SCCHA and $561 in comparison PHAs toward their housing costs (rent plus utilities). Only a very small proportion of households (4 percent in SCCHA and 3 percent in comparison PHAs) live in neighborhoods with poverty rates greater than 30 percent. Most households (82 percent in SCCHA and 89 percent in comparison PHAs) live in neighborhoods with relatively low poverty rates of no more than 20 percent.

The validity of the CITS analysis that investigates the impact of the rent reform on employment and earnings is not based on how similar the comparison group is to the intervention group but on the level of confidence that the comparison group PHAs are subject to the same labor and housing market forces, and that they generally respond similarly to such changes. The baseline trends in employment and earnings presented in exhibits 10 and 11 provide a reasonable level of confidence that subsidy recipients in each of the two groups respond similarly to changing economic conditions. Even so, it is useful to note that the study households in the comparison PHAs are quite similar to the study households in SCCHA.

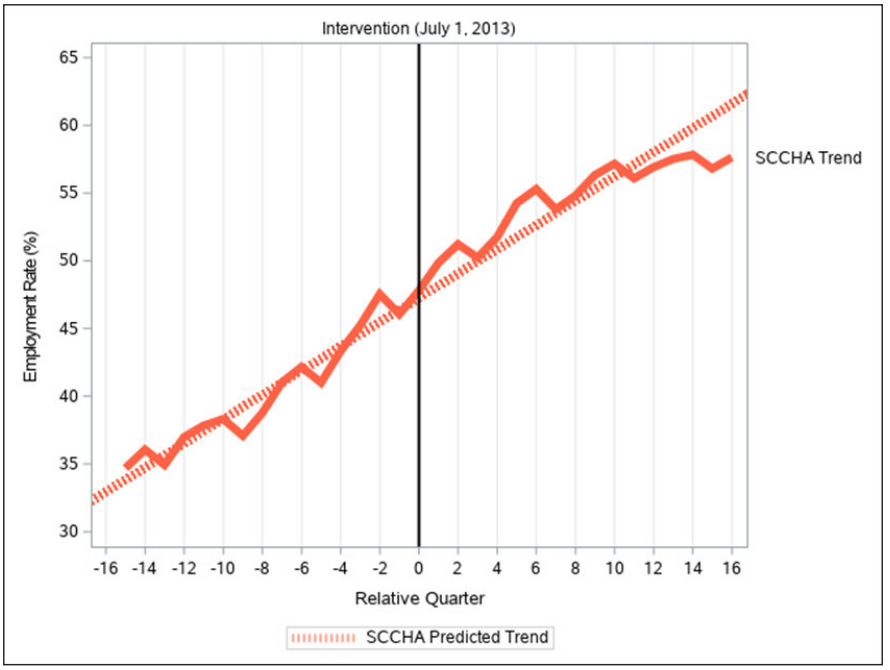
Findings

Impacts on Employment and Earnings

The CITS design tests whether the SCCHA rent reform caused a deviation from the predicted baseline trend in employment rates and average earnings for the nonelderly, nondisabled adults in the SCCHA HCV program. Exhibits 14 to 15 graphically illustrate this analysis. The first step in the CITS analysis was to use the observed quarterly employment rate of the adults in the SCCHA sample (the solid line in exhibit 14) over the 4-year baseline period before the SCCHA rent reform to measure the employment rate trend over those 4 years, which is shown by the dotted line over the same baseline period. This baseline trend was used to project what employment rates would have looked like for this SCCHA sample in the absence of the 2013 rent reform, as shown with the dotted line continuing throughout the 4-year followup period. The second step of the analysis was to measure the quarterly employment rates after the SCCHA rent reform (the solid line) to estimate whether there was a deviation from this baseline trend, indicated by the distance between the solid line during the followup period and the dotted line during the followup period. Visually, this gap indicates that employment rates were slightly higher than the trend would predict in the first 2 years of implementing the new SCCHA rent policies, and then somewhat lower.

Exhibit 14

Quarterly Employment Rates for Nonelderly, Nondisabled Adults in the Santa Clara County Housing Authority



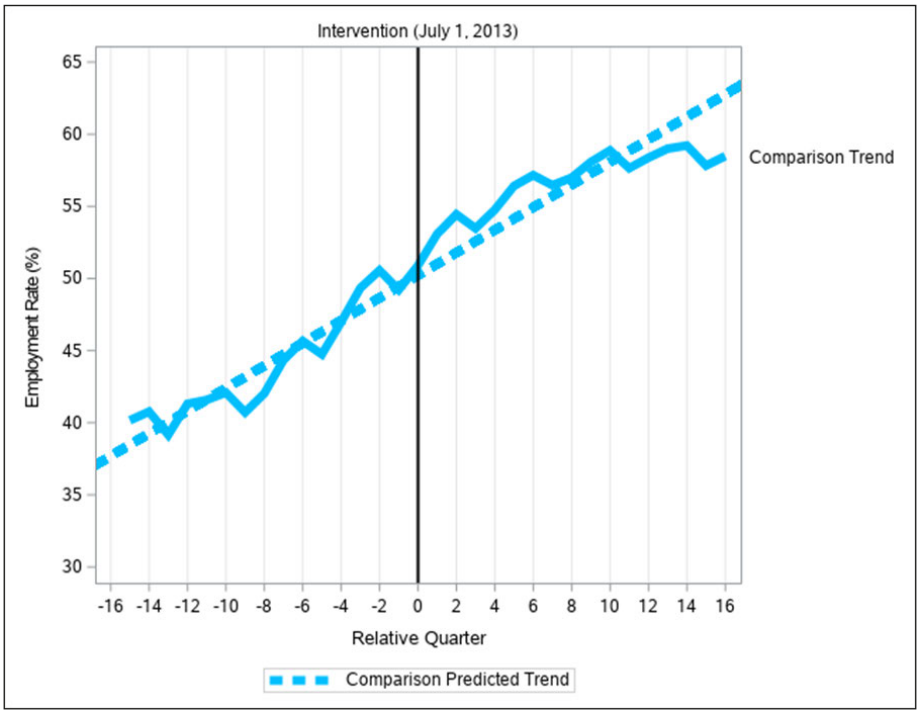
SCCHA = Santa Clara County Housing Authority.

Notes: Samples consist of adults who were not elderly and did not have disabilities. Impacts were estimated using a comparative interrupted time series model. Average quarterly earnings were adjusted for inflation to 2017 dollars using the Bureau of Labor Statistics Consumer Price Index.

Source: California Employment Development Department individual-level aggregate unemployment insurance data

Exhibit 15

Quarterly Employment Rates for Nonelderly, Nondisabled Adults in the Comparison Group

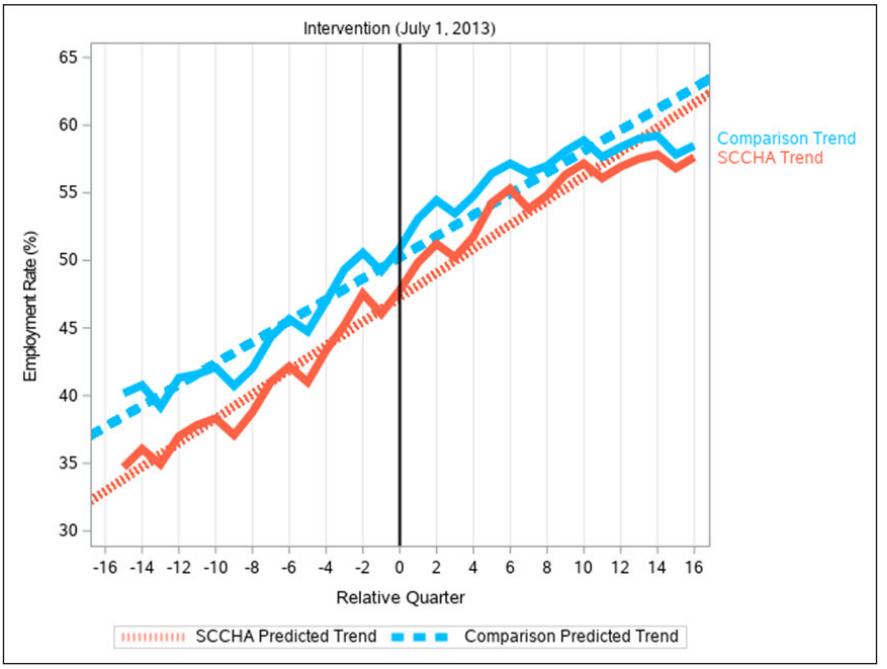


Notes: Samples consist of adults who were not elderly and did not have disabilities. The set of comparison group public housing agencies includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Impacts were estimated using a comparative interrupted time series model. Average quarterly earnings were adjusted for inflation to 2017 dollars using the Bureau of Labor Statistics Consumer Price Index.

Source: California Employment Development Department individual-level aggregate unemployment insurance data

Exhibit 16

Quarterly Employment Rates for Nonelderly, Nondisabled Adults in the Santa Clara County Housing Authority and Comparison Group



SCCHA = Santa Clara County Housing Authority.

Notes: Samples consist of adults who were not elderly and did not have disabilities. The set of comparison group public housing agencies includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Impacts were estimated using a comparative interrupted time series model. Average quarterly earnings were adjusted for inflation to 2017 dollars using the Bureau of Labor Statistics Consumer Price Index.

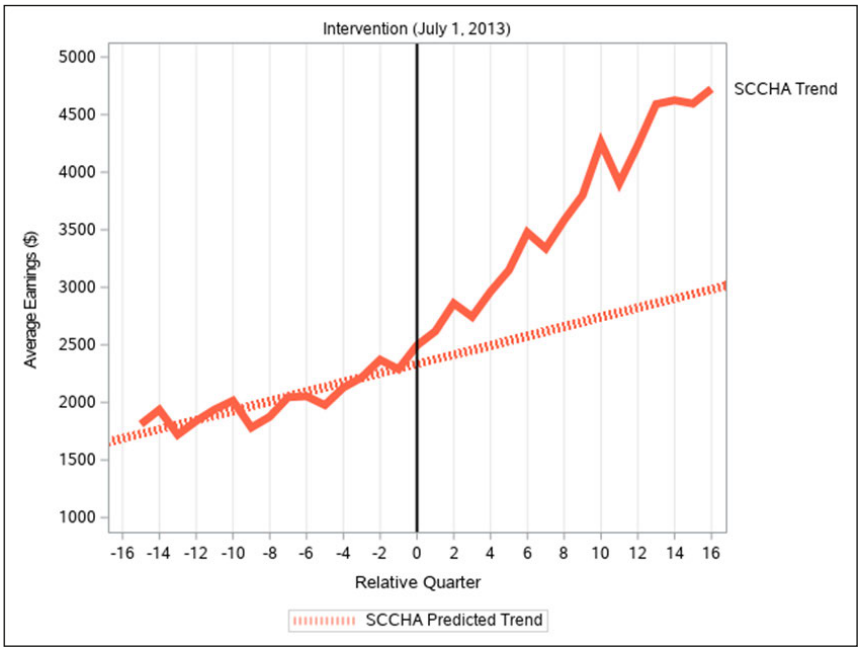
Source: California Employment Development Department individual-level aggregate unemployment insurance data

A parallel analysis was then conducted for the comparison group sample, illustrated in exhibit 15. The deviation of the actual employment rates from the predicted employment rates over the followup period looks similar to the deviation for SCCHA in exhibit 14. The final step of the analysis was to test whether the deviation in the employment rates for SCCHA was statistically discernible from the deviation for the comparison group PHAs. In other words, the *differences* in the deviations were examined. Exhibit 16 overlays the graphs for the SCCHA and comparison groups. Again, the relevant comparison is not between the two [solid lines], but between the two sets of deviations from each [solid line].

Exhibit 17 to 19 illustrate the same CITS analysis for average earnings. The difference between the gaps for the two groups was not statistically significant for either the employment rate or average earnings outcome throughout the followup period. The sharp upward trend in average earnings for both SCCHA and the comparison group reflect the rapidly growing local economy during the study, which covers a time period when the economy was rebounding from the 2008 recession, the overall median household income was accelerating more rapidly in the area compared with the rest of the state and the country, and where the latter half of the study period saw a series of increases in local (and state) minimum wages.

Exhibit 17

Average Quarterly Earnings of Nonelderly, Nondisabled Adults in the Santa Clara County Housing Authority



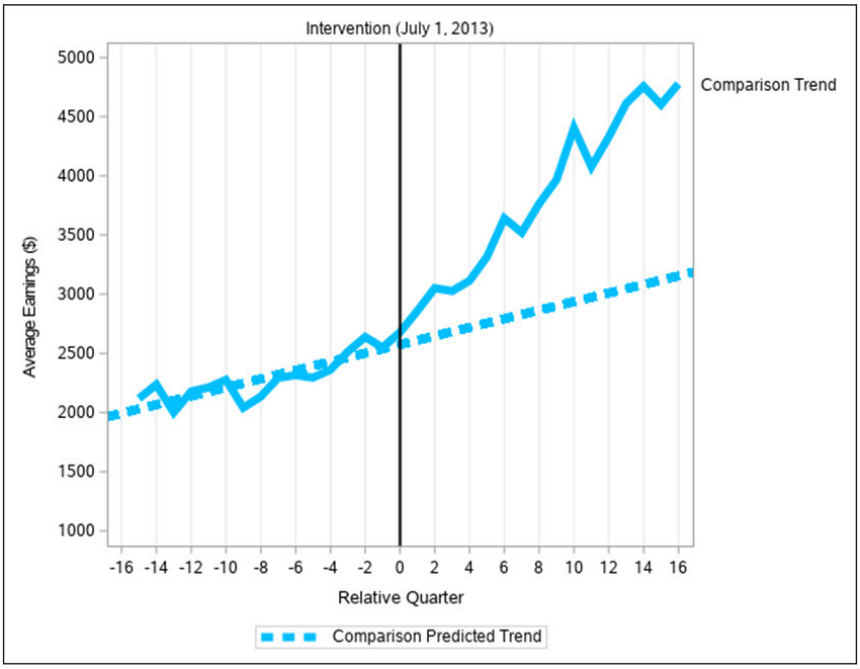
SCCHA = Santa Clara County Housing Authority.

Notes: Samples consist of adults who were not elderly and did not have disabilities. Impacts were estimated using a comparative interrupted time series model. Average quarterly earnings were adjusted for inflation to 2017 dollars using the Bureau of Labor Statistics Consumer Price Index.

Source: California Employment Development Department individual-level aggregate unemployment insurance data

Exhibit 18

Average Quarterly Earnings of Nonelderly, Nondisabled Adults in the Comparison Group

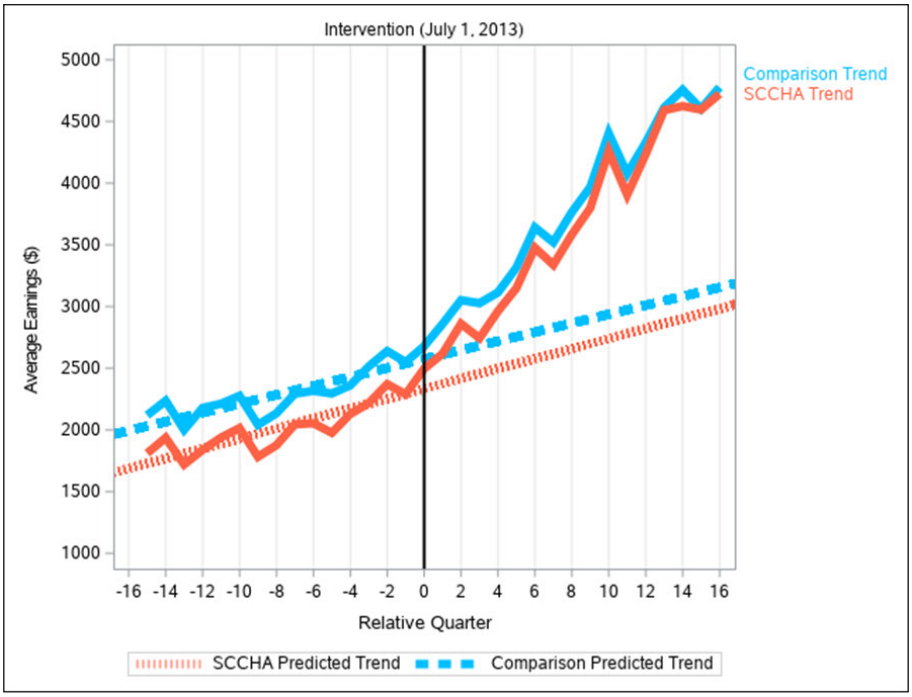


Notes: Samples consist of adults who were not elderly and did not have disabilities. The set of comparison group public housing agencies includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Impacts were estimated using a comparative interrupted time series model.

Source: California Employment Development Department individual-level aggregate unemployment insurance data

Exhibit 19

Average Quarterly Earnings of Nonelderly, Nondisabled Adults in both the Santa Clara County Housing Authority and the Comparison Group



SCCHA = Santa Clara County Housing Authority.

Notes: Samples consist of adults who were not elderly and did not have disabilities. The set of comparison group public housing agencies includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Impacts were estimated using a comparative interrupted time series model. Average quarterly earnings were adjusted for inflation to 2017 dollars using the Bureau of Labor Statistics Consumer Price Index.

Source: California Employment Development Department individual-level aggregate unemployment insurance data

Exhibit 20 presents the estimated effects of the SCCHA rent reform on average employment rates and average annual earnings for adults for each year of the followup period.[34] Yearly effects on employment rates for each year in the followup period were calculated by averaging the quarterly employment rate impact estimates across the four quarters in each followup year. Yearly effects on average earnings were calculated by summing quarterly earnings impact estimates across the four quarters in each followup year. Standard errors were computed accordingly.

The first column of results in exhibit 20, labeled "SCCHA Mean," represents the average outcome for the study cohort in SCCHA. For example, the average quarterly employment rate in Year 1 (which is an average of the quarterly employment rate for each of the four quarters in Year 1) is 50.8 percent. In other words, 50.8 percent of the SCCHA households had some earnings in a given quarter, on average, in Year 1. The second column, labeled "Impact," represents the estimated impact of the SCCHA rent reform. For example, the 50.8-percent employment rate observed

[34] See Castells (2020) for estimated quarterly impacts on employment rates and average earnings.

for SCCHA is estimated to be a 0.5 percentage point lower than what it would have been in the absence of the SCCHA rent reform. This impact estimate is an estimate of the true effect, which is unknown. The third column labeled "Std. Error" represents the standard error of the impact estimate, which measures the uncertainty which exists about its corresponding impact estimate. The final column reports the p-value of the impact estimate, which represents the likelihood that an estimated effect at least as large as the one observed would have occurred by chance if there was no true effect.

Exhibit 20

Impacts on Average Quarterly Employment Rate and Annual Earnings of Nonelderly, Nondisabled Adults

Outcome	SCCHA Mean	Estimated Effect	Std. Error	P-Value
Employment Rate				
Year 1	50.8	-0.5	0.9	0.604
Year 2	54.5	0.0	1.2	0.972
Year 3	56.6	0.1	1.5	0.929
Year 4	57.5	0.1	1.8	0.941
Earnings				
Year 1	11,187	46	349	0.897
Year 2	13,549	143	474	0.763
Year 3	16,198	200	597	0.738
Year 4	18,538	509	725	0.484
Sample Size				34,075

SCCHA = Santa Clara County Housing Authority.

*Notes: Samples consist of adults who were not elderly and did not have disabilities. The set of comparison group public housing agencies includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Effects were estimated using a comparative interrupted time series model. All estimated earnings effects are reported in 2017 dollars. The p-value indicates the likelihood that the estimated impact (or larger) would have been generated by an intervention with zero true effect. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.*

Source: California Employment Development Department individual-level aggregate unemployment insurance data

The results show no evidence of effects on the percentage of nonelderly, nondisabled adults who are employed or on their average earnings across the 4 years of followup. The estimated effects on both outcomes are small and not statistically significant. For example, in the first year after the rent reform, the estimated impact on average earnings was $46, but this difference was not statistically significant. This estimate could be interpreted to mean that the SCCHA average quarterly earnings of $11,187 for this first followup year was $46 higher than it would have been in the absence of the rent reform. The magnitude of the effect is very small, however, and the standard error and p-values are very large, suggesting that this small difference is very likely due to chance. In other words, there is no evidence that the SCCHA rent reform caused a deviation from its predicted average earnings trend in the first year after the rent reform was implemented that was

appreciably different from deviation from the predicted average earnings trend for the comparison group during the same time period, where no rent reform was implemented. As exhibits 14 to 19 illustrate, employment rates and average earnings increased steadily throughout the 4 years following the SCCHA rent reform for both SCCHA and comparison group subsidy recipients.

Impacts on Housing Subsidies

The SCCHA rent reform was intended to directly decrease the average household HAP by increasing the tenant contribution rate from 30 percent of adjusted income to 35 percent of gross income, eliminating utility allowances for all households, and by reducing the voucher sizes for a smaller percentage of households (23 percent) by applying a new voucher size policy. This part of the analysis examines whether the rent reform did in fact decrease average household HAP and whether HAP remained lower over time. If households had reduced their earnings in response to the rent reform (there was no evidence they did so, as discussed in the previous section), the SCCHA HAP savings would have been smaller than what it had projected. The analysis also tested whether the SCCHA rent reform increased the rate of households leaving the HCV program. The rent reform could have caused attrition from the HCV program if it drove some households' HAPs down to zero, reduced subsidies to the extent that some households decided the subsidy no longer justified the hassles of complying with program rules or increased household rent burden to a level that was not sustainable for households.

Exhibit 21 presents the estimated effects of the SCCHA rent reform on the average amount of housing subsidy and the percentage of households receiving any housing subsidy at followup, using autoregressive difference-in-difference estimation. The findings in this exhibit can be interpreted in the same way as described in the previous section for exhibit 20, with the caveat that the research design used to estimate impacts for exhibit 21 is weaker and that less confidence should be placed in the estimates.

The average household housing subsidy in the month before the implementation of the rent reform was $16,764 per year, or $1,397 per month (as shown in exhibit 12). As expected, the SCCHA rent reform reduced the average amount of housing subsidy that households received. This effect is probably a direct result of the increase in the tenant contribution rate from 30 percent of adjusted income to 35 percent of gross income and the other policy changes implemented as part of the rent reform, which resulted in the PHA paying less of a subsidy on behalf of each household. In the first year, the average annual household subsidy was estimated to be $1,593 less than it would have been in the absence of the rent reform. This annual effect is equivalent to $133 monthly.[35] In the second year after the rent reform was implemented, when the tenant contribution rate was reduced to 32 percent of gross income, the effect was slightly smaller: the average monthly household subsidy was $1,548 less annually, or $129 less monthly,

[35] This first-year impact estimate does not account for a 90-day hardship exemption that allowed some households to deduct medical and childcare expenses from their gross income for their temporary HAP calculation. A total of 414 households were granted a hardship exemption, but this total includes elderly and disabled households. SCCHA did not retain data on the elderly and disabled status of these households, so the precise number of households in the study's nonelderly, nondisabled sample is unknown.

than it would have been in the absence of the rent reform. In the third year, the rent reform reduced annual HAP by $1,329 and monthly HAP by $111.[36,37]

Exhibit 21

Impacts on Housing Subsidies of Nonelderly, Nondisabled Households

Outcome	SCCHA Mean	Estimated Effect	Std. Error	P-Value	
Total Annual Housing Subsidy ($)					
Year 1	14,335	-1,593	65	0.000	***
Year 2	13,414	-1,548	99	0.000	***
Year 3	13,481	-1,329	123	0.000	***
Receipt of Housing Subsidy (%)					
Year 1	99.2	0.5	0.2	0.013	**
Year 2	92.9	-0.4	0.5	0.368	
Year 3	87.5	-0.9	0.6	0.137	
Sample (Total = 15,490)	7,109				

SCCHA = Santa Clara County Housing Authority.

*Notes: Samples consist of households that were not headed by elderly adults or adults with disabilities. The set of comparison group public housing agencies (PHAs) includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Sample sizes may vary because of missing values. Effects were estimated using an autoregressive difference-in-differences model, controlling for the past receipt of housing subsidies and other baseline characteristics of sample households. To assess differences between the research groups, chi-square tests were used for categorical variables and two-tailed t-tests were used for continuous variables. The p-value indicates the likelihood that the estimated impact (or larger) would have been generated by an intervention with zero true effect. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent. Utility allowance data were not available for San Mateo and are therefore not included in San Mateo's housing subsidy measures.*

Source: MDRC calculations using HUD Public and Indian Housing Information Center data

The bottom panel of exhibit 21 presents the estimated effects of the rent reform on whether households are still receiving subsidies at followup.[38] Overall, there is no clear evidence that the SCCHA rent reform had an effect on the percentage of nonelderly, nondisabled households that lost their subsidies. There was a small (0.5 percentage point) but statistically significant increase in the percentage of households continuing to receive subsidies in the first year of followup, but this effect is probably inconsequential because of its small magnitude and the fact that it disappears after the first year.[39] (This 0.5 percentage point impact estimate can be interpreted to mean that

[36] The effect continues to decrease in the fourth year, though this finding is likely due to the data limitation for Year 4 housing data described in the "Data Sources" section of chapter 2.

[37] Results from a sensitivity test that estimated effects on HAP using utility allowance imputations for HACSM in the HAP calculations had very similar results (Castells, 2020).

[38] Any household that is receiving a HAP amount greater than zero (in any PHA) is counted as still receiving a subsidy at that time. If a household's income increases to the threshold where its HAP amount is zero because its calculated TTP is greater than the gross rent, the household has a grace period of 180 days during which it is still considered active in the program. If the household income drops during this period, TTP can be recalculated, and the subsidy can resume; otherwise, the household's participation is terminated from the HCV program and would have to go back on the waiting list to rejoin if its situation changes. Households that leave the HCV program are included in the average with a subsidy amount of $0. If 10 percent of the sample left the HCV program and the PHA replaced them all with new households, the subsidy receipt rate for the group would be 90 percent (not 100 percent).

[39] The statistical significance for an impact estimate of such a small magnitude reflects the high precision that exists when the mean of a binary outcome variable is near zero or one.

99.2 percent of the cohort of households who were receiving HCV subsidies from SCCHA when the rent reform was implemented in July 2013 still received subsidies during the first year after the rent reform was implemented, which is 0.5 of a percentage point more than what the percentage would have been in the absence of the rent reform.) Two years after the implementation of the rent reform, there was no difference between the percentage of households in the sample receiving subsidies in SCCHA and the percentage that would have been receiving subsidies in the absence of the rent reform. This remained true 3 years after rent reform was implemented.[40, 41, 42]

The patterns in household housing subsidy outcomes over time align with expectations based on the nature and timing of the rent reform, indicating that the rent reform was implemented as intended.[43] The average household TTP and family share (TTP plus the amount by which a household's gross rent exceeds the payment standard) increased more steeply than they did for comparison group PHAs when the tenant contribution rate changed from 30 percent of adjusted income to 35 percent of gross income in the first year of the rent reform. The increase was tempered in the second year when the tenant contribution rate was reduced to 32 percent of gross income. As expected, the household HAP—which is directly related to the TTP in that a household's HAP decreases by the same amount that the TTP increases—mirrors these patterns in TTP and family share. Housing market trends are also reflected in these patterns of housing subsidy outcomes: housing prices were steeply increasing during the followup period, so there is a general upward trend in subsidies independent of any policy change (across both SCCHA and comparison PHAs) as payment standards increased in response.

Households' Housing Decisions and Rent Burden

The findings discussed so far show that SCCHA rent reform did not have an overall effect on tenants' employment and earnings and that it did lead to deep and lasting cuts in housing subsidies as intended. This section explores measures of households' housing characteristics over time to gain further insight into how households may have responded to the SCCHA rent reform and to describe households' levels of rent burden in the years following the rent reform. The rent reform could have encouraged households to seek other, less expensive housing, possibly with fewer bedrooms or in higher poverty neighborhoods in some cases, or to transfer to an area in the jurisdiction of a different PHA that still used traditional rent rules. These types of housing decisions would have tempered the increase in households' rent burden resulting from the reduction in housing subsidies.

The findings in this section should be interpreted with a great deal of caution. The exhibits in this section present average housing outcomes over time and causal inferences should not be drawn

[40] It also remained true 4 years after the rent reform was implemented. While the data limitations with the Year 4 IMS/PIC data would have affected measures of average subsidy amounts more than the measures of any subsidy receipt, the overall data limitations also reduce the reliability of this Year 4 impact estimate.

[41] As a sensitivity test, logistic regressions were run to estimate effects on this dichotomous outcome. The results were very similar.

[42] Results from a sensitivity test that included utility allowance imputations for HACSM in the HAP calculations were very similar in magnitude to these main findings except for the Year 1 impact estimate, which was smaller (but still positive) and was not statistically significant.

[43] Patterns in household housing subsidy outcomes over the study period are presented in Castells (2020).

from this descriptive analysis. Comparison group levels are presented to provide context for the SCCHA findings.

Households' Housing Decisions While in the Voucher Program

The patterns in measures related to households' housing decisions throughout the followup period give no obvious indication that households are, on average, relocating to poorer quality neighborhoods, moving to smaller units, moving to units outside the jurisdiction of SCCHA, or changing their household composition.[44] There was a general upward trend in households' neighborhood poverty rate over the followup period, suggesting that households that moved tended to move to poorer neighborhoods, but this trend also existed for households in the comparison group PHAs. The SCCHA households' average number of bedrooms dropped only slightly, from 2.7 to 2.6 bedrooms. (The comparison group's average number of bedrooms remained constant throughout the followup period.) There is also no strong indication that a significant portion of households changed their household composition by adding or removing household members in response to the rent reform. Household size decreased slightly over the followup period, but a similar trend is evident for the comparison group households. Last, there is no indication that a large portion of households chose to relocate to a unit outside the jurisdiction of SCCHA to avoid the higher out-of-pocket housing costs (defined as "porting out"); SCCHA had a lower rate of port-outs than the comparison group PHAs throughout the study period.

Household Rent Burden While in the Voucher Program

The lack of effects on employment and earnings discussed earlier in this chapter means that households were not increasing their incomes to cover their greater tenant rent share due to the rent reform. These findings suggest that households were absorbing their increased housing costs into their current budgets, either by reducing spending or incurring debt. Considering material hardship is therefore an important part of understanding the effects of a rent reform that increases the tenant contribution rate toward rent, but material hardship is only partially measured in this study. This section looks at patterns of rent burden over the study period to better understand the extent to which households' rent burdens increased after the rent reform was implemented.[45] As described earlier, the present study uses a measure of rent burden that is the tenant rent share (equal to the TTP plus any amount over the payment standard that the household pays toward the contract rent, not including tenant-paid utilities) as a proportion of the household's gross income.

Exhibit 22 shows patterns in households' rent burden from the last month of the baseline period (before the rent reform was implemented) through the 4 years of followup.[46] In the month before SCCHA's rent reform was implemented, the percentage of nonelderly, nondisabled households

[44] See Castells (2020) for details.

[45] As described earlier, this study focused on nonelderly, nondisabled households and individuals in the HCV program. Although it was not feasible to conduct an impact analysis for the cohort of elderly and disabled households and individuals in the HCV program due to the data limitations described earlier, the rent burden measure was available for this cohort. Castells (2020) presents the rent burden measures for the cohort of elderly and disabled households and shows similar patterns as the nonelderly, nondisabled sample, though the increases in the percent of gross income these households pay toward rent are not as steep.

[46] Castells (2020) presents alternative measures of rent burden, including average, median, and distributions of rent burden in the last month of baseline and of each followup year.

whose tenant rent share exceeded 40 percent of their gross income looked fairly similar to the percentage for the comparison group households; 12 percent in SCCHA and 14 percent in comparison PHAs were paying more than 40 percent of their gross income toward rent. In the first year following the implementation of the SCCHA rent reform, the percentage of households in SCCHA paying more than 40 percent of their income toward rent increased steeply from 12 to 30 percent, compared with a three percentage points increase for households in comparison group PHAs. These patterns largely held up during the second year; the differences declined in the third. That decline may not reflect a true decline in rent burden, if it was at least in part due to households with an extreme rent burden leaving the subsidy program (voluntarily or through eviction) and therefore not being counted in the averages. It is notable that a downward trend in the percentage of households exceeding this 40-percent threshold also existed for the comparison group in this subsample, possibly also because of the changing composition of households continuing to receive subsidies over time.

Exhibit 22

Rent Burden Among Nonelderly, Nondisabled Households Receiving Subsidies

Outcome	SCCHA	Comparison PHAs
Tenant Rent Share Exceeds 40% of Monthly Gross Income (%)		
Last Month of Baseline	12.3	14.0
Last Month of Year 1	30.1	17.4
Last Month of Year 2	30.5	14.2
Last Month of Year 3	19.4	11.2
Tenant Rent Share Exceeds 50% of Monthly Gross Income (%)		
Last Month of Baseline	8.9	9.6
Last Month of Year 1	21.4	11.9
Last Month of Year 2	21.9	9.3
Last Month of Year 3	13.9	7.7
Sample Size (Total = 15,490)	7,109	8,381

PHA = public housing agency. SCCHA = Santa Clara County Housing Authority.

Notes: Samples consist of households headed by adults who were not elderly and did not have disabilities. The set of comparison group PHAs includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Sample sizes may vary because of missing values. Outcomes shown describe only those households receiving any housing subsidies in the specified month. Utility allowance data were not available for San Mateo and are therefore not included in San Mateo's housing subsidy measures.

Source: MDRC calculations using HUD Public and Indian Housing Information Center data

Effects for the Single and Double Policy Change Subgroups

As described earlier, SCCHA implemented a new voucher size policy that enforced a minimum of two family members per bedroom, excluding the head of household's bedroom. Before this policy change, the age, generation, gender, and relationship of other household members were considered when determining voucher size. The group of households in SCCHA that were immediately affected by this change constituted approximately 23 percent of the nonelderly, nondisabled

voucher population. This section presents the findings of a subgroup analysis of the effects on earnings and employment and describes housing characteristics and rent burden separately for the households only affected by the tenant rent contribution increase (referred to as the "single policy change" subgroup) and households affected by the voucher policy change in addition to the tenant contribution rate increase (referred to as the "double policy change" subgroup).

The single policy change subgroup differed from the double policy change subgroup in some important ways. It is important to keep this in mind when interpreting the subgroup findings, as differences in effects between the two subgroups may not be entirely due to being differentially affected by just the tenant contribution rate versus both policy changes, but they may also reflect how different types of households respond to the policy changes. Exhibit 23 presents characteristics of households just before SCCHA implemented its rent reform for the single policy change and the double policy change subgroups separately. Households that were directly affected by the voucher size rule change tended to be larger and have more children than households that were only affected by the tenant contribution rate change. In SCCHA, the average number of household members is 3.7 for this subgroup (compared with 3.2 for the single policy change subgroup), and 77 percent of households in the double policy change group in SCCHA included children, compared with 61 percent in the single policy change subgroup. A slightly larger proportion of households in the double policy change subgroup in SCCHA had at least one adult working at baseline than those among the single policy change subgroup: 65 percent compared with 61 percent. The double policy change subgroup in SCCHA also had a higher level of out-of-pocket housing costs ($574 monthly) than the single policy change subgroup ($508 monthly) and a larger average subsidy ($1,711 per month compared with $1,304).[47]

[47] See Castells (2020) for more detailed exhibits of baseline characteristics of households and adults in each of these subgroups.

Exhibit 23

Characteristics of the Sample at Baseline by Policy Group Nonelderly, Nondisabled Santa Clara County Housing Authority Households

Characteristic	Single Policy Change	Double Policy Change
Average Number of Family Members		
Adults[a]	1.8	2.2
Children	1.4	1.5
Families with More than One Adult (%)	53.6	74.1
Families with Any Children (%)	61.2	76.7
Current/Anticipated Annual Family Income ($)	16,511	20,247
Income Sources[b] (%)		
Wages	60.7	65.2
Temporary Assistance for Needy Families (TANF)	22.6	25.4
Social Security/SSI/Pension	11.2	18.0
Other Income Sources	28.1	32.4
Average Monthly Family Share[c] ($)	508	574
Average Monthly Housing Subsidy[d] ($)	1,304	1,711
Monthly Gross Rent Exceeds Payment Standard (%)	53.5	52.0
Neighborhood Poverty Rate[e] (%)		
0%–10%	39.0	50.1
11%–20%	41.1	36.8
21%–30%	15.5	10.4
More than 30%	4.4	2.7
Household Sample Size (Total = 6,725)	5,183	1,542

SCCHA = Santa Clara County Housing Authority. SSI = Supplementary Security Income.

[a]Adults are defined as individuals age 18 and older who were not classified on the HUD-50058 form as a live-in aide.

[b]Income source categories are as defined on the HUD-50058 form. Wages include one's own business, federal wages, public housing agency (PHA) wages, military pay, and other wages. Other income sources include child support, medical reimbursement, Indian trust/per capita, unemployment benefits, and other nonwage sources.

[c]Family share is the family's contribution toward the gross rent.

[d]Housing subsidy is the full subsidy amount paid by the housing agency on the household's behalf. It includes any utility allowance payments made to the tenant in addition to rent paid to the owner by the housing agency.

[e]Poverty rate is defined as the percentage of individuals ages 18 to 64 years whose income in the previous 12 months was below the poverty threshold.

Notes: Samples consist of households headed by adults who were not elderly and did not have disabilities. Sample sizes may vary because of missing values. Rounding may cause slight discrepancies in sums and differences. The set of comparison group PHAs includes the San Mateo County Housing Authority, the San Francisco Housing Authority, and the Alameda County Housing Authority. Housing subsidy characteristics represent monthly averages. Utility allowance data were not available for San Mateo and are therefore not included in San Mateo's housing subsidy measures.

Sources: MDRC calculations using HUD Public and Indian Housing Information Center and 2009–2013 American Community Survey 5-year estimates data

Subgroup Impacts on Employment and Earnings

The estimated effects of the SCCHA rent reform on employment rates and average earnings for the subgroup of individuals living in households that were affected only by the tenant contribution rate increase were very similar to the impact estimates for the full sample. There is no suggestion

of positive or negative effects on employment rates or average earnings for this subgroup. This is unsurprising, given that these households constitute 77 percent of the full study sample.

As exhibit 24 shows, households affected by the change in the voucher size policy *in addition* to the tenant contribution rate increase—the remaining 23 percent of the full study sample—showed a pattern of negative estimated effects on employment rates, but these estimates were not statistically significant. They were also not statistically significantly different from those for the single policy change subgroup. The impact estimates in the "single policy change" panel and the "double policy change" panel of exhibit 24 represent impact estimates using a CITS analysis for each subgroup separately and can be interpreted in the same way as the impact estimates in exhibit 20. Exhibit 24 contains an additional column labeled "Difference Between Groups." This column presents the results of the statistical comparison between the *difference* in the impact estimates between the two subgroups. The numbers in the column represent the p-values, and the daggers represent the levels of statistical significance of the estimate of the difference in impacts.

There is some evidence, however, that the household members also affected by the voucher size rule change may have reduced their earnings in response to the rent reform. For this double policy change subgroup, average annual earnings were estimated to be lower in the first 2 years after the rent reform was implemented than they would have been in the absence of the rent reform, though these estimated effects were not statistically significant from zero. By the third year, SCCHA residents in this subgroup were earning $2,220 less annually on average than they would have been in the absence of the rent reform, and this effect was sustained in the fourth year (when the estimated decrease was $2,341). These third- and fourth-year effects are statistically significant at the 0.05 level. They are also statistically significantly different from the impact estimates for the single policy change subgroup at the 0.05 level.

As exhibits 14 to 19 from the full sample analysis illustrated, employment rates and average earnings increased over the followup period for both SCCHA and the comparison group. In the context of these earnings trends, an estimated negative effect on average earnings means that, although average earnings did increase over time for SCCHA subsidy residents, they did not increase as quickly or as much as they would have in the absence of the rent reform. An estimated negative effect on average earnings could be caused either by some SCCHA residents reducing their employment in response to the rent reform or by some SCCHA residents not obtaining employment or not increasing their hours or wages because of the rent reform.

Exhibit 24

Impacts on Average Quarterly Employment Rate and Annual Earnings of Adults in Nonelderly, Nondisabled Households by Policy Change

Outcome	One Policy Change Group				Two Policy Change Group				Difference Between Groups	
	SCCHA Mean	Estimated Effect	Std. Error	P-Value	SCCHA Mean	Estimated Effect	Std. Error	P-Value		
Employment Rate										
Year 1	49.9	-0.2	1.4	0.881	51.0	-1.3	1.3	0.323	0.573	
Year 2	53.1	-0.2	1.9	0.907	54.6	-1.7	1.7	0.322	0.560	
Year 3	54.9	-0.6	2.4	0.801	56.4	-3.5	2.2	0.112	0.374	
Year 4	55.6	-0.4	2.9	0.886	57.7	-4.2	2.6	0.112	0.334	
Earnings										
Year 1	11,223	111	496	0.824	11,572	-663	521	0.208	0.284	
Year 2	13,206	212	674	0.755	13,761	-960	695	0.172	0.228	
Year 3	15,618	223	859	0.796	16,206	-2,220	875	0.014 **	0.048	††
Year 4	17,606	736	1,046	0.484	18,487	-2,341	1,058	0.031 **	0.041	††
Sample Size				12,439				4,438		

SCCHA = Santa Clara County Housing Authority.

*Notes: The comparison group public housing agency in this exhibit is the San Francisco Housing Authority. Effects were estimated using a comparative interrupted time series model. All estimated earnings effects are reported in 2017 dollars. The p-value indicates the likelihood that the estimated impact (or larger) would have been generated by an intervention with zero true effect. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent. A two-tailed t-test was applied to differences between the outcomes of the policy subgroups. Statistical significance levels for differences across subgroup impacts are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.*

Source: California Employment Development Department household-level aggregate unemployment insurance data

This negative effect of the rent reform on average earnings for the households affected by both the tenant contribution rate change and the voucher size rule change seems at least partly due to the decrease in employment rates that the impact estimates (though not statistically significant) on employment rates suggest. The negative effect on employment and earnings for this subset of the sample did not occur immediately after the rent reform was implemented, suggesting that residents did not reduce their employment right away.

An exploratory analysis examined whether these employment and earnings effects may also be related to the double policy change households' housing experiences following the rent reform. The column labeled "Difference Between Groups" can be interpreted as the *difference* in impact estimates (the double policy change subgroup impact estimate minus the single policy change subgroup impact estimate). The column to the right of that column contains their p-values, which are marked with daggers to indicate the level of statistical significance.

The findings of this exploratory analysis suggest that households in the double policy change subgroup experienced much larger reductions in HAP than the single policy change group. Households in the double policy change subgroup experienced reductions in subsidies that were more than $4,000 larger than the single policy change group in the first 2 years following the rent reform, and this difference declined somewhat in the third year. These differences in effects on

average HAP are statistically significant at the 0.01 significance level. The differential effects on continued subsidy receipt are not statistically significant between the two groups (although they approach statistical significance by the third year), but the pattern of these differential effects may suggest that the SCCHA rent reform led a small percentage of households in the double policy change group to leave the subsidy program or lose their housing subsidies. The timing of these estimated impacts on continued subsidy receipt aligns with the timing of the estimated negative impacts on employment and earnings for this double policy change subgroup, suggesting that they may be related. The patterns in housing subsidies for each of the subgroups (in relation to their corresponding comparison groups) aligns with these suggestive findings. HAP decreased significantly more, and tenant rent share increased significantly more, for the double policy change subgroup than for the single policy change subgroup. By the third year after the SCCHA rent reform was implemented, 86 percent of SCCHA households in the double policy change subgroup were still receiving subsidies compared with 91 percent in the comparison group.[48]

Households' Housing Decisions and Rent Burden While in the Voucher Program by Subgroup

Households affected by only the tenant contribution rate increase may have had an incentive to move to a more affordable unit (whose contract rent exceeds the payment standard by a lesser amount than their current unit) to offset increases in housing costs. Households affected by the voucher size rule change, in addition to the tenant contribution rate increase, had an additional very strong incentive to relocate to smaller units to avoid the steeper out-of-pocket housing cost they would have faced if they remained in their units.

Especially in a tight housing market, finding a unit that is affordable may require moving to a more affordable neighborhood. The trends among both single policy change households and double policy change households look similar to each other: a slight increase in neighborhood poverty over the 3 years following the SCCHA rent reform that mirrors the full sample results. Similar to the full sample findings, the differences between each subgroup of SCCHA households and their corresponding comparison group households (whose trends fluctuate only slightly) are not stark, and it is impossible to draw any conclusion about effects from these purely descriptive data. The trends in the number of bedrooms over time suggest more strongly that households in the double policy change group moved to smaller units, with households' average unit size dropping from 3.4 to 3.2 bedrooms in the first year after the SCCHA rent reform was implemented, and then continuing to drop to 3.1 bedrooms by the end of the third year, compared with the single policy change comparison group, whose average remains steady at 3.1 starting before the SCCHA rent reform was implemented and remaining at 3.1 throughout the 3 years following the rent reform. For the single policy change group, the number of bedrooms remains steady both for SCCHA households and comparison group households. There is no apparent pattern of households changing their household composition following the policy changes for either subgroup.[49]

One particularly striking pattern is that the double policy change households' tenant rent share (as measured by TTP plus the amount that the contract rent exceeds the payment standard) increased

[48] See Castells (2020) for more details.

[49] See Castells (2020) for details.

very steeply in the year following implementation of the rent reform for households continuing to receive subsidies compared with the single policy change subgroup. Tenants' rent shares increased slightly in the comparison groups for both the single and double policy change households. The SCCHA households' tenant rent share in the single policy change subgroup increased from $447 to $529 between the month before the SCCHA rent reform and 1 year later (which was a larger increase than the single policy change comparison group, as expected). In contrast, the SCCHA households' tenant rent share in the double policy change subgroup rose from $511 per month just before the implementation of the rent reform to $810 per month 1 year later. (Only a tiny fraction of households in the double policy change subgroup—0.3 percent—stopped receiving housing subsidies between these two time points, so these averages are a relatively reliable measure of the sample's housing costs.) Tenant rent shares did decrease in subsequent years (in part because of the reduction in tenant contribution from 35 to 32 percent of gross income), but they remained high. This pattern supports SCCHA's observation that while many double policy subgroup households moved to smaller units, many other households stayed in place and paid the much higher housing costs as a result.

The increase in tenant rent share for double policy change households from $511 to $810 per month is quite large for this subset of SCCHA households, which have an average household income of $1,687 per month. This apparent hardship is explored more formally in exhibit 25, which presents households' rent burden just before the SCCHA implementation of the rent reform and throughout the followup period.[50] The levels of average rent burden demonstrate that this subset of households experienced very high levels of housing-related hardship after the rent reform was implemented. Just before the rent reform was implemented, just 6 percent of these households had tenant rent shares that exceeded 40 percent of their gross income. The percentage jumped to 61 percent 1 year after the rent reform was first implemented. (In contrast, this percentage only increased from 15 to 21 percent for single policy change households.) This percentage then decreased over the rest of the followup period, to 50 percent by the end of the second year and 33 percent by the end of the third. This decrease reflects the tenant contribution rate being reduced from 35 to 32 percent of gross income in the second year of its implementation, but may also reflect the fact that some households may have moved to smaller or more affordable units after the end of the first year, or that households with the highest levels of rent burden may have left the subsidy program following the rent reform. The same pattern is evident using a higher threshold. The percentage of SCCHA households in the single policy change subgroup paying over one-half of their gross incomes toward rent rose only slightly from 11 to 14 percent, but for households in the double policy subgroup, this percentage rose steeply from 4 percent just before the start of implementation to 47 percent 1 year later.

[50] Additional measures of rent burden are presented in Castells (2020).

Exhibit 25

Tenant Rent Burden Among Nonelderly, Nondisabled Households Receiving Subsidies, by Policy Subgroup in Santa Clara County Housing Authority

Outcome	Single Policy Change	Double Policy Change
Tenant Rent Share Exceeds 40% of Monthly Gross Income (%)		
Last Month of Baseline	14.9	5.8
Last Month of Year 1	21.4	60.5
Last Month of Year 2	24.5	50.2
Last Month of Year 3	15.6	32.9
Tenant Rent Share Exceeds 50% of Monthly Gross Income (%)		
Last Month of Baseline	10.9	4.1
Last Month of Year 1	14.0	47.3
Last Month of Year 2	16.8	38.7
Last Month of Year 3	10.9	25.0
Sample Size (Total = 6,723)	5,181	1,542

Notes: Sample sizes may vary because of missing values. Outcomes shown describe only those households receiving any housing subsidies in the specified month.

Source: MDRC calculations using HUD Public and Indian Housing Information Center data

Discussion

This study analyzed the impact of SCCHA's rent reform on employment, earnings, housing subsidy, and housing characteristics of the group of nonelderly, nondisabled SCCHA tenants who were receiving HCV subsidies in July 2013, when SCCHA's rent reform was implemented. There were three possible effects of the rent reform on tenant earnings: (1) households would reduce their earnings in response to the disincentive of higher tenant contribution rate; (2) households would increase earnings to cover their increased housing costs; or (3) households would not change their employment behavior and instead would reduce spending in other areas to cover their higher housing costs, or they would increase their debt, or do neither and experience increased material hardship. The analysis found no evidence that SCCHA's rent reform had any effects, on average, on the employment and earnings of nonelderly, nondisabled SCCHA residents. Since the rent reform did not lead to a decrease in earnings, SCCHA realized its projected HAP savings. Nonelderly, nondisabled households received approximately $1,600 less in housing subsidies, on average, during the first year, $1,550 less in the second, and $1,330 less in the third year after the rent reform than they would have received without the rent reform. There was also no evidence that the rent reform caused households to lose their housing subsidies, on average.

There are two factors specific to the SCCHA context that might have strengthened any incentive inherent in the rent reform's policy change for households to increase their employment and earnings. First, Santa Clara County and its surrounding counties had a robust job market during the study period. While this limits the ability to generalize the findings from this study to areas with weaker job markets, it is worth noting that even in this robust job market, households did

not increase their employment or earnings in response to an increased tenant contribution rate. Second, SCCHA has a 24-month recertification period, which is longer than the typical 12-month recertification period used in traditional PHAs. SCCHA households that were considering increasing their income in response to the rent reform (to compensate for lost net income) may have had a stronger incentive to do so than they would have in a PHA with a 12-month recertification period since they have a longer period of time for which their increased income would not have increased their rent share. If positive effects had been estimated on employment and earnings, these two factors would have needed to be taken into consideration when interpreting results. There was no evidence, however, of effects on employment and earnings, despite these two conditions that could have made it more possible or more likely for households to respond to the "income effect," that is, to increase their income to compensate for their higher housing costs. This absence of earnings effects could mean that they were not important factors in households' employment decisions. For example, the overall robust job market may not have translated to many employment opportunities for SCCHA tenants, who generally have lower education levels and less work history than non-subsidized residents in the county. And, the 24-month recertification period, which had already been in place for about 4 years before the rent reform was implemented, may not have provided a significant incentive to increase earnings beyond that which households may have already responded to before the rent reform. If they were meaningful factors in households' employment decisions, it is unknown the extent to which they balanced out a disincentive to earn more.

The combination of findings that overall the SCCHA rent reform did not increase residents' average earnings levels and that it did, as intended, reduce households' housing subsidies, means that households experienced reductions in their net income. For households that did not increase their income over time, these reductions in net income could have been persistent. Households who did increase their income over time would have experienced smaller increases in net income compared with the increases they would have experienced in the absence of the rent reform. This interpretation is consistent with SCCHA leadership's impression that voucher households generally did not change their employment behavior but instead absorbed their increased housing costs.

This study did not include measures of households' material hardship beyond rent burden, and therefore cannot assess how this increase in rent burden translated into experiences with material hardship. It is an important consideration, however, because increased housing costs for households without increased income to cover those costs could mean that households are reducing spending on other necessary goods and services, which may lead to increased material hardship or increased debt.

One study—the Rent Reform demonstration—that is currently underway in four PHAs can provide some context for potential effects on households' material hardship. A baseline survey of the households participating in the demonstration—a population comparable to the sample for the present study, consisting of nonelderly, nondisabled households in the Housing Choice Voucher (HCV) program—revealed that households receiving housing subsidies under traditional rent rules commonly experience material hardship: almost 70 percent of survey respondents said they had experienced at least one form of material hardship during the last year. Forty-six percent

said they were not able to pay a utility bill, 34 percent said they were not able to pay a telephone bill, and 20 percent said they were not able to pay the (subsidized) rent in at least 1 month of the past year. Furthermore, 28 percent said they were not able to buy food, and 23 percent said they were not able to see a doctor or buy prescription drugs they needed during at least 1 month in the past year (Riccio, Deitch, and Verma, 2017). Given that HCV households in SCCHA were likely to be experiencing similar material hardship before the rent reform, there is a risk that the increase in housing costs and consequent decrease in net income caused by the rent reform may have worsened such hardship. A subgroup analysis explored how the SCCHA rent reform may have affected households subject to only the change in the tenant contribution rate differently from households who were *also* affected by the voucher size rule change. Like the findings for the full sample, there was no evidence that the rent reform had any effects on employment or earnings for the subgroup only affected by the tenant contribution rate change. There was, however, some evidence that the SCCHA rent reform reduced earnings for the subgroup of households that was affected by both policy changes. These households experienced particularly high levels of rent burden following the rent reform (measured as the tenant rent share as a proportion of household gross income). The negative effect on earnings for this subgroup did not occur immediately after the rent reform was implemented, suggesting that residents did not reduce their employment right away, but perhaps struggled with their increased housing costs before reducing their earnings. An exploratory analysis shows that, as expected, the SCCHA rent reform led to especially deep cuts in housing subsidies for this double policy change subgroup. To the extent that the steep increases in households' housing costs led some households to leave the subsidy program (of which there is only suggestive evidence), this housing instability might partially explain the employment and earnings effects for this subgroup of households, if having to relocate to a new unit or leave the subsidy program destabilized a person's employment situation. The true drivers of these delayed negative effects on household earnings for this subgroup cannot be identified within the scope of the present study.

These findings hint at some potential consequences of implementing a voucher size policy that causes steep increases in households' housing costs if they do not move to a smaller unit. The scarcity of affordable housing in Santa Clara meant that households had few options for less expensive units. Although the trends in the average number of bedrooms over time suggest that some households in this group did move to smaller units, it is likely that many were unable to, or that if they did, those units might not have been as affordable as their previous units.[51] In a location with more affordable housing options, households that have to move to a smaller unit may have an easier time doing so.

SCCHA provided crucial safeguards for these households by partnering with local organizations to provide legal and financial assistance to prevent eviction. It is important for any PHA that implements a rent reform to identify the households that might be most adversely affected by the policy changes and provide them with adequate protection from severe hardship. This study provides evidence that can help inform that assessment for other PHAs considering these changes to the rent policy. For example, the SCCHA eviction prevention assistance program (SEPP)

[51] A new unit with fewer bedrooms under the new policy could be less affordable than the former unit with more bedrooms if the new unit's gross rent exceeded the payment standard for the smaller voucher size more than the former unit's gross rent exceeded the payment standard for the larger voucher size.

provided important support that likely helped many households avoid eviction during the time that it was being operated. An attorney working in the program (and now a staff member of SCCHA) recalled that of the 293 households that SEPP assisted, only two cases at most resulted in an actual eviction. Other PHAs considering a similar policy change in a similar context (where finding an affordable smaller unit may be difficult) might consider that households who are vulnerable to adverse effects because of the policy change may greatly benefit from an effective safeguard such as the SEPP program that is offered over an extended period of time.

Study Limitations

Findings from this study contribute to the emerging body of evidence on how changing the rent policy for households receiving housing assistance can affect employment and earnings. Still, the study has some limitations that should be kept in mind when interpreting the results. An important limitation, as discussed earlier, is that aspects of material hardship beyond rent burdens, such as food insecurity and difficulty covering medical expenses or rent and utilities, are not measured in this study. A full assessment of the implications of increasing the tenant contribution rate—or any other rent reform that reduces housing subsidy levels—should consider the effects on the level of material hardship that households experience in response to the policy change.

Another limitation is that the study does not examine how the effects of the rent reform may vary for different types of individuals and households. It includes a subgroup analysis that compares effects for households only affected by the tenant contribution rate and households affected by both policies, but there may be other sources of variation that the study was not able to explore. It is possible, for example, that nonelderly, nondisabled adults who were already working at the time the SCCHA rent reform was implemented would have more flexibility than those who were not employed to increase or reduce their employment and earnings in response to the increased tenant contribution rate. Nonelderly, nondisabled individuals who are not yet working may have less of an incentive to begin a new job with a higher tenant contribution rate. The study was not able to estimate effects separately for these subgroups due to data limitations.

The primary analytic method in this study is a rigorous one: a CITS to examine the effects of the SCCHA rent reform on employment and earnings. The rent reform meets important conditions for CITS in that it was a consequential change that occurred for the full study cohort all at once, and there were data available for a comparison group that was subject to the same economic forces as SCCHA. As noted in the Analytic Approach section, it was not feasible to use CITS to examine effects on households' average housing subsidies or continued subsidy receipt because 4 years of historical housing subsidy data were not available for the full study sample, and therefore baseline trends could not be estimated for these measures. The autoregressive difference-in-difference design used to study the effects of the rent reform on these outcomes is not as rigorous as CITS because it does not account for potentially differing baseline trends in housing subsidy measures. Furthermore, it was not feasible to use either CITS or autoregressive difference-in-difference to examine effects on housing characteristics (including the number of bedrooms in the unit or neighborhood poverty) or household composition because these data were not available for households that were no longer receiving subsidies. The descriptive analysis used to explore these outcomes can only provide suggestive evidence of potential effects.

This analysis relies on UI wage data to assess effects on employment and earnings, and these data do not capture earnings from employment that is not covered by UI. While there is no strong reason to believe that the SCCHA rent reform would have affected informal employment differently from formal employment, this study cannot formally test that assumption. It is possible, however, that the increased rent contribution rate could strengthen the incentive to underreport earnings to the PHA, and underreporting would be easier with informal employment, especially if the worker is not paying taxes on the earnings.

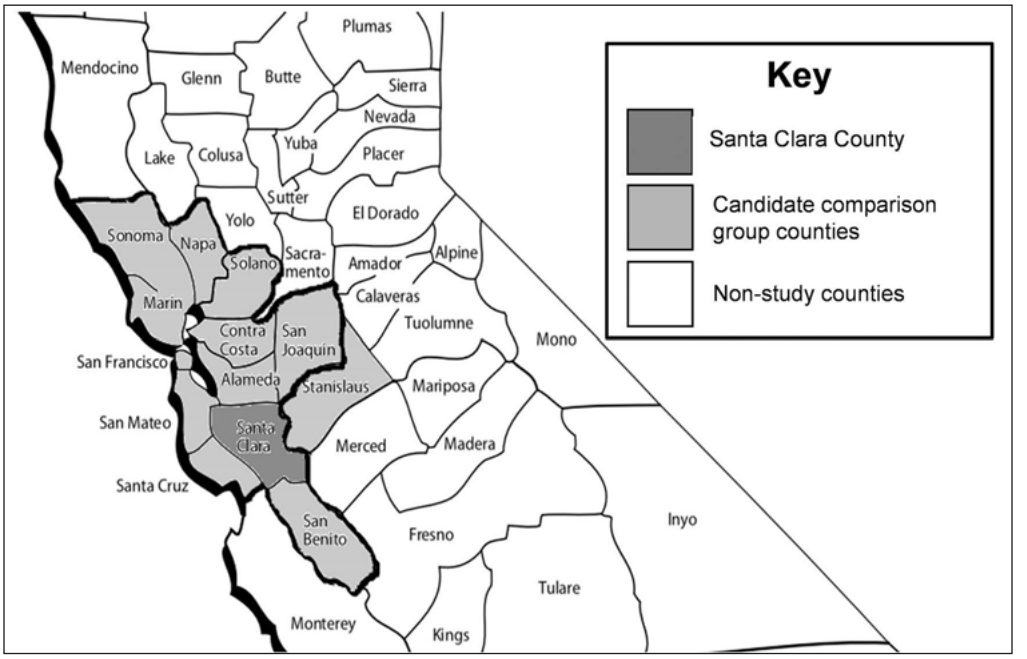
Finally, the present study focused on only one PHA in one location, Santa Clara County, that has a tighter housing market and a more robust job market than most of the country, though there are many PHAs in comparable situations—such as PHAs in New York City, Boston, Los Angeles, Seattle, Denver, Washington, and San Diego—serving large numbers of households. These findings provide an important contribution to the literature on the effects of rent reform on labor market outcomes; still, additional studies in multiple locations with diverse contexts are needed to draw more broadly applicable conclusions.

Conclusion

The present study of the effects of a rent reform implemented by SCCHA provides evidence, from one location, that a public housing agency can increase the tenant contribution rate by a moderate amount (30 percent of adjusted income to 35 percent of gross income, later to 32 percent of gross income) without creating a substantial disincentive to work and without significantly increasing the likelihood that households may lose their subsidies. It also provides suggestive evidence that implementing a voucher size policy that requires some households to relocate to a different unit (with fewer bedrooms) to avoid even deeper cuts in housing subsidies may have adverse effects in the context of a housing market where affordable housing options are very limited, and that short-term safeguards that PHAs provide to households may not fully prevent longer-term hardship.

Further research is needed in multiple locations that represent diverse housing markets and labor markets to examine how the effects of this type of rent reform may be expected to vary based on the context. Studies with a random assignment design would help overcome many of the methodological limitations of this study described above, for example, by providing a reliable counterfactual for outcomes where multiple years of pre-intervention data are not available for the full sample. Finally, future studies of rent reforms that might result in reduced housing subsidies for households should carefully measure households' experiences with material hardship, including food insecurity and their ability to cover medical expenses, in response to the rent reform. The present study is the first to investigate how increasing the tenant contribution rate affects households' employment, earnings, and housing subsidies.

Appendix A. Map of Santa Clara and Comparison Counties



Source: California State Association of Counties

Appendix B. Model Specifications

Comparative Interrupted Time Series Model

The following comparative interrupted time series (CITS) model was used to estimate effects on quarterly employment rates and average quarterly earnings:

$$Y_i = \sum_{p=14}^{} \alpha_p \mathrm{PHA}_{pi} + \sum_{p=1}^{4} \beta_{0p}\, \mathrm{PHA}_{pi} Q_i + \sum_{f=1}^{16} \beta_{1f}\, F_{fi} + \sum_{f=1}^{16} \beta_{2f}\, F_{fi} * S_i + e_i$$

Where:

Y_i = the value of the outcome variable for observation i, where observation i is defined as the value of the outcome variable for the public housing agency (PHA) p in quarter q,

PHA = a series of four indicator variables, one for each PHA p,

α = a series of four intercepts for baseline trends, one for each PHA p,

Q = the quarter (a continuous variable),

β_0 = a series of coefficients representing the slope of the baseline trend for each of the four PHAs,

F = an indicator value for followup quarter f,

β_1 = a series of coefficients representing the comparison group deviation from its baseline trend for each followup quarter *f*,

S = 1 if the PHA is the Santa Clara County Housing Authority (SCCHA) (the treatment group) and 0 otherwise,

β_2 = a series of coefficients representing the treatment-comparison group difference between their deviations from their baseline trends for each followup quarter *f*, and

e = a random error term.

Autoregressive Difference-in-Difference Model

The following autoregressive difference-in-difference (DinD) model was used to estimate effects on housing subsidy outcomes:

$$Y_h = \alpha + \beta_1 S_h + \sum_{b=-1}^{-4} \beta_{2b} Y_{bh} + \sum_{b=-1}^{-4} \beta_{3b} R_{bh} + \sum_{m=1}^{M} \beta_4 X_{mh} + e_h$$

Where:

Y_h = the value of the outcome variable for sample household *h*,

α = the intercept, representing the conditional mean outcome for the three comparison PHAs combined,

S = 1 if household *h* was in SCCHA (the treatment group) at the time of the rent reform and 0 otherwise,

β_1 = estimate of the effect of the SCCHA rent reform on outcome Y,

Y_{bh} = a set of four variables representing the lagged value of the outcome variable Y for the 4 baseline years prior to the rent reform for household *h*

β_2 = a series of four regression coefficients, one for each of the four variables representing the lagged values of the outcome for the 4 baseline years prior to the rent reform,

R = a set of four variables representing whether the household received any subsidies in each of the 4 baseline years prior to the rent reform,

β_3 = a series of four regression coefficients for the 4 baseline years' indicators of any housing subsidy receipt,

X = a set of background characteristics for household *h*,[52]

β_4 = the set of regression coefficients for the background characteristics,

e = a random error term.

[52] The background household characteristics included in the model as covariates include: the head of household's gender, age, race and ethnicity, and receipt of wage, Temporary Assistance for Needy Families (TANF), or Social Security/Supplementary Security Income/Pension (SSIP) income; number of adults in a household; age of the youngest child; annual household wage earnings; monthly family share; and whether the household's monthly gross rent exceeds the payment standard.

Acknowledgments

The evaluation was sponsored by the Office of Policy Development and Research in the U.S. Department of Housing and Urban Development (HUD) and was part of a broader Moving to Work (MTW) evaluation led by Diane Levy at Urban Institute. At HUD, I am especially grateful to Elizabeth Rudd, the government technical representative for the MTW retrospective evaluation, who provided guidance and very thoughtful feedback throughout the study. Elaine Ng, regional economist at the HUD San Francisco office, shared helpful insights on the labor and housing markets of counties in the Bay Area, which provided important context for selecting appropriate comparison sites and interpreting study findings.

This report reflects the efforts and important contributions of the study team at MDRC. James Riccio and Nandita Verma—the project director and project manager—provided valuable guidance and support throughout, from the research design to their careful reviews of each draft of this report. Howard Bloom, the senior technical reviewer, worked closely with the study team on developing the methodology and providing guidance and advice throughout the analysis. I am very grateful for the critical insights and expertise that he contributed. Gordon Berlin also provided critical advice on the report and its findings. Audrey Yu and Kali Aloisi carefully processed and analyzed all the earnings data and housing subsidy data for the study and contributed many important insights on the data to the interpretation of the findings. Jennie Kaufman skillfully edited the report. David Long from Princeton Policy Associates also contributed important insights during the research design, analysis, and report writing phases of the study.

This report has benefited greatly from the insights of the staff at the MTW housing agencies included in this study, particularly the Santa Clara County Housing Authority (SCCHA). Katherine Harasz, the executive director of SCCHA, and Janine Burrier, the assistant director of housing, generously shared extensive details about the housing agency's policies and safeguards and the policy and economic context in which the SCCHA rent reform was implemented. Jennifer Rainwater at the Housing Authority of the County of San Mateo and Dominica Henderson at the Oakland Housing Authority also shared important information on their agencies' policies and the housing and employment contexts where their housing agencies were located.

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