

Evaluation of the Compass Family Self-Sufficiency (FSS) Programs Administered in Partnership with Public Housing Agencies in Lynn and Cambridge, Massachusetts



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Executive Summary

Overview

This report documents the results of our evaluation of the quantitative outcomes of Family Self-Sufficiency (FSS) programs administered by Compass Working Capital (Compass) in Lynn and Cambridge, Massachusetts in partnership with public housing agencies in those cities. Using administrative data provided by HUD, we compared the change over time in earnings and welfare and Social Security income for Compass FSS participants to those of a matched comparison group. We also compared changes over time in FICO[®] Scores and debt levels for Compass FSS participants to changes in similar metrics for a comparison group provided by the Experian credit bureau.

In brief, we found that Compass FSS participants performed substantially better than the applicable comparison groups in terms of: (a) growth in earnings, (b) reductions in welfare income, (c) growth in FICO[®] Scores; and (d) reductions in credit card and derogatory debt. The box below summarizes key findings.

To the best of our knowledge, this is only the third evaluation of a local FSS program to compare earnings outcomes for FSS participants to those of a matched comparison group, and the first to study credit and debt outcomes in this manner. It is also the first evaluation of a full FSS program to find statistically significant differences between the performance of FSS participants and an applicable comparison group.

Key Findings:

- Earnings. Participation in Compass FSS was associated with an average gain in annual household earnings of \$6,305 between the 4th quarter of 2010 and the 1st quarter of 2016.
- Welfare Income. Participation in Compass FSS was associated with a decline of \$496 in annual household welfare payments over this time period, but this finding is difficult to interpret given state time limits.
- Credit Scores and Debt. On each of the following measures, Compass FSS
 participants performed significantly better than a comparison group of low-income
 households in the same census tracts, used to provide benchmarks:
 - Among Compass FSS participants who entered the program with a FICO[®] Score, the average score rose from 616.9 to 639.9, an increase of 23.0 points (3.7 percent).
 - The share of Compass FSS participants who had a FICO[®] Score increased by 7 percentage points, rising from 91 to 98 percent.
 - The share of Compass FSS participants with a prime FICO[®] Score (above 660) rose by 14 percentage points, from 23 to 37 percent.
 - Compass FSS participants experienced an average decrease in total derogatory debt of \$764 and an average decrease in credit card debt of \$655.

What did we study?

With funding from the Oak Foundation and HUD's Office of Policy Development and Research (PDR), Abt Associates conducted an evaluation of selected quantitative outcomes of Compass's FSS programs in Lynn and Cambridge, Massachusetts. Compass is an asset-building nonprofit organization based in Boston, Massachusetts, that works with public housing agencies and private owners in southern New England to administer FSS programs for households participating in U.S. Department of Housing and Urban Development (HUD) rental assistance programs.

FSS is a HUD program established by Congress in 1990 that seeks to help participants in three HUD rental assistance programs (the Housing Choice Voucher, Public Housing and Project-based Section 8 programs) make progress toward economic security. FSS works to achieve these goals by combining stable affordable rental housing with: (a) case management or coaching to help participants identify and achieve their goals and (b) an escrow savings account that increases in value as participants' earnings and rent contributions rise.

Compass began administering the FSS program in Lynn in October 2010 and began administering the FSS program in Cambridge in November 2012. Our study of earnings and public benefits receipt focuses on the experience of 269 households with Housing Choice Vouchers who enrolled in either the Lynn or Cambridge FSS program between October 2010 and March 2015.¹ Our study of credit and debt includes additional FSS participants served by Compass in Lynn (for a total of 280 individuals) who live in public housing or have a voucher from another housing agency.

In addition to the traditional FSS program requirements and components, Compass's implementation of FSS includes several innovative features:

- A strong focus on helping clients build financial capability, pay down high-interest debt, build savings, and improve their budgeting and FICO[®] Scores, complementing the assetbuilding that occurs through the FSS escrow accounts;
- A coaching model for case management that emphasizes participant-driven interaction and goal-setting;
- A program-wide goal of growing the FSS program enrollment rate to 20 percent.² Compass seeks to achieve this outcome through marketing and outreach strategies, including a postcard marketing campaign that taps into and builds upon families' aspirations for themselves and their children;

¹ This is the sample we used for our descriptive analysis of earnings and cash benefit amounts of Compass FSS participants. For the impact analysis on earnings and cash benefits amounts, we used a somewhat smaller sample (173 households) to ensure comparability with the comparison group members' data availability and patterns of participation in the Housing Choice Voucher programs.

² Compass calculates this performance target based on an estimate of the number of non-elderly non-disabled households in each PHA. This calculation is used solely to set Compass's performance targets for enrollment. Like all FSS programs, the Compass FSS program is open to all households, including households with heads that are elderly or persons with disabilities.

- A public-private partnership model, supported by philanthropy. While most FSS programs are run entirely by PHAs, the Compass FSS programs are run by Compass (i.e., a nonprofit that specializes in financial coaching and asset-building programs) in partnership with the public housing agencies; and,
- At the Cambridge Housing Authority, an escrow account that is less generous than in a typical FSS program, providing an escrow equal to half of the traditional amount. The Cambridge escrow model also eliminates the normal cap on escrow accumulation for households with incomes between 50 and 80 percent of the area median income (AMI). The agency has been able to make these changes because it participates in the Moving to Work demonstration program.

We did not examine the amount of savings accumulated by FSS participants in their escrow accounts, but plan to report on that in a subsequent report as part of an analysis of costs and benefits.

What methodology did we use?

Our report is based entirely on an analysis of administrative data provided by HUD, Compass, and the Experian credit bureau. We conducted two main analyses:

- Using HUD administrative data, we conducted a quasi-experimental analysis of the impact of Compass FSS on the earnings and benefits use of Housing Choice Voucher holder households by comparing the experiences of households enrolled in the Compass FSS program to those of a comparison group of voucher-holders in other Massachusetts, Connecticut, and Rhode Island PHAs during the same period. We matched this comparison group to Compass FSS participants using propensity scores designed to match for likelihood of choosing to enroll in the Compass FSS program.
- Using data provided by Compass and the Experian credit bureau, we analyzed changes in the FICO[®] Scores and debt of Compass FSS participants, comparing the changes experienced by Compass FSS participants to those of a comparison group of individuals with similar demographic, credit, debt, and income characteristics in the same census tracts during the same period provided by Experian.

We also include descriptive statistics of changes over time for Compass FSS participants on these measures.

What did we find?

The following is a summary of our principal findings. All findings described in this section are statistically significant (p<.05):³

³ To facilitate presentation of our findings on earnings and public benefits receipt in this executive summary, we have combined the results of our descriptive and comparative analyses. These analyses cover somewhat different samples of Compass participants over somewhat different time periods for technical reasons described in the report. Please see the full report for details on the separate findings of each analysis.

Earnings:

- On average, the **annual household earnings of Compass FSS participants rose from \$21,320 at enrollment to \$27,923 at the time of the most recent income certification** available in our dataset. This reflects an average of 38 months between enrollment in FSS and the end of the data period.
- More than 40 percent of Compass FSS participants experienced gains in household earnings equal to or greater than the average gain of \$6,603, but 37.5 percent of participating households had either no earnings growth or a decline in earnings.
- Average increases in annual household earnings were highest for Compass FSS participants that started out in the **bottom two quintiles of earnings** as of the time of enrollment into FSS.
- Based on our comparison of earnings growth for Compass FSS participants and that of a matched comparison group, we estimate that participation in Compass FSS led to an average gain of \$6,305 in annual household earnings.
- Roughly half of the estimated impact of Compass FSS on household earnings is attributable to changes in earnings of heads of household with the remaining impact attributable to other earners in the household. We estimate that participation in Compass FSS led to an average gain of \$3,084 in annual earnings of the head of household, which is the individual with whom Compass works in the FSS program. Participation in Compass FSS is also associated with an increase during the analysis period in the proportion of households with one or more earners who are not head of household. Many of these additional earners appear to be students or other adult children.

Welfare, SSI, Pension and Social Security Income:

- On average, annual household income from welfare declined by 27 percent among Compass FSS participants, falling from \$789 to \$575. The welfare measure used for this report includes benefits from the Temporary Assistance for Needy Families (TANF) program and payments from state, local, or tribal programs for financial or medical assistance.
- Based on our comparison of welfare income changes for Compass FSS participants and that of a matched comparison group, we estimate that participation in Compass FSS was associated with a decline of \$496 in annual household welfare payments.
- Because only a small share of Compass FSS participants had welfare income at baseline (12 percent in the sample used for the comparative analysis) and because Massachusetts limits receipt of TANF funds to a two-year period every five years (though with certain exceptions), we recommend interpreting the welfare findings with caution.

• On average, annual household income from SSI, pension, and Social Security rose by 17 percent among Compass FSS participants, increasing from \$1,500 to \$1,761. In our comparative analysis, however, we did not find a statistically significant impact on this outcome associated with participation in Compass FSS.

FICO® Scores:

- Compass FSS participants with FICO[®] Scores at the time of entry into the program experienced modest, but significant increases in scores —an average increase in FICO[®] Score of 23 points (3.7 percent), compared with only 3.9 points (0.6 percent) among the comparison households.
- The share of Compass FSS participants with a FICO[®] Score also increased, rising by 7 percentage points between enrollment and the latest data available. This was a significant difference from the change experienced by the comparison group: a decline of 1 percentage point. Compass participants who "gained" a FICO[®] Score had an average score of 636.8 as of the most recent available credit report, a good score (though not quite at prime level). By contrast, the average score among individuals in the comparison group who gained a FICO[®] Score during the follow-up period was 555.0.
- The share of Compass FSS participants with a prime FICO[®] Score (above 660) rose from 23 to 37 percent, compared with an increase of 2 percentage points in the comparison group.

Debt:

- Compass participants saw an average decrease in total derogatory debt of \$764, while comparison group members saw an *increase* of \$554. Furthermore, the share of Compass participants with *any* debt that is derogatory declined 11 percentage points, from 65 percent to 54 percent, while comparison group members saw an increase in the share with derogatory debt (moving from 61 percent to 66 percent).
- Compass participants decreased credit card debt by an average of \$654.52, while the comparison group's average credit card debt remained flat.

What do the results mean?

The results on earnings, credit and debt are all highly positive, suggesting that the Compass FSS program is helping participants make progress in all of these areas. The findings on welfare income receipt are also positive but more difficult to interpret given that most Compass FSS participants did not receive any welfare income during the study period and the likely influence of Massachusetts' time limits.

Despite FSS' 25-year history, there have been relatively few rigorous evaluations of its effects. To the best of our knowledge, this is only the third evaluation of a local FSS program to compare earnings outcomes for FSS participants to those of a matched comparison group, and the first study to examine

credit and debt outcomes.⁴ It is also the first evaluation of a full FSS program to find statistically significant differences between the performance of FSS participants and an applicable comparison group. Both of the prior evaluations studied local FSS programs that utilized service delivery approaches that were very different from that of Compass.

Two national studies commissioned by HUD described earnings gains for FSS participants but did not include data for comparison groups (Ficke and Piesse 2004; De Silva et al. 2011). A third HUD-commissioned study – a randomized controlled trial of a convenience sample of large FSS programs in the U.S. – is currently underway with initial interim results expected later in 2017.

Because of the significant differences between the FSS program and other programs designed to boost earnings, there is no ready standard to use as a benchmark for assessing Compass's earnings results. However, there are benchmarks for assessing the results on credit and debt. A recently completed evaluation of financial coaching programs in Miami and New York City found no statistically significant impact on FICO[®] Scores in one program and an impact of 12 to 53 points in the other (Theodos et al. 2015, 129-130). The Compass FSS results are within the range reported for the program with an impact. While the other evaluation focused on somewhat different measures of debt, in general, the debt results for Compass FSS participants are as good as or better than those of the other programs. Note, however, that this other evaluation used random assignment, a more rigorous methodology than we were able to use here.

Conclusion

This evaluation confirms that an FSS program can achieve successful outcomes for participants in terms of earnings, credit and debt. Further research is needed to determine the extent to which other FSS programs report similar results and what program characteristics are associated with positive outcomes.

⁴ The other two are studies of programs in New York City and Denver. The New York City study examined a newly expanded FSS program that appears to have undergone several changes in approach during its initial years (Nuñez, Verma, and Yang 2015). The Denver study focused on a limited population of intensively treated individuals enrolled in a special homeownership program in addition to either FSS or Denver's Resident Opportunities and Self-Sufficiency program (Santiago, Galster, and Smith 2017). A third study used regression techniques to study outcomes for FSS participants in Rockford, Illinois (Anthony 2005).

1. Introduction

This report documents the results of our evaluation of the quantitative outcomes of Family Self-Sufficiency (FSS) programs administered by Compass Working Capital (Compass) in Lynn and Cambridge, Massachusetts in partnership with the Lynn Housing Authority and Neighborhood Development (LHAND) and the Cambridge Housing Authority.⁵ Compass, an asset-building nonprofit organization based in Boston, Massachusetts, works with public housing agencies (PHAs) and private owners in southern New England to administer FSS programs for households participating in HUD rental assistance programs.⁶

FSS is a program of the U.S. Department of Housing and Urban Development (HUD) designed to help housing assistance recipients increase their earnings and build savings in order to make progress toward economic security. The standard FSS program has three main components: (1) stable affordable rental housing; (2) case management or coaching to help families set and achieve their goals; and (3) an escrow account that increases in value as participants' earnings and rent contributions increase. As discussed in more detail below, Compass's implementation of FSS includes a number of unique features—in particular, an emphasis on client-driven financial coaching.

With funding from Oak Foundation and HUD's Office of Policy Development and Research (PDR), Abt Associates has conducted an evaluation of selected outcomes of the Cambridge and Lynn FSS programs. In this report, we provide the results of two sets of analyses assessing the effects of the Compass FSS programs:

- Earnings and benefits use. To assess the effectiveness of Compass's FSS programs in helping participants increase their earnings and related changes in public benefits use, we have conducted a quasi-experimental impact analysis that compares the change in household earnings and cash benefit amounts of Compass participants who have a Housing Choice Voucher with those of a propensity score-matched comparison group of voucher holders in other Massachusetts, Connecticut, and Rhode Island PHAs during the same period.
- Credit score and debt. To assess the impacts of Compass's program on changes in participants' credit scores and debt, we compare the changes in FICO[®] Score and debt of Compass participants over time with the changes experienced by a stratified comparison group of individuals in the same census tracts during the same period provided by the

⁵ These programs are true public-private partnerships in the sense that they succeed only through their joint efforts, but Compass has the lead responsibility for helping participants achieve their goals. In this report we refer to "Compass FSS programs" and "Compass FSS households" for simplicity.

⁶ Though Lynn and Cambridge are the locations included in this evaluation because they are the sites of the longest running Compass FSS programs (launching in October 2010 and November 2012, respectively), Compass also currently provides its FSS program in other southern New England cities. These include Boston (in partnership with Metropolitan Boston Housing Partnership) and Gloucester, Massachusetts; Willimantic, Connecticut (in partnership with the Caleb Group); and multi-family developments in Springfield and Cambridge, Massachusetts, and North Kingstown and Providence, Rhode Island (the latter in partnership with Preservation of Affordable Housing).

Experian credit bureau. The FSS sample for this analysis includes Housing Choice Voucher holders in Lynn and Cambridge plus a small number of public housing residents in Lynn.

Since most of the families enrolled in Compass's FSS programs have not yet reached the end of the five-year term of program participation, we have not included a detailed analysis of Compass's graduation rates. We also do not examine the level of accrued savings through the escrow account; we plan to examine escrowed savings in a subsequent analysis.

In the remainder of this chapter, we describe Compass's FSS program model, summarize the research literature that provides the context for this report, and provide an outline of this report.

1.1 Compass's Program Model for FSS

Like traditional FSS programs, the Compass FSS programs provide clients receiving housing assistance with (a) the ability to build escrowed savings based on increased rent paid as a result of increased earnings following enrollment in the program and (b) one-on-one coaching to encourage and support participants in increasing their earnings and achieving other individually identified goals.⁷ Families join the programs voluntarily and must continue to meet with their FSS financial coach periodically to remain in the FSS program. A family's participation in FSS (or withdrawal or graduation from FSS) has no impact on the family's level of housing assistance. To graduate from the FSS program (and receive the full amount accrued in escrow savings), participants must be employed, all household members must have been free of TANF assistance for at least one year, and participants must have achieved the participant-specific goals outlined in their individual training and services plans.

The Compass FSS programs satisfy those traditional FSS program requirements. In addition, its programs are innovative in five primary respects:

- 1. Compass's programs have a strong focus on helping clients build financial capability, pay down high-interest debt, build savings, and improve their budgeting and credit scores, complementing the asset building that occurs through the FSS escrow accounts.
- 2. Compass uses a coaching model that emphasizes participant-driven interaction (as opposed to a more traditional case management model in which the case manager more actively guides the participant).
- 3. The programs represent public-private partnerships supported substantially by philanthropy. While most FSS programs are run entirely by PHAs, the Compass FSS programs are run by a nonprofit that specializes in financial coaching and asset-building programs, in partnership with the public housing agencies in Lynn and Cambridge.
- 4. Compass seeks to enroll a greater share of the eligible population than is typical for FSS programs, aiming for an enrollment equal to at least 20 percent of the number of non-elderly

All FSS programs provide case management or coaching to help participants identify goals and overcome barriers to achieving them. The form of this interaction can vary substantially, however, from one local program to another.

non-disabled households in each site where Compass operates an FSS program.⁸ Compass achieves a high level of enrollment through its marketing and outreach strategies, including a postcard campaign that taps into and builds on families' aspirations for themselves and their children.

5. Compass uses a traditional calculation of FSS escrow in its Lynn FSS program, but it uses a variation on the traditional calculation in its Cambridge FSS program. Participants in Cambridge typically receive half of the traditional escrow amount. The Cambridge escrow model also eliminates the normal cap on escrow accumulation for households with incomes between 50 and 80 percent of the area median income (AMI).⁹

This evaluation builds on a previous descriptive evaluation conducted for Compass by Brandeis University (Kimbrel and Venner 2014), following the first two years of operation of the Compass FSS programs. That evaluation provided a qualitative analysis of the components of Compass's FSS program model, including Compass's outreach and marketing approach for reaching a large base of participants, the relationship-building necessary for a nonprofit organization to work effectively with a public housing authority or other housing partner, and the role of Compass's financial education workshops.

1.2 Literature Review and Program Context

This evaluation has several relevant contexts that we briefly discuss in turn: (1) the Housing Choice Voucher Program; (2) prior efforts to help individuals receiving HUD rental assistance make progress towards self-sufficiency; (3) the broader universe of employment programs; (4) prior efforts to help individuals build assets, improve their credit, and pay down debt; and (5) the unique circumstances of Compass's FSS program.

1.2.1 The Housing Choice Voucher Program

Our analysis of changes in earnings and public benefits amounts focuses on Compass FSS participants in the Housing Choice Voucher (HCV) program. There are reasons to think that HCVs could either promote or hinder recipients' work effort. On the one hand, we know that households with HCVs tend to be more residentially stable than households without HCVs (Mills et al. 2006). Because it's likely to be difficult to focus on getting and keeping a job when you're worried about where to sleep at night, the stability provided by an HCV might have a positive effect on employment and earnings. HCVs also provide families with the flexibility to move closer to a new work location, which again might have a positive effect on employment and earnings. On the other hand, participants in the HCV program pay 30 percent of their income for rent, so if they earn more, their contribution

⁸ These numbers are used for benchmarking only. Households may participate in FSS regardless of the age or disability status of the head of household. As of April 2017, Compass had met this benchmark in Lynn, its longest running program, and was 80 percent of the way toward this benchmark in Cambridge.

⁹ Cambridge Housing Authority is allowed to modify the FSS escrow formula because of its status as a Moving to Work (MTW) PHA. Contributing 50 percent of the increase in rent resulting from increased earnings to an escrow account rather than the standard 100 percent helps to reduce the financial costs of FSS for the Cambridge Housing Authority. We did not have a large enough sample to test whether this program variation may have contributed to different outcomes at the Cambridge and Lynn sites.

to rent will rise; this could potentially act as a marginal tax that discourages increasing earnings. As with any government subsidy, receipt of the HCV subsidy could also reduce the incentive that HCV holders have to increase employment and earnings because they can achieve a minimum standard of living at a lower level of work effort than unassisted households can.

A number of high-quality studies have found that receipt of rental assistance leads to a small initial reduction in earnings that fades over time (Mills et al. 2006; Newman, Holupka, and Harkness 2009; Carlson et al. 2009). Though the reason is unclear, one potential explanation is that after an initial dislocation associated with receiving a voucher (perhaps related to moving), the benefits and drawbacks of rental assistance for work offset each other. Other studies have found more persistent negative effects. For example, a study of voucher recipients in Chicago found an initial decline in earnings that did not dissipate over time (Jacob and Ludwig 2012), and a recent study of homeless families who received immediate access to HCVs found reductions in work effort under some (but not all) measures relative to other families who were left to find their own way out of emergency shelter (Gubits et al. 2016).¹⁰

These studies indicate that rental assistance alone does not promote earnings and employment.

1.2.2 Housing-Based Self-Sufficiency Programs

In light of concerns about the potential of rental assistance to suppress employment and earnings, a number of self-sufficiency efforts have been undertaken to help residents of subsidized housing increase their earnings. The best known is the Jobs Plus demonstration, a saturation initiative targeted at public housing residents designed to engage all working-age adults in a housing development-wide effort to boost employment. The demonstration, conducted in the late 1990s to early 2000s, combines financial incentives to work through changes in rent policy;¹¹ employment services (such as job search, job referrals, and career counseling); and a program component called "community support for work" that involved encouraging residents to support one another's work effort in various ways.

An evaluation by MDRC of the initial Jobs Plus demonstration found significant gains in earnings and employment among residents in the three developments that implemented the program robustly as compared with residents of similar developments that did not (Bloom, Riccio and Verma, 2005). These gains were not seen in the two sites that did not robustly implement the demonstration. A sixth site left the demonstration early. Despite the site variation, the results still showed earnings gains for residents of the six developments overall relative to residents of comparison developments. The Jobs Plus initiative has been implemented several times since the early demonstration, with the most recent implementation consisting of HUD funding for 24 new Jobs Plus sites in fiscal years 2014-2016.

¹⁰ These studies were focused on rental assistance participants generally, rather than the subset enrolled in a self-sufficiency program.

¹¹ The rent policies in Jobs Plus generally sought to provide a financial incentive for increased earnings. Different sites used different approaches, including policies that kept rents flat until families' earnings reached a certain level and policies that charged a lower share of income for rent.

Though Jobs Plus is better known in the research literature, FSS is by far the larger program,¹² currently serving more than 71,000 households total in more than 1,000 local FSS programs around the United States.¹³ Based on a series of research demonstrations conducted in the 1980s – Operation Bootstrap (Blomquist, Ellen, and Bell 1994), Project Self-Sufficiency (Smith 1988), and the Gateway Transitional Families Program (Rohe and Kleit 1997) – the FSS program was authorized by Congress in the Cranston-Gonzalez National Affordable Housing Act of 1990. FSS combines the stability of HUD-assisted rental housing with (a) case management or coaching to help participants set and achieve goals and make progress toward economic security and (b) an escrow account that grows as participants' earnings grow. The escrow account functions both as an asset-building mechanism and as a financial incentive for participants to increase their earnings.

HUD has commissioned two major longitudinal studies of FSS, both of which showed significant earnings gains for FSS participants, but neither of which had a control group or random assignment (Ficke and Piesse 2004; De Silva, Wijewardena, Wood, and Kaul 2011).¹⁴ HUD has commissioned a randomized controlled trial of a convenience sample of large FSS programs that MDRC is currently conducting, with interim results expected later in 2017.

There have been a number of evaluations of local FSS programs. The most rigorous evaluation was a randomized controlled trial conducted by MDRC of an FSS expansion that New York City undertook for purposes of testing FSS, both alone and in conjunction with a conditional cash transfer (CCT) program (Nuñez, Verma and Yang, 2015). Though neither FSS alone nor the FSS + CCT models produced earnings gains for the full sample, the results suggested there may have been an impact on particular outcomes and for some specific subgroups. Both FSS and FSS + CCT, for example, significantly increased the share of households working 30 or more hours per week. The FSS + CCT model also produced significant gains in employment and earnings among households not working at baseline; results for such families were consistently better for the FSS-only group than for the control group, but the difference was not statistically significant.¹⁵

¹² Although direct comparisons can be difficult, FSS is also likely to be less expensive on a per-household basis than Jobs Plus since FSS funding focuses only on case management or coaching (as opposed to the provision of job training and other direct services) and the escrow represents a contingent rather than a guaranteed expenditure.

¹³ The estimate of the number of FSS participants is based on the information included in the Congressional Justifications accompanying HUD's FY 2017 budget request (<u>https://portal.hud.gov/hudportal/documents/huddoc?id=7-Family_Self-Suff.pdf</u>). The estimate of the number of PHAs with FSS programs is based on Abt's analysis of data in HUD's PIC system and reflects programs enrolling FSS participants between mid-2007 and mid-2010. Both numbers fluctuate from year to year.

¹⁴ In addition, Rohe and Kleit (1999) conducted an early assessment of FSS and Olsen et. al. (2005) conducted an analysis of administrative data which found that FSS had a positive effect on earnings.

¹⁵ See also Santiago, Galster, and Smith (2017); Holgate et. al. (2016); Anthony (2005); and Gibson (2002).

1.2.3 Broader Universe of Employment Programs

A third context for this evaluation is the universe of employment programs. There is no direct analogue to FSS in the broader literature on employment programs that can serve as a benchmark for our evaluation of the Compass FSS program, but the literature does help us identify some of the relevant issues at play. We know from the literature, for example, that clearly-communicated financial incentives matter (Hamilton 2012: Martinson and Hamilton 2011). Such incentives can include, for example, the disregard of increased earnings in calculating program benefits as well as wage supplements. The financial incentive in the FSS program, however, is unusual in that it is significant delayed incentive. Unlike an earnings disregard, which leads to immediate benefits, the FSS escrow leads to the accumulation of funds in an escrow account that the family generally accesses upon graduation from the program.¹⁶ Final receipt of escrow funds is also contingent on successful graduation from the program (although participants may access some of the escrowed funds on an interim basis under certain conditions). One question is whether a delayed and contingent incentive such as the FSS escrow account can provide sufficient financial incentive to support increased work. We can't separate out the effects of the escrow account from the broader supports provided by Compass through its coaching, but a finding of significant positive effects on earnings would at least suggest that the delayed and contingent nature of the FSS escrow account does not make it an ineffective incentive.

Much of the employment literature is focused on interventions directed at helping families who receive federal welfare payments. This literature does not provide a comparable benchmark for this study, since only a small share of Compass participants received welfare payments and the average earnings of Compass participants at enrollment substantially exceeded those of the typical welfare program participant. In other cases, the job search assistance literature focuses on participants receiving unemployment insurance. In any event, those studies generally found only small gains in earnings that were not sufficient to lift families out of poverty (Hamilton 2012; Martinson and Hamilton 2011).¹⁷

Recent literature suggests that a Career Pathways workforce development model and programs that supplement low-wage work can be effective in boosting earnings, but neither approach is directly comparable to the Compass FSS program (Fein 2012; Werner, Dun Rappaport, Bagnell Stuart, and Lewis 2013; Strawn 2011; Maguire et al. 2010; Zeidenberg, Cho and Jenkins 2010).

¹⁶ While FSS participants receive the full balance of their escrow accounts if and when they graduate, they may also receive some funds prior to graduation through interim disbursements from the escrow account. These are withdrawals that the program provider allows for expenses that help participants achieve their goals. Examples of such expenses include paying for education or purchasing or repairing a vehicle to get to work.

¹⁷ There are some studies that focus on a somewhat similar population in older parts of the job search assistance literature; however, these were for multi-component or bundled initiatives that have a mismatch with the features of the Compass FSS program along several dimensions. For example, some studies focused on participants who received welfare payments or who received unemployment insurance payments, together with job search assistance and peer job search clubs and included enforcement mechanisms that could result in benefits reductions for participants (Gueron and Pauly 1991; Freedman et al. 2000).

1.2.4 Programs to Help Individuals Build Assets, Improve Their Credit, and Pay Down Debt

While the contingent and delayed receipt of funds from the FSS escrow account raises questions about whether it is an effective incentive for increased earnings, it has the clear benefit of helping participants who graduate from the program to accumulate assets.¹⁸ Research shows that assets can benefit families in a number of ways. Assets provide families with financial security, preventing them from falling into poverty when faced with unexpected expenses, such as job loss, broken down cars needed to get to work, or emergency medical bills. People can also use assets to invest in themselves and their families by pursuing further education or training to increase wages and job satisfaction, starting a business, putting a down payment on a home, or saving for their children's education. Finally, the hope and confidence that successful asset-building instills in a family can both enhance their well-being and motivate them to set, pursue, and achieve long-term goals (Sherraden 1992; Boguslaw et al. 2013; McKernan and Sherraden 2008).

There are a number of other social programs designed to help low-income households build assets. The most thoroughly researched asset-building program is the Individual Development Account (IDA) program, which provides participants with a financial match to encourage greater savings. The IDA program is different from FSS in incenting increased savings rather than increased earnings. But it does have some parallels to FSS in the sense of providing a deferred benefit, rather than an immediate cash benefit. (IDA benefits are deferred in the sense that families cannot access their matched funds right away, but must wait until they are ready to make a qualifying purchase, such as homeownership or post-secondary education.) Notwithstanding the deferred benefits, evidence suggests that IDAs can be effective in encouraging savings while the program is in operation (Mills et al. 2016; 2008). Effects on secondary impacts like homeownership, however, appear to diminish or disappear over the long-term (Grinstein-Weiss et al. 2012).

Though all FSS programs include the FSS escrow account and thus function as asset-building programs, the Compass FSS program places a particular emphasis on asset-building as a core element of its program. Among other things, Compass has integrated financial coaching into its basic program model, coaching participants on how to improve their credit scores, pay down debt, budget, build savings, and access mainstream financial products, in addition to the more standard FSS focus on helping residents overcome barriers to increased earnings.¹⁹ Because of Compass's focus on financial coaching, we examine the extent to which Compass FSS participants experience increases in FICO[®] Scores and reductions in debt as compared with individuals with similar characteristics.

While we are unaware of any direct analogues to FSS in the context of employment programs, we believe that Compass's coaching on credit and debt can be compared with other financial coaching programs on these metrics. One of the most useful comparisons comes from a randomized controlled trial by the Urban Institute of financial coaching programs in Miami (Branches) and New York City

¹⁸ Participants only receive the balance of their escrow savings accounts if they successfully graduate from the FSS program.

¹⁹ Though there are other FSS programs that offer coaching on credit and debt to FSS participants, we are not aware of any other FSS program that integrates these services as holistically and comprehensively into its FSS program as the Compass FSS program does.

(the Financial Clinic). That study found that financial coaching produced a range of positive outcomes, including increases in savings and reductions in perceived financial stress. With respect to credit scores, it detected no statistically significant impact of coaching on credit scores at the Branches site but a significant impact at the Financial Clinic. The researchers estimate the impact on credit scores of those who received financial coaching at the Financial Clinic was 33 points, with a wide confidence interval of 20 points, for an estimated impact range of 12 to 53 points. At neither site did researchers find an increase in the proportion of clients with a credit score. The study found reductions in total debt at Branches but not the Financial Clinic, and reductions in the total balance 90 to 180 days delinquent at the Financial Clinic but not Branches. The study found no impact on most other measures of debt and delinquency (Theodos et al. 2015, 129-130).

The Economic Mobility Corporation (Mobility), using a quasi-experimental design, examined credit score as an outcome of Financial Opportunity Center (FOC) participation. Overall, the outcomes of the treatment group were not statistically greater than those of the matched comparison group, but Mobility found positive and significant effects on credit following FOC participation when it examined results separately by credit status at program entry. Specifically, those participants who did not have a credit score at the outset were 9.3 percentage points more likely to have gained one after two years. Among those who had a score and a "thick credit file" at the outset, FOC participants were 13.8 percentage points more likely to have a prime credit score after two years (Roder 2016, 43-44).

1.2.5 Compass's Unique Approach

The final context to consider is Compass's unique approach to implementing FSS in Cambridge and Lynn. As described above, the Compass program model is unique in a number of important ways, including and especially the fact that Compass incorporates financial coaching into its FSS program to a much greater extent than other FSS programs.

This evaluation did not include a qualitative assessment of Compass's implementation, but we know from other evaluative work we are doing with Compass that it exhibits a number of characteristics of high-performing organizations that could contribute to the quality of its FSS program. These include:

- A learning culture Compass regularly reviews data on the outcomes of its programs to determine whether it should be adjusting its approach;
- A reliance on evidence-based practices this is particularly evident in its use of participantdriven coaching and its adaptation of insights from behavioral economics to enhance its FSS marketing campaign; and
- An emphasis on hiring quality staff, providing structured training and ongoing professional development, and the regular sharing and vetting of challenges among staff.

We note these points because the quality of a program's implementation is likely an important factor in determining its success. Our evaluation here is not of FSS generally, but of the FSS programs run by Compass in partnership with the housing agencies in Lynn and Cambridge. The Compass FSS programs possess unique programmatic features, including a focus on financial coaching; unique structural features, such as administration of the coaching by a nonprofit organization (Compass itself) working in partnership with the PHA; and a strong organizational culture. We are unable to separately determine the extent to which the results of this evaluation are driven by Compass's program model versus its organizational culture and capacity. Until proven otherwise, it is reasonable to assume the results reflect a combination of all of these factors.

1.3 Structure of this Report

In each of the three subsequent chapters, we report on the outcomes of the Compass FSS programs in Lynn and Cambridge. Chapter 2 describes the demographic characteristics of the households participating in the Compass FSS programs at the Lynn and Cambridge sites and the changes in those households' earnings, use of benefits, FICO[®] Scores, and debt over time. Chapter 3 presents results from the quasi-experimental impact evaluation of **earnings and benefits amounts**, contrasting the outcomes of the FSS participants to a matched comparison group of other households in the HCV program. Chapter 4 presents results for **FICO[®] Scores and debt**, contrasting the outcomes of the FSS participants to those experienced by a comparison group of low-income households with similar demographic, credit, debt, and income characteristics in the same census tracts during the same period.

2. Compass FSS Participant Experiences: Characteristics and Changes over Time

This chapter describes the demographics of the Compass FSS participants with Housing Choice Vouchers in Cambridge and Lynn and their experiences in terms of earnings, cash benefits received, FICO[®] Score, and debt at enrollment and over time. These descriptive analyses provide context for the impact and comparative analyses in Chapters 3 and 4.

Section 2.1 describes the data sources and methodology used in the descriptive analyses reported in this chapter. Section 2.2 describes the demographic characteristics of the Compass FSS participants in Lynn and Cambridge. Section 2.3 presents descriptive statistics on changes in earnings levels and benefits receipt from the time of participants' enrollment in FSS until the most recent income recertification available in our dataset, which includes recertifications through March 2016. Finally, Section 2.4 presents descriptive statistics on changes in FICO[®] Score and debt from the time of participants' enrollment in FSS until the most recent income statistics on changes in FICO[®] Score and debt from the time of participants' enrollment in FSS until the most recent income statistics on changes in FICO[®] Score and debt from the time of participants' enrollment in FSS until the most recent credit report in Compass's files as of June 2015.

Summary of Descriptive Data Presented in Chapter 2

Earnings and Benefits

- On average, the annual household earnings of Compass FSS participants rose by 30 percent between enrollment and the latest available data. Average annual household earnings were \$21,320 at enrollment and \$27,923 as of the most recent available recertification. This reflected, on average, about 40 months in the FSS program. More than 40 percent of participants saw gains in household earnings equal to or greater than the average gain of \$6,603, but 38 percent of participants had either no earnings growth or a decline in earnings.
- Percentage increases in household earnings between enrollment and the latest available data were somewhat similar for Lynn participants (34 percent) and Cambridge participants (29 percent), even though the Cambridge program started more recently than the Lynn program (November 2012 vs. October 2010) and Cambridge's escrow contribution is less generous than Lynn's.
- Small sample sizes make it difficult to reliably compare estimates of earnings growth based on year of program entry or duration of time in the program, but the available data suggest that much of the earnings growth occurs after just one year in the program, with little growth between the first and second year, and the rest happening in later years.
- About 71 percent of the overall average increase in household earnings is attributable to the earnings of heads of household, with the balance attributable to the earnings of other household members.
- The average amount of household welfare benefits declined sharply for participants in Cambridge, but increased somewhat for participants in Lynn. Caution should be used when interpreting participant changes in average welfare amounts because these benefits are relatively uncommon among participants and have strict time limits. In both Cambridge and Lynn, household income from Social Security and pensions increased, and "other" income decreased.

FICO[®] Scores and Debt

- Compass FSS participants saw decreases in key types of debt between enrollment in FSS and the latest available data. On average, total derogatory debt decreased \$764 (23 percent) and credit card debt decreased \$654 (20 percent). Both of these changes generally reflect a strengthening of a household's financial position.
- The share of participants with any debt in each debt category tended to rise or remain static since enrollment in FSS, except for derogatory debt, which fell from 65 percent to 54 percent. This statistically significant change (*p*<.01) indicates that participants experienced improvements while in the Compass FSS program.
- On average, FICO[®] Scores since enrollment increased. The average FICO[®] Score at enrollment for all participants who had one was 617, which increased an average of 23 points. For many participants, gains were realized fairly quickly. Those with at least one year since enrollment saw an average increase of 16 points (2.6 percent) that first year.
- About 9 percent of participants had no score at baseline. 81 percent of these
 participants gained a score by the most recent credit report available (at least
 one year following enrollment in FSS). Their average score was 634.

2.1 Data and Methodology

The descriptions of FSS participant characteristics and of their changes in earnings and public benefits use that we summarize in this section – as well as data we use for the impact analysis we describe in Chapter 3 – are based on HUD data from the PIH Information Center (PIC) entered by housing authorities for PIC module Form HUD-50058.²⁰ For both, only participants who enrolled in FSS prior to March 2015 are included in our analysis, to ensure at least one full year of follow-up data is available.

Compass began administering the FSS program in Lynn in October 2010 and in Cambridge in November 2012. Therefore, we identify Compass FSS participants by noting their FSS participant flag in the PIC records. The PIC dataset also includes information about earnings, demographics, and household composition.²¹ We converted the Form 50058 records from PIC into a longitudinal dataset with quarterly data points for values including annual earnings and benefits receipt. In these analyses, we have included only participants with enrollments through March 2015 in order to allow for at least one year of follow-up data. In total, the descriptive data cover 269 Compass FSS participants with HCVs: 118 from Lynn and 151 from Cambridge. Imputed values derived from nearest available records are employed to fill in for missing records or data that are not available because households have left the HCV program.²²

The description of changes in FICO[®] Scores and debt for Compass FSS participants uses a different data source. The analysis is based on FICO[®] Scores and debt information pulled by Compass with participants' consent upon initial enrollment in FSS pre-program workshops and for semi-annual appointments with Compass financial coaches. Compass used Kroll Factual Data to pull credit reports from the Experian credit bureau and then created a database in the Compass case management

²² Imputed values are equal to the value of the nearest available record.

²⁰ The data shown for each time period represent the most recent data transmitted to HUD's PIC data system as of that date for each household participating in FSS. For example, the data reported for March 2016 represent the most recent PIC record on file for that household through March 31, 2016. Some of those data points may be the results of reexaminations of income by the Lynn or Cambridge PHA in March 2016, but others may reflect reexaminations from previous months, depending on the date of that household's annual reexamination and whether the PHA requires HCV holders to report increases in income that occur in between annual reexamination dates. (Lynn has this requirement for interim reexaminations, but Cambridge does not.)

²¹ Many MTW housing agencies, including Cambridge Housing Authority, do not submit to HUD the FSS addendum data needed to determine FSS participation from PIC transaction records. Accordingly, in order to generate the dates of entry and exit into the FSS program that were essential for our analysis, the Cambridge Housing Authority provided supplemental entry and exit information about its own FSS participants to HUD, which included these supplemental data points in the data we received.

system. The data start with the first enrollees in the Compass FSS programs in October 2010 and continue through June 2015, when Compass began using data from a different credit bureau.²³

The description of changes in FICO[®] Scores and debt includes 280 Compass FSS participants who had at least one year of follow-up data to analyze.²⁴ To persist in the Compass FSS administrative dataset, FSS participants had to remain in the program following enrollment. Those who exited the program, either passively or actively, by not meeting with their financial coach or by not meeting other basic program requirements, or who left housing assistance prior to one year following enrollment were not included in the analysis. In total, there are four households who initially enrolled in Compass FSS prior to June 2014 but had no data following their initial enrollment, and so were not included in this analysis. When participants have missing data or have left FSS or HCV prior to June 2015, we imputed missing data from the previous period or (for those who have left the Compass FSS program) from the most recent data available.²⁵

2.2 Demographic Characteristics of Compass FSS Participants

The demographics and household composition of Compass FSS participants vary somewhat by site. The overwhelming majority of heads of household, both overall and by site, are female, under age 65, and do not have a disability (Exhibit 2-1). Male-headed households are a bit more common in Cambridge than in Lynn (13 percent vs. 6 percent). Racial/ethnic composition also varies. More than two-thirds (67 percent) of Lynn participants are Hispanic/Latino, whereas relatively few (13 percent) Cambridge participants are; and nearly three-quarters (74 percent) of Cambridge participants are Black or African American, whereas only a third of Lynn participants are.

²⁵ Imputed values are equal to the value of the nearest available record.

²³ Consent forms signed by Compass FSS participants allowed for these data to be used in program evaluation, but did not indicate that additional backwards-looking or forward-looking credit and debt data could be obtained for this purpose.

²⁴ The number of participants included in the earnings and benefits receipt tables and analyses in this chapter and the credit and debt analysis in Chapter 4 varies for a number of reasons, including differences in time periods of data availability and types of participants included. The HUD PIC dataset provided to Abt runs through March 2016 (earnings and benefits receipt analysis), whereas the Compass FSS administrative dataset including comparable data runs through June 2015 (credit and debt analysis). In addition, the earnings and benefits receipt analysis (Chapter 3) includes only households in the Cambridge and Lynn HCV programs, whereas the credit and debt analysis includes households in the Cambridge and Lynn HCV and public housing programs plus a handful of participants residing in Lynn who are in the statewide Massachusetts HCV program but participate in the Compass FSS program.

		Overall (N=269)	Lynn (N=118)	Cambridge (N=151)
Race	White	40.9%	61.9%	24.5%
	Black/African American	56.1%	33.1%	74.2%
	Asian	5.6%	5.1%	6.0%
	Native American	0.7%	0.0%	1.3%
Race/Ethnicity	Hispanic/Latino	36.8%	67.0%	13.3%
	Non-Hispanic	63.2%	33.1%	86.8%
Age	Average Age (yrs)	41.2	39.7	42.4
	Age 65+	0%	0%	0%
Disability	Disabled	4.8%	4.2%	5.3%
Gender	Female	90.3%	94.1%	87.4%
	Male	9.7%	5.9%	12.6%

Exhibit 2-1. Compass FSS Participants: Head of Household Demographics at Baseline

SOURCE: HUD PIC 50058 data for HCV recipients, October 2010-March 2016. NOTE: Baseline is defined as the date of enrollment in FSS for each household.

In some cases, participants left the FSS program (through graduation, voluntary drop-off, or termination) or left housing assistance during the study period. The baseline demographic and income characteristic tables presented in this chapter describe all enrollees in the Compass FSS program between October 2010 and March 2015 (allowing for at least one year of follow-up data after enrollment). Where participants have left FSS, graduated, or been terminated from the FSS program, follow-up data are available so long as the households retain HCVs in the same PHA where they enrolled in Compass FSS. During the study period, 11.5 percent of Compass FSS-enrolled households graduated from the program, 13.8 percent left the FSS program without graduating (including 3.7 percent who left HCV or the housing authority without graduating), and 74.7 percent remained in the FSS program through at least March 2016. Because FSS participants generally have five years to complete their FSS contracts of participation – and may request an additional two years, if needed – we have not conducted a substantive analysis of Compass's graduation rates.

For Compass FSS participants overall and in the two sites, single-adult households are more common than households with more than one adult; however, in Cambridge, almost half of households (47 percent) have more than one adult, whereas in Lynn, only one-third of households do (Exhibit 2-2). Though all Compass FSS households are more likely to have children under age 18 than not (78 percent had at least one child), children are substantially more likely to be present in Lynn households, where 91 percent of households have at least one child, whereas just 68 percent of Cambridge households do.

	Overall (N=269)		Lynn (N=118)		Cambridge (N=151)	
	Mean	Median	Mean	Median	Mean	Median
Number of adults	1.6	1	1.4	1	1.7	1
Number of children	1.7	2	2.2	2	1.4	1
Total number of household members	3.3	3	3.6	4	3.1	3
Households with more than one adult	40.9%		33.1%		47.0%	
Households with any children	78.1%		90.7%		68.2%	

Exhibit 2-2. Compass FSS	Participants: Household	Composition at E	3aseline
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SOURCE: HUD PIC 50058 data for HCV recipients, October 2010-March2016. NOTE: Baseline is defined as the date of enrollment in FSS for each household.

2.3 Changes in Earnings and Benefits Receipt for Compass FSS Participants

On average, Compass FSS participants have made substantial progress in increasing their household earnings and reducing their income from welfare. The most recent annual earnings estimate for households participating in Compass FSS in our dataset (reflecting income recertifications through March 2016) averaged \$27,923 for participants who enrolled in FSS prior to March 2015. This is more than 30 percent higher than at baseline, which was \$21,320 (Exhibit 2-3).

Annual income from welfare for Compass FSS households decreased from an average of \$789 at baseline to an average of \$575 as of March 2016, a decline of almost one-third. The welfare measure includes benefits from the Temporary Assistance for Needy Families (TANF) program and payments from state, local, or tribal programs for financial or medical assistance. Social Security Disability Income (SSDI), Supplemental Security Income (SSI), old age Social Security, and pensions income increased by 17 percent. "Other income" – which includes child support payments, medical reimbursements, Indian trusts receipt, Unemployment Insurance benefits, and other nonwage income – decreased by about 27 percent.

		Overall			Lynn			Cambridge			
	N = 269			N = 118			N = 151				
	Enrollment	1st Quarter 2016	% Change	Enrollment	1st Quarter 2016	% Change	Enrollment	1st Quarter 2016	% Change		
Earnings	\$21,320	\$27,923	31%	\$19,125	\$25,535	34%	\$23,036	\$29,790	29%		
Welfare	\$789	\$575	-27%	\$569	\$659	16%	\$961	\$509	-47%		
SSDI, SSI, Pension, and Social Security	\$1,500	\$1,761	17%	\$1,659	\$2,108	27%	\$1,375	\$1,489	8%		
Other income	\$2,499	\$1,826	-27%	\$2,452	\$1,452	-41%	\$2,536	\$2,117	-17%		
Total	\$26,108	\$32,085	23%	\$23,805	\$29,754	25%	\$27,908	\$33,905	21%		

Exhibit 2-3. Compass FSS Participants: Changes over Time in Average Annual Earnings and Benefits Receipt of Households

SOURCE: HUD PIC 50058 data for HCV recipients, October 2010-March2016. NOTE: The enrollment columns of this table show household income by source as of the date of enrollment into FSS. Data in the 1st Quarter 2016 columns represent the most recent income recertification available in the PIC dataset as of March 31, 2016. This table uses imputed values for households that exited the HCV program prior to Q1 2016.

Compass FSS participants in Lynn and Cambridge experienced a similar pattern of average earnings change between enrollment and the most recent income recertification as of March 2016. Average annual earnings for participating households grew by 34 percent in Lynn and 29 percent in Cambridge. Interestingly, the earnings gains in Cambridge were similar to those in Lynn even though Lynn participants have had a longer time since enrollment in FSS (average of 49 months) than have the Cambridge participants (average of 29 months) and Cambridge's escrow is less generous than Lynn's (Exhibit 2-3).

Annual household welfare income was much higher at baseline in Cambridge than in Lynn (\$961 vs. \$569); however, by March 2016 it had fallen substantially in Cambridge, to \$509, but increased to \$659 in Lynn. Social Security income and pensions increased for participants in both sites, but more substantially in Lynn (27 percent) than in Cambridge (8 percent). We do not know what accounted for the rise, although probability of receiving SSDI, old age Social Security, and pensions increases over time due to both aging and the cumulative risk of disability. While no Compass FSS participants were age 65 or older at enrollment, some may have had elderly members of the household, and some may have passed this age during the course of the study period. The residual category of "other income" fell more sharply in Lynn than in Cambridge. If a reduction in "other income" represented, for example, a loss of child support income or other income needed to support the family, it could potentially help explain an uptick in welfare income.

In Massachusetts, a family may not receive TANF for more than two years (except under certain circumstances) and then may apply again after five years without TANF. This policy makes the changes in welfare income difficult to interpret. A further complication is the fact that participation in

benefits programs is relatively uncommon among Compass FSS participants. Just under 15 percent of Compass FSS participants in Lynn and Cambridge received any welfare income at enrollment (Exhibit 2-4). By the end of our follow-up period, the share who received welfare income fell to 9.3 percent, a statistically significant change.

SSI, pensions, and Social Security income were also relatively uncommon for Compass FSS participants. Thirteen percent received any of these benefits at baseline, and this share did not change substantially. Nearly a third (30.9 percent) received other income benefits or payments at baseline. This number fell somewhat to 24.2 percent by the end of the study period.

Exhibit 2-4. Compass FSS Participants: Share Receiving Income from Benefits

	Enrollment	1st Quarter 2016	Change (percentage pts)	p value
Welfare	14.9%	9.3%	-5.6	0.0189**
SSDI, SSI, Pensions, and Social Security	13.0%	14.5%	1.5	0.3182
Other Income	30.9%	24.2%	-6.7	0.0019***

SOURCE: HUD PIC 50058 data for HCV recipients, October 2010-March2016.

NOTE: The enrollment column of this table shows percent with household income source as of households' dates of enrollment in FSS. Data in the 1st Quarter 2016 column represents the most recent income recertification available in the PIC dataset as of March 31, 2016. This table uses imputed data for households that exited the HCV program prior to Q1 2016.

*/**/*** indicates earnings statistically different from baseline earnings at the 10, 5, and 1 percent levels, respectively

This analysis focuses on changes in individual components of income, rather than changes in total household income. Total income can be an ambiguous indicator of economic security, given that increases in earnings may mean a decrease in eligibility for certain income benefits and that some benefits are time-limited. Change in earnings—which increased about 30 percent in each site—is a more direct measure of progress or setbacks toward clients' FSS goals.

2.3.1 Changes in Earnings for Compass FSS Participants by Duration of Enrollment

The descriptive data provide insight into the timing of the increases in household earnings of Compass FSS participants. Exhibit 2-5 shows earnings for Compass FSS participants for each year since their enrollment in Compass FSS grouped by how many full years of data are available for them between enrollment and Q1 2016. The number of years of data depends on when they entered the FSS program. The line graph shows trends over time for each cohort. The data in this chart also provide us with a basis for adding up the experiences of Compass FSS households after certain durations in FSS (such as after one year or two years), regardless of when they entered the FSS program. The totals over time across data year groups are analyzed in Exhibit 2-5. These cohorts are small, and thus care should be taken in interpreting differences between cohorts.

All groups saw an increase in annual household earnings over their first year in FSS, averaging to an increase of 18 percent across all cohorts. The 5-year cohort experienced a relatively modest increase in annual household earnings (15 percent) over the first year, but substantial increases from baseline to 2 years (28 percent) and 3 years (40 percent) and an increase of 74 percent from baseline by 4 years since enrollment; these increases were somewhat higher than the increases experienced by other cohorts during these intervals. The 3-year and 4-year cohorts saw increases in household earnings

between enrollment and their first year after enrollment, followed by slight decreases between their first and second year of enrollment in the program (5 percent and 6 percent decreases, respectively). Aside from the 5-year cohort, cohorts had either relatively modest increases or decreases in earnings during the second year in the program.





SOURCE: HUD PIC 50058 data for HCV recipients in Lynn and Cambridge, October 2010-March2016. NOTES: The number of participants included in each year group is as follows: 1 year (n=52), 2 years (n=96), 3 years (n=48), 4 years (n=49), 5 years (n=24). Across all groups, N=269.

Data availability duration groups (cohorts) are mutually exclusive. For example, the "1 Year" group includes Compass FSS participants for whom at least 1 year of data is available but less than 2 years of data between enrollment and Q1 2016.

The data include imputed values for households that exited the HCV program prior to the quarter of interest. Participants are included in cohorts so long as they have the requisite number of quarters (data periods) since enrollment, even if data from some of those quarters are missing.

In Exhibit 2-6, we aggregate the individual cohort data depicted graphically in Exhibit 2-5 to show growth in annual household earnings over time after entering the FSS program. We compute the baseline separately for each of these new cohorts (e.g., participants in FSS for at least two years) by averaging the baseline earnings for households in each cohort.

In all five groups, the most recent household earnings are significantly higher from baseline earnings at least at the p<.05 level. Earnings have increased the most for participants with at least 5 years of data available (73 percent), though care should be taken in interpreting this finding because the number of such participants is very small (n=24). This could reflect their longevity in the program or, alternatively, that the participants who joined the FSS program earliest started with some of the lowest baseline earnings levels but reached earnings levels similar to those of other cohorts by Q1 2016. It is also possible that lingering local economic effects of the recession affected early enrollees' employment and earnings, and subsequent economic recovery may have helped boost employment and earnings.

Years since Enrollment	N	Baseline Earnings	Q1 2016	% Change	p-Value
At least 1 year	269	\$ 21,320	\$ 25,253	18.4%	.011**
At least 2 years	217	\$ 20,487	\$ 24,026	17.3%	.031**
At least 3 years	121	\$ 20,278	\$ 25,454	25.5%	.035**
At least 4 years	73	\$ 18,468	\$ 26,241	42.1%	.006***
At least 5 years	24	\$ 15,172	\$ 26,249	73.0%	.031**

Exhibit 2-6. Compass FSS Participants: Changes in Household Earnings by Years since Baseline

SOURCE: HUD PIC 50058 data for HCV recipients in Lynn and Cambridge, October 2010-March2016. NOTES: The baseline earnings column of this table shows earnings as of households' dates of enrollment in FSS.

The data include imputed values for households that exited the HCV program prior to the quarter of interest. The *p*-values result from two-sample *t*-tests of whether most-recent earnings are different from baseline earnings. */**/*** indicates earnings statistically different from baseline earnings at the 10, 5, and 1 percent levels, respectively

2.3.2 Distribution of Earnings Changes for Compass FSS Participants

Average changes in household earnings for Compass FSS participants could be driven by a small number of households with very large gains or by broadly shared gains across all or most Compass FSS participants. A distribution of annual household earnings changes (Exhibit 2-7) shows that more than 40 percent of Compass FSS participants experienced gains in household earnings equal to or greater than the average gain of \$6,603; however, 37.5 percent of participants had no earnings growth or a decline in earnings.

Starting at the bottom of the exhibit, 10 percent of FSS participants experienced declines of \$15,147 or more in household earnings since enrollment in FSS, and 20 percent of FSS participants experienced declines of at least \$3,956. Though not shown here, we know from other calculations that 28.3 percent of Compass FSS participants experienced a decline in household earnings since enrollment, and 9.3 percent experienced no change in earnings (68 percent of those with no change in household earnings had zero earnings at both baseline and March 2016).

The median change in annual household earnings since enrollment is \$4,979, which means that at least half of Compass FSS participants report earnings gains at least this large. Thirty percent of participants experienced annual household earnings gains of \$12,315 or more, and 10 percent of participants experienced gains of \$29,788 or more.



Exhibit 2-7. Compass FSS Participants: Distribution of Household Earnings Changes from Baseline to Most Recent Available Data, by Decile

SOURCE: HUD PIC 50058 data for HCV recipients in Lynn and Cambridge, October 2010-March 2016. NOTE: N = 269. The data include overall earnings changes between enrollment and most recent data available as of Q1 2016.

The data include imputed values for households that exited the HCV program prior to the quarter of interest.

Error! Reference source not found. Exhibit 2-7 helps to describe the distribution of the percentage change in annual household earnings that participants have experienced between enrollment and the most recent data available as of Q1 2016. In comparing Exhibit 2-7 with Exhibit 2-8, note that 30 households experienced a gain from no earnings to some earnings, which amounts to an infinitely large percentage change). They are not included in the decile distribution (Exhibit 2-8), which is why no growth ("0.0%" or \$0) appears as the 40th percentile in Exhibit 2-8 but the 30th percentile in Exhibit 2-7.

Exhibit 2-8 shows that the median growth in annual household earnings for Compass FSS participants is 12.7 percent. Again, this does not consider the infinitely large percentage gains by those increasing their earnings from \$0. Among Compass FSS participants with positive earnings at baseline, 30 percent experienced gains of 39 percent or more and 30 percent experienced declines of 4 percent or more. Twenty percent of Compass FSS participants with positive earnings at baseline experienced earnings gains of 76 percent or more. While it is difficult to say what factors influenced these high percentage increases, it seems likely that many of those who saw more than a 75 percent increase in annual household earnings from enrollment to the end of the study period were under-employed at enrollment. The median annual earnings at enrollment for this group (pre-tax) was \$11,890, well below the expected earnings for a full-time minimum wage job in Massachusetts (which ranges from

\$16,640 to \$20,800 during the study period, as Massachusetts increased the minimum wage from \$8-\$10 per hour).



Exhibit 8-8. Compass FSS Participants: Distribution of Percent Household Earnings Changes from Baseline to March 2016

SOURCE: HUD PIC 50058 data for HCV recipients in Lynn and Cambridge, October 2010-March2016. NOTE: N=239. The data include overall earnings changes between enrollment and most recent data available as of Q1 2016. This analysis excludes the 30 individuals who experienced a positive in change from zero earnings at enrollment. (Those who had zero income at both baseline and latest data are included.)

Compass households with the lowest earnings at baseline tended to increase their earnings by the end of the study period (or latest available data) by the highest amounts, both as a dollar amount and as a percent of baseline earnings. Exhibits 2-9 and 2-10 show the average change in household earnings by quintile of baseline earnings and the average percent change in household earnings by percentile of baseline earnings, respectively. These earnings groups are composed of small numbers of households, so it is not possible to draw definitive conclusions from these data, but the results are suggestive of a pattern. Households in the bottom fifth of earnings level at baseline saw an average increase in annual earnings of \$13,762. In contrast, on average, households in the top fifth of earnings at baseline saw a small decrease in annual earnings (Exhibit 2-9). The average increases in annual earnings for households in the bottom two quintiles of baseline earnings were the highest. Based on their incomes at baseline, households in the bottom two quintiles did not have a household member with full time employment, so these increases in earnings may have been increases to full or fuller employment or to better hourly wages. A similar pattern emerges when looking at percentage increases in annual

household earnings; households in the bottom 30th percentile of earnings at baseline saw the highest percent increases in household earnings (Exhibit 2-10).²⁶

Exhibit 9-9. Compass FSS Participants: Change i	n Annual Household Earnings by Quintile of
Earnings at Baseline	

Baseline Earnings Quintiles	Household Earnings Range (at baseline)	Average Earnings Change (baseline to latest data)
0-20th	\$0 to \$2,869	\$13,762
20th-40th	\$3,063 to \$16,324	\$10,348
40th-60th	\$16,327 to \$25,802	\$2,169
60th-80th	\$26,029 to \$34,883	\$7,411
80th-100th	\$34,962 to \$69,651	-\$812
Total (n=269)	\$0 to \$69,651	\$6,603

SOURCE: HUD PIC 50058 data for HCV recipients in Lynn and Cambridge, October 2010-March 2016. NOTE: N = 269. The data include overall earnings changes between enrollment and the most recent data available as of Q1 2016 by quintile of baseline earnings. The majority of households in the bottom quintile had no earnings at baseline.

Exhibit 10-10. Compass FSS Participants: Percent Change in Annual Household Earnings by
Percentile of Earnings at Baseline

Baseline Earnings Percentiles	Household Earnings Range (at baseline)	Average Percent Change in Earnings (baseline to latest data)
0-10th	\$0 to \$2,869	187%
10th-20th	\$3,063 to \$8,320	157%
20th-30th	\$8,975 to \$14,522	115%
30th-40th	\$14,552 to \$18,914	26%
40th-50th	\$19,630 to \$23,704	29%
50th-60th	\$23,912 to \$27,567	-5%
60th-70th	\$27,568 to \$31,591	35%
70th-80th	\$31,605 to \$36,477	12%
80th-90th	\$36,572 to \$43,776	4%
90th-100th	\$44,124 to \$69,651	-6%
Total (n=239)	\$0 to \$69,651	56%

SOURCE: HUD PIC 50058 data for HCV recipients in Lynn and Cambridge, October 2010-March2016. NOTE: N=239. The data include overall earnings changes between enrollment and the most recent data available as of Q1 2016. This analysis excludes the 30 individuals who experienced a positive change from zero earnings at enrollment. (Those who had zero income at both baseline and latest data are included.)

²⁶ Similarly to Exhibit 2-8, Exhibit 2-10 excludes 30 households that saw a positive increase in earnings from zero between baseline and latest data. As a result, decile pairs in Exhibit 2-10 cannot be matched to quintiles in Exhibit 2-9.

2.3.3 Changes in Annual Earnings by Head of Household vs. Other Household Members

Compass FSS participant households saw changes in earnings as a result of earnings changes for both the head of household (primary FSS participant) and other adults in the household. The average change in annual earnings for heads of Compass FSS households between enrollment and the latest available data is \$4,668, or 71 percent of the average change in annual earnings for the entire household (Exhibit 2-11). Change in the earnings of other adult household members accounted for the remaining 29 percent of average household earnings change.

The increase in average annual earnings for non-heads of household is associated in part with an increase in the number of earners in Compass FSS households. Fifteen percent of Compass FSS households had more than one earner at enrollment, whereas 23 percent had more than one earner as of March 2016 (Exhibit 2-12), an increase of about eight percentage points.

We do not know to what extent the increase in average annual earnings of non-household heads reflects the earnings of individuals such as a spouse or significant other who joined the household after enrollment or the earnings of individuals who were previously in the household, which could include or children who reached the age of 18 after enrollment. The average number of adults in FSS households rose by 6 percent, from 1.6 at enrollment to 1.7 in March 2016. This is only about half the rate of growth in the average number of earners per household (from .99 to 1.10), so at least some of the new earners were already adults in the Compass FSS household as of the time of enrollment.

Exhibit 11-11. Average Change in Earnings per Household by Household Member Type (Enrollment to Endline)

Household Member Type	Average Earnings Change	Percent of Total Household Average Earnings Change
Head of household	\$4,668	71%
Non-head of household	\$1,935	29%

SOURCE: HUD PIC 50058 data for HCV recipients, October 2010-March2016.

NOTE: Data in the 1st Quarter 2016 column represents earnings data from the most recent income recertification available in the PIC dataset as of March 31, 2016. This table uses imputed data for households that exited the HCV program prior to Q1 2016.

Exhibit 12-12. Change in Earners per Household

	Enrollment	1st Quarter 2016
Households with more than one earner	14.5%	22.7%
Average number of earners per household	0.99	1.10
Average number of adults per household	1.6	1.7

SOURCE: HUD PIC 50058 data for HCV recipients, October 2010-March2016.

NOTE: Data in the 1st Quarter 2016 column represents the most recent income recertification available in the PIC dataset as of March 31, 2016. This table uses imputed data for households that exited the HCV program prior to Q1 2016.

The characteristics of individuals who newly gain earnings provide some suggestion of who they may be. Among individuals in Compass households, we found 49 household members other than the head of household who were not reporting earnings at enrollment in FSS but reported earnings as of March 2016.²⁷ Exhibit 2-13 provides their basic characteristics. As of March 2016, or the latest available data, 43 percent (21 individuals) are full-time students over age 18, with a mean age of 21. Their relatively young age and student status suggest that some of these household members may be adult children of the head of household who remained in the household and began earning money. Very few of the new earners (6 percent) are spouses of the head of household. The majority of new earners (25 individuals) are "other adults" who do not fall into the other two categories. Their relatively young age (averaging 24 years) compared with the average age of Compass FSS participants at baseline (41.2) suggests that at least some (and perhaps many) of these individuals also are children who have reached adulthood during the study period. Others may be significant others, relatives, or non-related adults who joined the household.

	N	Mean Age (Q1 2016)
Spouse	3	37.2
full-time student 18+	21	21.3
Other adult	25	24.1
Total	49	23.7

Exhibit 13-13. New Non-Head Earners at Endline

SOURCE: HUD PIC 50058 data for HCV recipients, October 2010-March2016.

NOTE: This table includes all non-head of household earners present in the Compass FSS households as of Q1 2016 who were not earners (but may have been present in the household) at enrollment in FSS. This table presents the most recent data available in the PIC dataset as of March 31, 2016. This table uses imputed data for households that exited the HCV program prior to Q1 2016.

2.4 Changes in FICO[®] Scores and Debt for Compass FSS Participants

On average, Compass FSS participants saw decreases in key types of debt between baseline and endline (most recent credit report pulled by Compass as of June 2015). Compass FSS participants saw an average decrease of \$764 (23 percent) in total derogatory debt and a decrease of \$654 (20 percent) in credit card debt (including credit debt that is derogatory) (Exhibit 2-14). Importantly, both of these debt types are ones that generally are desirable to reduce, whereas some types of debt—for example, student debt and auto debt—may actually, in some cases, indicate a positive step toward economic health, such as entering a degree program to increase earning potential and long-term employability or purchasing a car in order to get to a job or start a business.

Since enrollment in Compass FSS, participants have, on average, seen an increase of \$1,570 in total debt (10 percent), as well as an average increase of \$1,621 in student debt (23 percent) and \$885 (28 percent) in auto debt.

We do not know whether these "new" earners were present in the household at the time of enrollment in FSS or joined the household afterwards due to challenges in determining this information from the available data.
	Enrollment	June 2015	Change	% Change	<i>p</i> -Value
Total debt	\$15,081	\$16,651	\$1,569	10.4%	.011**
Derogatory debt	\$3,322	\$2,558	-\$763.80	-23.0%	.022**
Credit card debt	\$3,268	\$2,613	-\$654.52	-20.0%	.019**
Student debt	\$7,512	\$8,774	\$1,621.37	22.7%	.001***
Auto debt	\$3,138	\$4,022	\$884.61	28.2%	.015**
Personal loan debt	\$434	\$263	-\$170.77	-39.4%	.075*
Other debt	\$1,089	\$817	-\$272.10	-25.0%	.014**

Exhibit 14-14. Compass FSS Participants: Debt at Baseline and Change in Debt

SOURCE: Compass FSS administrative credit report data.

NOTES: N=279. The enrollment column of this table shows debt levels as of households' dates of enrollment in FSS. The data include imputed values for households that exited the FSS or housing assistance programs prior to June 2015.

All debt categories combine both non-derogatory and derogatory debt (with the exception of Derogatory debt, which includes only derogatory debt. Other debt includes all types of debt not classified as credit card debt, student debt, auto debt, or personal loan debt. Primarily, this includes medical debt, child support, alimony, tax liens, debt to a bank (other than credit card or mortgage debt), entertainment-related debt (e.g., a gym membership or music membership), rent-related debt, debt to a utilities company, and timeshare debt.

*/**/*** indicates debt levels statistically different from baseline debt levels at the 10, 5, and 1 percent levels, respectively.

As shown in Exhibit 2-15, the share of Compass FSS participants with any debt in each debt category has tended to rise or remain static since enrollment in FSS, with the exceptions of derogatory debt and "other debt." The percentage of Compass FSS participants who had any derogatory debt between baseline and endline fell from 65 percent at the time of enrollment in FSS to 54 percent—a statistically significant change (p<.01) suggesting that Compass FSS participants experienced a real decline in derogatory debt since enrolling in the program.

The share of FSS participants who had any credit card debt actually rose slightly, from 75 percent to 79 percent; however, this change is not statistically significant, and the presence of any credit card debt is an ambiguous indicator, as it may indicate that participants have gained access to credit they did not previously have. At enrollment, almost all Compass FSS participants had some kind of debt, and this remained static. There was a modest increase in the share of Compass FSS participants with any auto debt (increasing from 25 to 32 percent), which is also consistent with the increase in the amount of auto debt seen in Exhibit 2-14.

	Enrollment	June 2015	Change (percentage points)	<i>p</i> -Value
Any debt	96%	97%	1	.468
Derogatory debt	65%	54%	-11	.001***
Credit card debt	75%	79%	4	.103
Student debt	35%	38%	3	.072*
Auto debt	25%	32%	6	.015**
Personal loan debt	14%	16%	2	.476
Other debt	61%	46%	-15	.000***

Exhibit 15-15. Compass FSS Participants: Share with Any Debt at Baseline and Endline

SOURCE: Compass FSS administrative credit report data.

NOTES: N=279. The enrollment column of this table shows percent with each type of debt as of households' dates of enrollment in FSS. The data include imputed values for households that exited the FSS or housing assistance programs prior to June 2015.

All debt categories combine both non-derogatory and derogatory debt (with the exception of Derogatory debt, which includes only derogatory debt. Other debt includes all types of debt not classified as credit card debt, student debt, auto debt, or personal loan debt. Primarily, this includes medical debt, child support, alimony, tax liens, debt to a bank (other than credit card or mortgage debt), entertainment-related debt (e.g., a gym membership or music membership), rent-related debt, debt to a utilities company, and timeshare debt.

*/**/*** indicates debt shares statistically different from baseline debt shares at the 10, 5, and 1 percent levels, respectively.

Compass FSS participants saw an increase in FICO[®] Scores since enrollment, with some notable early gains. The average FICO[®] Score at enrollment for all Compass FSS participants in the sample who had FICO[®] Scores at enrollment was 617, with participants experiencing an average increase of 23 points by the most recently available credit report as of June 2015 (endline), as shown in the final row of Exhibit 2-16.

It appears that for many participants, these gains were realized fairly quickly. Participants with at least one year since enrollment saw an average increase of 16 points (2.6 percent) within one year. Participants saw the biggest increases in two and three years since enrollment (26.7 and 26.4 points, respectively, or 4.3 and 4.4 percent). It appears that these results were actually negated slightly in the overall average change by early entrants into the FSS program, who had at least 4 years since enrollment. That group (just 29 individuals) started off with lower FICO[®] Scores (an average score of 585.5) and saw a smaller increase within 4 years than participants did within 2 or 3 years – just 19 points, or 3.2 percent.

	N	Average Score at Enrollment	Average Score X Years since Enrollment		Average Change since Enrollment	<i>p</i> -Value	% Change since Enrollment
At least 1 year	248	617.4	1 yr	633.5	16.0	.000***	2.6%
At least 2 years	130	615.2	2 yrs	642.0	26.7	.000***	4.3%
At least 3 years	70	603.4	3 yrs	629.8	26.4	.001**	4.4%
At least 4 years	29	585.5	4 yrs	604.5	19.0	.194	3.2%
All	253	616.6	Endline	639.6	23.0	.000***	3.7%

Exhibit 16-16. Compass FSS	Participants: Change in FICO	[®] Scores by Years since Baseline
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SOURCE: Compass FSS administrative credit report data.

NOTES: The average score at enrollment column of this table shows average score at the time of enrollment in FSS. This table includes only Compass FSS participants with a FICO[®] Score at both baseline and the endline data point for each row. The data include imputed values for households that exited the FSS or housing assistance programs prior to June 2015.

*/**/*** indicates FICO[®] Score statistically different from baseline FICO[®] Score at the 10, 5, and 1 percent levels, respectively.

Not all Compass FSS participants had a FICO[®] Score at baseline (and those without a FICO[®] Score are not included in Exhibit 2-16). At baseline, 9.3 percent of Compass FSS participants had no FICO[®] Score, but by the endline, most of these participants (80.8 percent) gained a FICO[®] Score. For those with no FICO[®] Score at baseline who had a FICO[®] Score at endline, the average endline score was 636.8.

3. Effect of Compass FSS on Earnings and Cash Benefits Receipt: Quasi-Experimental Findings

This chapter summarizes the findings of a quasi-experimental analysis of changes in earnings and public benefits receipt for Compass FSS participants with Housing Choice Vouchers (HCV) in Lynn and Cambridge. More precisely, it addresses the following research question about earnings and benefits:

What is the effect of Compass's FSS programs on households who would decide to participate in a Compass FSS program if it were offered to them?

For this analysis, we study households who enrolled at any point between the start of the Compass

FSS programs in the two housing authorities (October 2010 in Lynn and November 2012 in Cambridge) and March 2015 (which allows for at least one year of follow-up data). Our analysis sample is smaller (N=173) than the number of households described in the previous chapter (N=279) because we only examine households for whom we have more complete outcome data (see Section 3.1.1).

To determine the impact of the Compass FSS programs, we compared the earnings and benefits receipt of these households ("participants") with the earnings and benefits receipt of comparable households participating in other HCV programs in similar urban settings.

Section 3.1 describes the data sources

Summary of Findings Presented in Chapter 3

- Earnings. Compass FSS participants experienced a larger increase in earnings than the comparison households over the same time period. Participation in Compass FSS was associated with an average gain in annual earnings of \$6,305 between the 4th quarter of 2010 and the 1st quarter of 2016.
- Welfare income. Participation in Compass FSS was associated with a decline of \$496 in annual welfare payments over this time period, but this finding is difficult to interpret given state time limits.
- There was no statistically detectable effect of the Compass FSS program on Social Security income and pensions or on other nonwage income.

and quasi-experimental design, including the construction of the comparison group. Section 3.2 defines the outcomes that we studied, and explains the regression method we used to estimate impacts. Finally, Section 3.3 presents the impact estimates.

3.1 Data Sources and Quasi-Experimental Design

FSS is a voluntary program for housing assistance recipients, and their motivation to participate may affect changes in earnings and benefits receipt that occur during their participation. Therefore, the HCV households in Lynn and Cambridge who do *not* choose to participate in a Compass FSS program are not a suitable group for comparison. Instead, the comparison group should comprise households who would decide to participate in a Compass FSS program if it were offered to them. Ideally, such a comparison group would be created through random assignment of households that have expressed a willingness to participate in FSS. That approach was not available to us. Instead, we

use a quasi-experimental design, selecting a comparison group that is comparable to the Compass FSS participants with respect to (1) HCV participation, (2) propensity to join Compass FSS if it were available to them, based on demographic and baseline income sources, and (3) local labor market opportunities. In the following subsections, we describe (3.1.1) the data sources for the quasi-experimental impact analysis and (3.1.2) how we selected comparable households. More detail on the methodology for this analysis is provided in Appendix A.

3.1.1 Data Sources and Panel Construction

Like the descriptive analysis in Chapter 2, the quasi-experimental impact analysis uses data from HUD's PIC dataset from module Form HUD-50058 that was provided to the study team by HUD. Unlike in Chapter 2, we used an expanded dataset that includes all households using HCVs in all PHAs in Massachusetts, Rhode Island, and Connecticut that had a HUD-50058 record between July 1, 2007 and March 31, 2016.²⁸

The PIC dataset does not offer information about households prior to their participation in the HCV program, nor does it follow households if they leave the HCV program. We also do not have data explaining why they entered or exited the HCV program. To create a longitudinal dataset, we impute earnings and benefits receipt for missing time periods as equal to the closest observed earnings and benefits receipt. As noted above, because our data are limited to records reported to HUD while households are in the HCV program, we exclude all households from this analysis that have more than 5 continuous quarters of imputed data after January 2011.²⁹ (Appendix B provides more detail about imputation.) Thus, our estimates will exclude any highly successful Compass FSS households that graduated from the FSS program and left the voucher program as well as any unsuccessful FSS household that left the HCV program without graduating from FSS. Similarly among the comparison group, our estimates exclude households who left the HCV program, which may include households who made progress toward economic security as well as those who did not.

In this section, we briefly describe the selection of comparison HCV programs in southern New England where HCV householders are likely to experience similar employment opportunities as households in the Lynn and Cambridge programs. We then present the method of selecting specific households from those comparison HCV programs.

Selecting Comparison PHAs

To identify comparison PHAs, we first studied which cities and towns best resemble Lynn and Cambridge. Geographic selection is important, because the employment opportunities and employment support opportunities such as public transportation and childcare options vary across cities. While it is impossible to fully control for the impact of place (e.g., local neighborhood

²⁸ Most Compass FSS participants are in an HCV program rather than a public housing program. In order to limit the volume of data and avoid the added level of complexity of performing the propensity score matching for two different program types, only HCV program participants are included in the Compass FSS and comparison group samples.

²⁹ In the descriptive analysis covered in Chapter 2, we focus on a larger sample of FSS participants, including all participants regardless of their entry and exit dates in the HCV records.

amenities, local housing market, and regional job market) on Compass FSS participants, our approach at least ensures that the HCV holders included in the comparison sample live in census tracts comparable to those occupied by HCV holders in Lynn and Cambridge along observable dimensions.

For PHAs in Massachusetts, Connecticut, and Rhode Island, we evaluated the characteristics of the census tracts in which HCV households for each housing authority live using census tract characteristics from the 2010 U.S. Census. We first weighted these characteristics based on how many voucher households live in a census tract and then standardized these data according to the means and standard deviations of these characteristics across all PHAs. Using these standardized characteristics, we generated a "distance" metric against which the average voucher household census tract in one housing authority can be compared with the average voucher household census tract in another housing authority. (Census tract variables used in the distance metric are provided in Appendix A.)

In addition to applying this measure of the similarity of other PHAs to the Cambridge and Lynn PHAs, we excluded PHAs where more than 5 percent (as of 2014) of non-elderly, non-disabled households were in an FSS program.³⁰ We selected the 20 most comparable PHA service areas separately for Lynn and for Cambridge. After consulting HUD field offices about the PHAs that passed these tests, we narrowed the list further by excluding statewide PHAs and PHAs that are run by independent nonprofit organizations, as these may be different in important ways from the Cambridge and Lynn PHAs. The remaining list of housing authorities included 15 matches for Lynn and 18 for Cambridge, with some overlap between the two lists, and yielded 21,105 possible comparison households to consider in our analysis who do not have outside-of-sample imputations in and after 2011.³¹

Appendix C shows the average census tract statistics for Lynn and Cambridge HCV households, as well as demographic and income characteristics of HCV households at those housing authorities. The appendix shows the same statistics for the selected PHAs in southern New England, as well as the PHAs that were not selected. The Lynn and Cambridge PHA operating areas are similar to the selected comparison PHA operating areas on many characteristics. The main differences are that the Lynn and Cambridge areas are slightly more racially diverse, and they have slightly lower overall employment rates but slightly higher average earnings.

³⁰ Including only PHAs with relatively small FSS programs allows better modeling of comparison group members. In PHAs with large FSS programs (or FSS programs serving a relatively high percentage of the target population), many of the households who would otherwise be good candidates for the comparison group may be participating in another FSS program. Our analysis limits them from the comparison group in order to estimate the absolute effects of the Compass FSS programs rather than the relative effects between the Compass FSS programs and other FSS programs.

³¹ Out-of-sample imputations refer to cases where data are missing because of likely exits from the HCV program. A household is out-of-sample when there is a record of an exit from HCV (even if there is a subsequent record of re-entry) and where one could infer a likely exit from HCV because there is no record for 5 or more quarters, indicating the possible absence of an annual recertification.

Selecting the Earnings and Benefit Comparison Group Members (Propensity Score Matching)

The research question motivating the earnings and benefit analysis asks what effect the Compass FSS would have on households most likely to sign up for a Compass FSS program if it were available to them. Therefore, we needed a process to identify such households. Fortunately, we find informative clues by looking at the households in Lynn and Cambridge. Compass's FSS program implementation began in late 2010, but we can distinguish households that participate in the program between 2011 and 2015 from households that do not participate in the program over that same period using *pre-2011* data for both types of households.³²

Modeling the propensity of Cambridge and Lynn HCV participants to enroll in Compass FSS

Compared with Lynn and Cambridge households who did not participate in the Compass FSS programs at some point between 2011 and 2015, households in the Compass FSS programs were younger, were less likely to have a disability, had more children, and had higher earnings, higher non-welfare sources of non-earnings income ("other income"), lower amounts of Social Security income, and lower total income after adjustments. (See Appendix A for the means of specific characteristics of households in Compass FSS and voucher households in Lynn and Cambridge who did not participate in Compass FSS and *p*-values for the likelihood that each set of means is truly different.)

Because Compass FSS program participants are distinguishable from non-participants in Lynn and Cambridge, it is feasible to estimate a propensity score model for program participation. The propensity score model "scores" each household on its likelihood of joining a Compass FSS program if it were available to them. In the analysis sample of Compass FSS participants, we excluded households who enrolled in FSS prior to 2011 and households with out-of-sample imputations for any quarter between 2011 and 2015.³³ The remaining Compass FSS households are 95 households in

³² The Compass FSS households in Lynn and Cambridge enrolled at various times, and thus by studying outcomes in the first quarter of 2016, we are averaging the program's effects over a duration that varies from 1 to 6 years (the average duration in our sample as of the first quarter of 2016 is 2.9 years). Unfortunately, there is no method using propensity scores to divide the treatment group into cohorts defined by time. Using the household characteristics in the data, there appears to be no discernable difference between households that joined in one year versus another year. Therefore, no propensity score model could predict when a household would join in one year versus another (at least, within the period from 2011 to 2015).

³³ Of the Lynn and Cambridge households with any FSS records after December 31, 2010, we excluded 112 from the sample because of out-of-sample imputations in any quarter between 2011 and 2015. Another 35 households were excluded because their FSS enrollment date was prior to the start of 2011. A further 25 were excluded because their FSS enrollment date was after March 2015. In contrast, Chapter 2 presents descriptive data on Compass participant experiences with earnings and benefits receipt that do *not* exclude participants who entered FSS between October 1, 2010, and December 32, 2010, and that do allow imputation following enrollment. For the quasi-experimental impact analysis, it is necessary to limit out-ofsample imputation to ensure comparability between Compass and comparison groups; however, including those with missing data in the descriptive analysis allows for a fuller, more nuanced picture of Compass participant experiences unrestricted by the need to ensure a robust conclusion.

Cambridge and 78 households in Lynn who joined a Compass FSS program at some point between January 2011 and March 2015.³⁴

We used a logit propensity score model to estimate the probability that a household joins a Compass FSS program.³⁵ The estimates show that the covariates do, in fact, have predictive power in determining participation—that is, the model successfully predicts that the Cambridge and Lynn households who joined a Compass FSS program were more likely to do so than households in Cambridge and Lynn who did not join a Compass FSS program. (Additional details, including the propensity scores for Compass FSS and non-participants in Lynn and Cambridge, are found in Appendix D.)

Applying the propensity score model to choose comparison households

We used the estimates from the propensity score model to generate propensity scores for all of the HCV households in the selected comparison PHAs (these scores represent the predicted propensity of these households to enroll in Compass FSS if it had been offered to them). For each Compass FSS household, we selected three comparison households from the comparison PHAs (with a separate list for Lynn FSS participants and Cambridge FSS participants) whose propensity scores most closely match those of Compass FSS households.³⁶ This exercise resulted in a comparison group of households that matches the treatment groups' distribution of propensity scores exactly. (See Appendix A for propensity score distributions.)

Exhibit 3-1 shows mean household characteristics for the Compass and comparison group households, as well as households excluded from the comparison. The selected comparison households are similar to the Compass FSS households with respect to all characteristics that are most associated with future earnings.³⁷ None of the baseline means for the 15 variables we determined to be predictive of future earnings is statistically different (at p<.10) between the Compass FSS and comparison group households.³⁸ Furthermore, the Compass FSS households and comparison group households in comparison PHAs who were excluded from the study sample on the basis of their propensity scores.

³⁴ As mentioned in Section 3.1, we exclude households with outside-of-sample imputations in and after 2011. We also exclude households who joined the Compass FSS program in late 2010 when the program began in Lynn, because there are only a small number of households (fewer than 20) and because of timing issues. Because the program began in late 2010, the majority of the participants' baseline year leading up to joining the program is 2010 rather than 2009.

³⁵ We estimated the logit model separately for Lynn and for Cambridge, because Lynn and Cambridge FSS participants would be matched to comparison PHAs that are good matches for their city.

³⁶ Comparison household selection is done "without replacement," and thus the ordering of the comparison households in the dataset matters. We randomly sort the comparison households prior to selection by generating a random number for each one, and sorting on those random numbers.

³⁷ We identified these characteristics through a separate regression of the HCV households in our dataset.

³⁸ Differences in means on a number of variables, however, including welfare income, are close to being statistically significant. We discuss the baseline values for welfare income and welfare receipt in the context of interpreting our impact findings in Section 3.2.

	Compass FSS	Compa	rison	Excl	uded
	Mean <i>(Stdev)</i>	Mean <i>(Stdev)</i>	<i>p</i> -Value	Mean <i>(Stdev)</i>	<i>p</i> -Value
Age in Dec 2010	40.44 <i>(</i> 9.14)	39.93 <i>(</i> 9.38)	.608	48.42 (14.43)	.000***
Head of household had disability at time of enrollment	2% (0.15)	3% (0.17)	.659	41% <i>(0.49)</i>	.000***
Years in voucher program as of Dec 2010	7.62 (5.46)	7.82 (5.23)	.727	8.11 (5.49)	.244
Number of children < age 5, Q4 2010	0.32 (0.60)	0.31 <i>(0.55)</i>	.770	0.20 <i>(0.49)</i>	.001***
Number of children age 5-18, Q4 2010	1.18 <i>(1.00)</i>	1.37 (1.13)	.105	0.76 (1.05)	.000***
Number of adults, Q4 2010	1.49 <i>(0.77)</i>	1.42 <i>(0.68)</i>	.396	1.39 <i>(0.66)</i>	.055*
Annual earnings in Q4 2010	\$20,103 <i>(\$16,029)</i>	\$18,926 <i>(\$15,960)</i>	.494	\$6,982 (\$11,915)	.000***
Change in earnings from Dec 2009 to Dec 2010	\$367 (\$11,034)	\$755 (\$9,956)	.732	-\$226 (\$6,998)	.271
Change in earnings from Dec 2008 to Dec 2010	-\$1,348 <i>(\$13,055)</i>	\$104 (\$12,790)	.297	-\$546 (\$8,849)	.238
Change in earnings from Dec 2007 to Dec 2010	-\$705 (\$14,624)	\$844 (\$13,907)	.313	-\$711 (\$9,735)	.993
Annual welfare receipt in Q4 2010	\$687 (\$1979)	\$1,055 <i>(\$2,493)</i>	.129	\$2,137 (\$3,956)	.000***
Annual other non-wage income in Q4 2010	\$3,049 (\$6,421)	\$4,043 (\$6,786)	.166	\$2,183 <i>(\$4,694)</i>	.016**
Annual Social Security income in Q4 2010	\$764 (\$3,334)	\$945 (\$2,773)	.583	\$6,384 (\$6,701)	.000***
Annual adjusted income Q4 2010	\$23,052 (\$13,792)	\$20,835 (\$12,449)	.117	\$14,185 (\$9,610)	.000***
Welfare receipt at baseline	12% (0.32)	17% (0.37)	.181	43% (0.50)	.000***
Ν	173	593		16,701	

Exhibit 3-1. Comparison of Compass FSS Households, Comparison Households, and Excluded Households in the Selected Comparison PHAs

SOURCE: HUD PIC 50058 data for HCV participants in MA, CT, and RI public housing agencies, July 2007-March 2016.

*/**/*** indicates earnings statistically different from baseline earnings at the 10, 5, and 1 percent levels, respectively

In summary, our methodology selected comparison households who live in similar types of neighborhoods as the Compass FSS households, have the same likelihood of joining a Compass FSS program if it were available to them, and are similar on most characteristics most predictive of future earnings growth (i.e., the characteristics in Exhibit 3-1). In Section 3.2, we analyze whether earnings and public benefits receipt at the end of the study period differ among Compass FSS households and comparison households.

3.2 Impact Analysis

Controlling for baseline characteristics, we compare earnings and public benefits receipt among Compass FSS households with the earnings and public benefits receipt of the households in the earnings and benefits comparison group. We analyze several outcome measures that describe household earnings and benefits receipt:

- *Most recent earnings*. Annual earnings as of the first quarter of 2016 based on the most recent earnings estimate in the PIC data.
- *Average annual earnings.* The average annual earnings reported by the household between January 2011 and the first quarter of 2016.
- *Most recent welfare.* Annual welfare income as of the first quarter of 2016, based on the most recent earnings estimate in the PIC data.
- *Average annual welfare.* The average annual welfare income reported by the household between January 2011 and the first quarter of 2016.
- *Most recent Social Security and pension income*. SSI, SSDI, or Social Security old age income and annual pension income as of the first quarter of 2016, based on the most recent earnings estimate in the PIC data.
- Average annual Social Security and pension incomes. The average SSI, SSDI, Social Security, and pension income reported by the household between January 2011 and the first quarter of 2016.
- *Most recent other income.* Annual other income as of the first quarter of 2016, based on the most recent earnings estimate in the PIC data. The "other income" category, as defined by HUD on Form 50058 for households receiving rental subsidies, includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.
- *Average annual other income.* The average annual other income reported by the household between January 2011 and the first quarter of 2016.

We analyze two versions of each outcome variable: the **most recent** annual amount and the **average** annual amount over the course of the analysis period. The average measure helps to smooth out variations over time in a volatile measure such as earnings. It also provides a window into what happens in between the baseline and most recent estimates of income receipt. This measure is especially important for welfare, as TANF (the main welfare program) is time limited: standard eligible recipients can receive up to 24 months of benefits every 5 years (there are exceptions for those with health problems, domestic violence, or pregnancy).

As of December 2010, the average earnings of households who joined Compass FSS between January 2011 and March 2015 was \$20,103. By early 2016, their average earnings had increased to \$29,088. By contrast, the average earnings of the comparison group increased by a much smaller amount, from \$18,926 to \$22,876. These are the unadjusted means, prior to controlling for any differences in baseline characteristics.³⁹

The purpose of this analysis is to study how much of the Compass FSS households' increase in earnings since December 2010 is attributable to Compass FSS. To do so, we compare this increase with earnings trends in the comparison group using a model that controls for household characteristics as of December 2010. For this comparison, we estimate a linear regression of the treatment indicator variable (FSS_i in Equation 1) and control variables (X_i in Equation 1) on outcomes (Y_i in Equation 1). For control variables, we use the characteristics listed in Appendix D which we selected because they significantly predict future earnings when looking at just the comparison group (as explained in Section 3.1).

$$Y_i = \alpha + \delta FSS_i + \beta X_i + \varepsilon_i \tag{1}$$

Exhibit 3-2 (on page 49) summarizes the results of our analysis and the estimated impact of participation in the Compass FSS program. The first column, "Impact", shows the estimated impact of Compass FSS participation, i.e., the average change in the outcome variable since baseline (the final quarter of 2010) that is attributable to participation in the Compass FSS program, while controlling for the baseline variables (see Equation 1). The second column, "p value", indicates the probability that the impact is equal to zero. P values less than .10 indicate statistically significant impact estimates. The third column shows the expected average outcome if a household were to participate in the Compass FSS program, whereas the last column shows the expected average outcome if the household were *not* to participate. For example, we estimate that, after applying the control variables, the average annual earnings of a household participating in Compass FSS would be \$29,135 by the first quarter of 2016 (first row), whereas the average annual earnings of a similar household not participating in the Compass FSS program would be \$22,830.

3.3 Impact of Compass on Earnings and Public Benefits Receipt

We find that, controlling for covariates, households in the Compass FSS programs in Lynn and Cambridge had two statistically significant differences in outcomes compared with the households in the comparison group.

Impact on Gains in Earnings

The analysis finds that participation in the Compass FSS program led to an estimated gain in annual household earnings that was \$6,305 larger than the gain the average household would have experienced had it not participated in Compass FSS (first row).

If we look instead at average annual earnings over the entire study period (second row), the analysis finds that Compass FSS is associated with a gain in earnings that was \$3,631 larger than the gain the

³⁹ See Appendix E for unadjusted means of changes over time in the earnings and public benefits receipt of Compass and comparison group households.

average household would have experienced had it not participated in Compass FSS. To the extent that Compass participants make progress in increasing their earnings over time, one would expect that the gain in average annual earnings would be lower than the difference between baseline and most recent earnings. The impact on average annual earnings may also be lower than the impact on recent earnings because some households might have first invested time in education or job training programs before scaling up their work effort. The increases in earnings measures associated with Compass FSS are statistically significant (p<.001).

We have analyzed earnings at the household level, rather than the individual level, and some households include more than one earner. Compass households have less of a disincentive to add earners than households who do not participate in an FSS program. While there was no significant difference in the number of earners per household between the Compass and comparison households at baseline, there was a significant difference at the end of the analysis period. In 28 percent of Compass households there was at least one earner at the end of the analysis period who was not head of household, compared to 13 percent for comparison households. However, these additional earners do not explain all of the positive impact of Compass on household income. Looking only at earnings of the head of household, Compass had an impact of \$3,084 and \$2,210 on earnings gains and average earnings over the study period (p=.008 and .002, respectively).

Impact on Welfare Receipt

We find that Compass FSS is associated with lower household welfare amounts. Participation in the Compass FSS program was associated with a \$496 or a \$761 reduction in average household welfare benefit amount, depending on which of the two measures is used, most recent or average annual welfare income.

Welfare receipt is constrained by statutory time limits, which makes it difficult to study and interpret changes over time. We thus urge a measure of caution in interpreting the welfare results. The need for caution is reinforced by the fact that the propensity model does not completely balance the Compass FSS households and the comparison group samples based on welfare eligibility during the study period. As shown in Exhibit 3-1, at baseline, 12 percent of Compass FSS participants received any welfare, as did 17 percent of the comparison group households. At the end of the study period, 10.4 percent of Compass FSS participants received welfare, as compared with 20 percent in the comparison group (not shown).

Compass FSS participation has no detectable effect on household levels of SSI, SSDI, and Social Security income, pension income, or other income. The "other income" category includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.

Outcome	Impact ^a (Standard Error)	<i>p</i> -Value	Expected Outcome If in Compass FSS Program ^b	Expected Outcome If Not in Compass FSS Program ^b
Earnings				
Most recent	\$6,305 <i>(\$1,371)</i>	<.001***	\$29,135	\$22,830
Average annual	\$3,631 <i>(</i> \$724)	<.001***	\$23,522	\$19,891
Welfare				
Most recent	-\$496 <i>(</i> \$171)	.004***	\$642	\$1,138
Average annual	-\$761 <i>(\$130)</i>	<.001***	\$929	\$1,690
SSI, SSDI, Social Secur	ity, and Pension Income			
Most recent	-\$247 (\$289)	.393	\$1,600	\$1,847
Average annual	-\$190 <i>(\$180)</i>	.293	\$1,307	\$1,497
Other Income				
Most recent	\$193 (\$308)	.531	\$1,893	\$1,700
Average annual	-\$19 <i>(</i> \$213)	.931	\$2,357	\$2,375

Exhibit 3-2. Impact of Compass FSS Program on Earnings and Public Benefits Receipt

^a The impact is equal to the change in outcome measure since baseline that is attributable to enrolling in the Compass FSS program.

^b The means presented in this table are regression-adjusted means. That is, they are the average outcome that the full sample (Compass FSS + Comparison) would have if it were in Compass, and the average outcome that the full sample (Compass FSS + Comparison) would have if it were *not* in Compass. These regression-adjusted means are our primary focus, rather than the unadjusted means mentioned earlier in this text, because they are more representative of the impact of participation in Compass on the whole analysis sample.

NOTES: There are 173 in the treatment group and 541 in the control group. Sample weights are used so that the effective sample size in the control group is 173, the same as the treatment group.

*/**/*** indicate p values less than 0.1, 0.05, and 0.01, respectively.

Limitations of Analysis

These estimates could be biased upwards or downwards due to a range of factors. The estimates could be biased upward due to selection bias; households that anticipate a rise in income have a larger financial incentive to join FSS than households who do not anticipate a rise in income, and households who choose to sign up for the FSS program may be more focused on improving their financial situation, a priori. Our approach rests on removing selection bias using control variables and propensity score matching. Still, our results may be biased in either a downwards or upwards direction due to the exclusion of households that left the HCV program at least one year before the end of the study period.⁴⁰

⁴⁰ See Appendix B for information on the number of households excluded from the Compass FSS and comparison group samples.

4. Comparison of FICO[®] Scores and Debt Changes Experienced by Compass FSS Participants and a Comparison Group

This chapter examines the extent to which the FICO[®] Scores and debt levels of Compass FSS participants with Housing Choice Vouchers (HCV) in Lynn and Cambridge change over time, and how any changes compare with changes in a comparison group provided by the Experian credit bureau. Specifically, this analysis addresses the following research question:

How do changes over time in credit scores and debt profiles for Compass's FSS participants compare with changes in credit scores and debt profiles for other households with similar characteristics during the same period?

For this analysis, we studied participants in the Compass FSS programs in Cambridge or Lynn at any point between December 2010 and June 2015, including

- Those with HCVs in Cambridge and Lynn;
- Those living in LHAND public housing; and
- Lynn residents who received HCVs through the Massachusetts Boston Housing Partnership (MBHP).

We contrast the changes in FICO[®] Score and debt (including total debt and types of debt) for these Compass FSS participants with the changes experienced by individuals with certain similar characteristics during the same time periods (credit and debt comparison group).

In the following sections, we describe the data sources and methodology (Section 4.1), the experiences of the two groups at baseline (Section 4.2), and the similarities and differences between the two groups. We then report the changes in FICO[®] Scores (Section 4.3) and debt levels (Section 4.4) experienced by each group. For this analysis, we explore the differences between those changes, a "difference in difference" comparison that might reflect the effect of participating in the Compass FSS program.

Because the credit and debt comparison group does not consist of individuals participating in the HCV or public housing programs and we do not control for a broader range of baseline characteristics, we do not describe this analysis as quasi-experimental and do not use the term "impact" to describe the difference between the changes we observe in the Compass and comparison groups. We do believe, however, that the comparison group provides a useful benchmark for assessing the progress made by Compass FSS participants.

Summary of Comparisons Presented in Chapter 4

- Compass FSS participants saw modest but significant increases in FICO[®] Scores. Those who did not have a score at enrollment in FSS gained them, and those who did have scores improved them, by a larger and more significant degree than did comparison group members. Scores of Compass FSS participants increased an average of 23 points (4 percent increase), whereas scores of comparison group members increased only 4 points (less than 1 percent). The FICO[®] Score increase experienced by Compass FSS Participants was larger, by a statistically significant amount (*p*<.01), than the increase experienced by the comparison group.
- The share of Compass FSS participants with a FICO[®] Score increased by 7 percentage points and the share of comparison group members with a credit score decreased by one percentage point. This difference in changes for the two groups is also statistically significant (*p*<.01). In addition, Compass participants who gained a FICO[®] Score had relatively high ending FICO[®] Scores (average of 637) compared to those in the comparison group who gained a score (555).
- Compass FSS participants tend to have substantial debt at enrollment: average total debt (including derogatory debt) of \$15,081 and median of \$7,690. This is driven, in part by a subset of participants with particularly high debt. These enrollment debt levels seem to be affected substantially by credit card debt (average of \$3,268 and median of \$1,180) and, at the high end, by student debt (the 75th percentile of student debt is \$5,201).
- Compass participants and comparison group members both saw an increase in average total debt over comparable time periods (\$1,570 and \$5,226, respectively). However, Compass FSS participants saw increases that were less than half those of the comparison group, a statistically significant difference between groups (*p*<.001).
- Total debt that is derogatory declined for Compass FSS participants and increased for comparison group members, showing statistically significantly different changes for each group (p<.05). The difference between the changes seen by the two groups (average decline of \$764 and average increase of \$554, respectively) is highly statistically significant (p<.01). Though the shares of each group with any derogatory debt were relatively close at baseline (65 percent for Compass FSS and 61 percent for the comparison group), among Compass participants this share declined 11 percentage points over time (to 54 percent), whereas comparison group members saw a slight increase (to 66 percent). These changes in the share with derogatory debt were statistically significant (p<.01) both within each group and between them.
- Compass FSS participants decreased credit card debt by an average of \$654 since enrollment (a statistically significant difference at p<.05), whereas the comparison group's average credit card debt remained flat (decrease of \$2). The difference in the differences between the two groups is statistically significant (p<.05). One-quarter of Compass households experienced a decrease in credit card debt of \$1,000 or more.

4.1 Data and Methodology

To provide context for interpreting the changes over time in the FICO[®] Scores and debt levels of Compass FSS participants, we sought a comparison group of individuals similar to those participants to suggest how FICO[®] Scores and debt levels would have changed over time in the absence of the Compass program.

Ideally, we would have created the credit and debt comparison group by obtaining FICO[®] Score data for heads of household in HCV programs who are not enrolled in a Compass FSS program. However, because of the expense required to obtain consent and the potential refusal of people not participating in FSS to permit the study team to pull their credit reports, this option was not feasible. Instead, the Experian credit bureau offered to support this research by giving us annual longitudinal, de-identified data on randomly selected people who met criteria that we specified. Experian provided a comparison group of consumers in the same census tracts with similar ranges of credit, debt, and demographic characteristics over time periods similar to those during which Compass FSS participants were in the FSS program. The comparison group differs from the Compass FSS participants in that the vast majority do not receive rental housing assistance through the HCV or public housing program, and in that the vast majority have likely not chosen or sought to participate in a program that offers to help them improve their financial situation.

This section describes (1) the data sources used for this analysis and (2) how we selected the comparison group for whom Experian provided data.

4.1.1 Data Sources

For the analysis of changes in FICO[®] score and debt, we use two data sources.

Compass FSS Participant Data

For Compass FSS participants, we received data gathered by Compass Working Capital on its participants in Lynn and Cambridge. These data include FICO[®] Scores and debt information pulled by Compass with participants' consent upon initial enrollment in FSS pre-program workshops and for semi-annual appointments with Compass financial coaches. The source of these data was the Experian credit bureau, but it was processed and provided to Compass by Kroll Factual Data, using its Bureau Express[®] tool to pull credit reports. Financial coaches entered these data into report fields in the Compass case management system. When transmitting these data to the Abt study team, Compass provided its decision rules for how financial coaches entered data into the case management system.

These data start with the first enrollees in the Compass FSS programs (October 2010) and continue through June 2015, when Compass moved to a new system that uses data from a different credit bureau and processor. To ensure data comparability over time, we made June 2015 the end point for the comparison between Compass FSS participants and the comparison group. Consent forms signed by participants permitted credit bureau data entered into the case management system to be used in program evaluation, but did not include permission to obtain additional historical or future credit and debt data and use it for an evaluation.

The analysis covers 280 Compass participants who had at least one year of follow-up data available for analysis.⁴¹ In order to persist in the Compass FSS administrative dataset, FSS participants had to remain in the program following enrollment. Those who exited the program, either actively or passively (by not meeting with their financial coach) or who left housing assistance prior to one year following enrollment were not included in the analysis. In total, there are four people who initially enrolled in Compass FSS prior to June 2014 but had no data following their initial enrollment and so were not included in this analysis. Participants who left the program after accumulating one year or more of follow-up data are included in this analysis even if they subsequently left the Compass FSS program, were terminated from the Compass FSS program, or left the housing authority entirely.

Comparison Group Data

For the comparison group, Compass and Abt worked with the Experian credit bureau, which provided data as comparable as possible to the Compass-processed data, in an annual longitudinal file. These data were pulled in annual cohorts designed to roughly match enrollment in a Compass FSS program (for those included in the Compass analysis dataset). The first comparison group cohort data starts in December 2010 and the final annual data pull is in December 2014. The selection of the comparison group is described below.

Comparability of data

There are some differences between the Experian data variables themselves and the ones in Compass's system tracked for its FSS participants, primarily because Compass received the initial data from a third-party provider, which did some processing and labeling for simplicity, and because Compass financial coaches combined some of those variables (e.g., specific types of debt) into a smaller number of fields that are most useful for tracking participant progress and providing financial coaching. The FICO[®] credit scores included in the Compass and comparison group data sources are fully comparable. For individual debt categories (e.g., auto loan debt), Compass's system combines non-derogatory and derogatory debt, and it is not possible to separate these categories. For some debt categories, the Experian database used to create the comparison group offers only non-derogatory debt as an available variable. Thus, it is impossible to develop an apples-to-apples comparison of changes in some debt categories between the two samples (e.g., auto debt and student debt; and Compass has also constructed an "other debt" category that cannot be appropriately matched with Experian data).

In this report, we have included these non-comparable categories in descriptive tables only, to help describe and understand the components of debt within each of the samples (but not to compare

⁴¹ The numbers of Compass FSS participants included in the earnings and public benefits receipt analyses described in Chapter 3 and the credit and debt analyses in this chapter vary for several reasons, including differences in time periods of data availability and types of participants included. The HUD PIC dataset provided to the study team for analysis of earnings and benefits runs through March 2016, whereas the Compass FSS administrative dataset based on Experian credit reports runs through June 2015. In addition, the earnings and benefits analysis includes only households in the Cambridge and Lynn HCV programs, whereas the credit and debt analysis includes households in the Cambridge and Lynn HCV programs, plus those in Lynn public housing programs and a handful of participants residing in Lynn who receive their housing assistance from MBHP but participate in the Compass FSS program.

directly between the two). For total debt and credit card debt, we combined derogatory debt with nonderogatory debt for comparability between the Compass and Experian datasets, and both data sources have a variable for total derogatory debt (though, given that the data processed by Kroll provided some proprietary summarizing, there still may be some subtle differences in which debt is included in derogatory debt for each category).

4.1.2 Experian Comparison Dataset Selection

A random selection of people in the United States would not be comparable to participants in the Compass FSS programs, who are low-income households receiving housing subsidies, mostly women, and geographically concentrated in Lynn and Cambridge, Massachusetts. Instead, based on our analysis of the characteristics of the 280 participants in the Compass FSS program for whom we had at least one year of follow-up data, we provided Experian with guidelines for selecting a subset of the U.S. population from which to randomly draw comparison households.

The first guideline was to select households who reside in the same census tracts as the Compass households. Although this guideline creates an opportunity for the comparison sample to include some of the Compass households, we concluded that this "contamination" would be minimal because Lynn and Cambridge are large cities and the majority of low-income households do not receive housing subsidies. The second set of criteria was to focus only on women who are not married, are under the age of 50, and do not have mortgage debt. Within the group who meet these geographic and demographic selection criteria, we specified the following additional selection criteria:

- Select 12 percent who do not have FICO[®] Scores at baseline and whose baseline earnings and income levels fall between \$0 and the 75th percentile earnings and income levels⁴² of Compass participants who did not have FICO[®] Scores.
- 2. Next, select 22 percent who have FICO[®] Scores at baseline below the 25th percentile of FICO[®] Scores of Compass participants, and who have baseline earnings and income levels between \$0 and the 75th percentile earnings and income levels of Compass participants whose FICO[®] Scores are in this first quartile.
- 3. Next, select 22 percent who have FICO[®] Scores at baseline between the 25th and 50th percentiles of FICO[®] Scores of Compass participants, and who have baseline earnings and income levels between \$0 and the 75th percentile earnings and income levels of Compass participants whose FICO[®] Scores are in this second quartile.
- 4. Next, select 22 percent who have FICO[®] Scores at baseline between the 50th and 75th percentiles of FICO[®] Scores of Compass participants, and who have baseline earnings and income levels between \$0 and the 75th percentile earnings and income levels of Compass participants whose FICO[®] Scores are in this third quartile.
- 5. Next, select 22 percent who have FICO[®] Scores at baseline above the 75th percentiles of FICO[®] Scores of Compass participants, and who have baseline earnings and income levels

⁴² Credit bureaus do not receive direct information on consumer earnings or income; however, Experian produces consumer earnings and income estimates that correlate with earnings and income by applying a proprietary model that makes use of known information in the consumer's credit and debt profile.

between \$0 and the 75th percentile earnings and income levels of Compass participants whose FICO[®] Scores are in this fourth quartile.

Finally, because Compass FSS participants join the program at various points in time throughout the study period, we asked Experian to draw up a similarly "stacked" longitudinal dataset. Specifically, 25 percent of the selected individuals were selected based on their December 2010 credit, income, and earnings levels and were followed for 4 years; 25 percent based on their December 2011 levels and followed for 3 years; 25 percent based on their December 2012 levels and followed for 2 years; and 25 percent based on their December 2013 levels and followed for 1 year.

Though the resulting sample of comparison households is roughly comparable to the Compass sample, there were some differences owing to constraints in selection criteria and processes. To further increase comparability, we use sample weights to make the individuals selected by Experian for the comparison group more equivalent to the Compass FSS households on baseline variables—specifically, credit score and credit card debt, which are relatively unambiguous indicators of financial health and access to credit and other services. To do this, we non-parametrically characterized the joint distribution of Compass FSS participants' FICO[®] Scores and credit card debts using 100 bins. For each bin, we assigned a weight to Experian households equal to the proportion of Compass FSS participants in that bin divided by the proportion of comparison group participants in that bin. As a result, the weighted distribution of comparison group households' FICO[®] Scores and credit card debt at baseline looks nearly identical to that of the Compass FSS participants'. In the next section we show the extent to which the resulting weighted comparison group is comparable to the Compass FSS participant sample.

4.2 Baseline Characteristics of Compass FSS Participants and Comparison Group Members

As just described, the members of the comparison group were chosen to mirror the characteristics of Compass FSS participants at baseline as closely as possible given the available information, and then weighted to further increase the precision of the match. "Baseline" dates are the dates that Compass FSS participants enrolled in the FSS program and that comparison group members entered the sample (selected to mirror Compass FSS enrollment dates). Exhibit 4-1 shows baseline demographic characteristics and average FICO[®] Score and debt baseline levels. All numbers provided in this analysis are weighted sample numbers. Almost all (93 percent) of the heads of households participating in Compass FSS are female, and the vast majority (79 percent) are under the age of 50. Almost three-quarters (71 percent) are unmarried. Given that there was no opportunity to match Compass participants one-to-one to Experian participants and there was a compelling need to keep selection criteria relatively simple, we used these baseline characteristics (female and unmarried) to restrict the sample. While this results in an imperfect comparison on demographic characteristics, it allowed for stratification in ranges of credit scores, total debt, and estimated income.

	N	Compass	N	Comparison Group	<i>p</i> -Value
Female	280	93.2%	1,936	100%	.000***
Married	280	28.9%	1,936	0%	.000***
Over age 50	280	20.1%	1,936	0%	.000***
FICO [®] Score	253	616.9	1,525	611.7	.344
No FICO [®] score	280	9.3%	1,936	8.5%	.674
Estimated annual earnings	280	\$22,753	1,936	\$26,982	.000***
Total debt	279	\$15,081	1,898	\$9,218	.000***
Credit card debt	279	\$3,267	1,898	\$2,640	.014**
Derogatory debt	279	\$3,322	1,898	\$2,993	.422

Exhibit 4-1. Compass FSS Participants versus Comparison Group: Average Credit, Debt, and Earnings Characteristics at Baseline

SOURCE: Compass Working Capital administrative data, October 2010-June 2015. Experian credit bureau comparison sample credit report data, December 2010-December 2014.

NOTE: Ns vary where debt and FICO[®] Score information is missing. Additionally, in order to prevent debt averages skewed by outliers, we excluded from all debt analysis (but not the analysis of FICO[®] Score) any households that held mortgages during the analysis period. This included 1 individual (0.4 percent) in the Compass sample and 40 (2 percent) in the comparison group sample. None in either sample had any mortgage debt at baseline.

*/**/*** indicates statistically different from baseline at the 10, 5, and 1 percent levels, respectively.

In Exhibit 4-1, we show the average baseline levels for the Compass FSS participants and the comparison group for FICO[®] Score, total debt (non-derogatory and derogatory), credit card debt, and total derogatory debt, as well as the percentage of each sample with no FICO[®] Score at baseline. This exhibit also includes a statistical test as to whether differences between the two samples are greater than differences that might occur randomly. We have also included estimated annual earnings in this table. The debt measures include comparable debt components between the Compass and comparison group samples.

There are some differences at baseline in characteristics between the two samples, resulting from limitations on sample stratification and weighting (all numbers provided in these exhibits are based on a weighted sample). Compass participants, for instance, held an average of almost two-thirds more debt overall (\$15,081 versus \$9,218) and about 20 percent more credit card debt (\$3,267 versus \$2,640) than did members of the comparison group. The *p*-values for the difference in total debt between the two groups are below .05, indicating that there is a statistically significant difference between the two samples on this characteristic.

However, the key outcome variables of FICO[®] Score and derogatory debt level are fairly comparable between the two samples at baseline, with the Compass FSS participants and the comparison group members averaging FICO[®] Scores of 617 and 612 and derogatory debt levels of \$3,322 and \$2,993, respectively. For neither of these measures is the difference between the two samples statistically significant (at either p<.05 or p<.1). At baseline, 9.3 percent of Compass FSS participants have no FICO[®] Score, compared with 8.5 percent of comparison group members. This difference is not statistically significant.

As shown in Exhibit 4-2, examining the 25th, 50th (median), and 75th percentiles of the FICO[®] Score, debt, and income characteristics at baseline provides additional context. Between the two groups, FICO[®] Score remains comparable when examining the quartiles; the medians (605 and 604, respectively) are virtually identical; and the distributions of the two groups' FICO[®] Scores are similar.

Compass FSS participants have a higher mean total debt (\$15,081) than do comparison group members (\$9,218; see Exhibit 4-1), and the Compass group's median is somewhat higher than the comparison group's (\$7,690 vs. \$6,190; Exhibit 4-2). The distribution is roughly similar.

The mean total derogatory debt between the two groups is roughly similar at baseline (see Exhibit 4-1), as is the distribution within groups. In addition, most Compass FSS participants have derogatory debt at baseline (Exhibit 4-2, median=\$774) that is well below the Compass mean of \$3,322 (see Exhibit 4-1), and the same is true for comparison group members. This suggests that in both samples, a relatively small proportion of households with very high derogatory debt skew the mean upwards.

Earnings (for the comparison group, these are estimated by Experian based on other characteristics) show some differences in distribution beyond what we see with the means. The Compass group's earnings have a lower median (\$23,090 compared to \$28,000 in the comparison group) and skew more widely than the comparison group's. One-quarter of Compass participants have baseline earnings below \$8,554, which is substantially lower than the comparison group's bottom quartile of \$23,000. This suggests that, at baseline, a substantial share of Compass FSS participants were living well below the poverty level whereas comparison group members may not have been. On the whole, while the samples are somewhat similar, the Compass FSS participants have higher debt levels and lower earnings levels at baseline.

		Comparison Group				
	25 th Percentile	50 th Percentile	75 th Percentile	25 th Percentile	50 th Percentile	75 th Percentile
FICO [®] Score	556	605	659	553	604	657
Estimated earnings	\$8,554	\$23,090	\$34,156	\$23,000	\$28,000	\$31,000
Total debt	\$2,351	\$7,690	\$18,605	\$1,959	\$6,190	\$12,583
Credit card debt	\$0	\$1,180	\$4,194	\$0	\$1,116	\$3,631
Derogatory debt	\$0	\$774	\$3,475	\$0	\$636	\$3,270

Exhibit 4-2. Compass FSS Participants versus Comparison Group: Credit, Debt, and Income Characteristics at Baseline, by Percentile

SOURCE: Compass Working Capital administrative data, October 2010-June 2015. Experian credit bureau comparison sample credit report data, December 2010-December 2014.

4.2.1 Compass and Comparison Group FICO[®] Scores and Debt at Baseline

In Exhibit 4-3, we show the range of the Compass FSS participants' FICO[®] Scores and debt levels upon enrolling in Compass FSS. Notably, the median participant carries more than a thousand dollars in credit card debt.

At the same time, this level of detail illustrates just how diverse each household's portfolio of debt is. Though the total debt variable for an individual is the sum of each component of debt (auto, credit card, student, personal loans, and "other" debt), and the median total debt is \$7,690, the *medians* of each debt component do not sum to \$7,690, suggesting that individuals who hold high levels of debt in some components may have very low or no debt in others. This pattern is further evidenced by the distance between the average and the median for each debt variable. For example, though at least half of the Compass FSS participants have no student debt, the average student debt is \$7,152, suggesting that the debt levels of a small share of participants are skewing the mean for all others. Indeed, the mean student debt for participants who *have* student debt at baseline is \$20,363 (not shown). All other debt components exhibit a similar behavior.

At baseline, the median FICO[®] Score (605; see Exhibit 4-2) is not dissimilar from the mean FICO[®] Score (617), and the distribution seems relatively symmetrical.

		Percentile									
	Min.	5 th	25 th	50 th	75 th	95 th	Max.	Average			
FICO [®] Score	444	502	556	605	659	785	822	616.9			
Auto debt	\$0	\$0	\$0	\$0	\$849	\$19,502	\$37,469	\$3,137.75			
Credit card debt	\$0	\$0	\$0	\$1,180	\$4,194	\$13,561	\$55,870	\$3,267.59			
Student debt	\$0	\$0	\$0	\$0	\$5,201	\$44,756	\$124,858	\$7,152.42			
Personal loan debt	\$0	\$0	\$0	\$0	\$0	\$3,189	\$13,106	\$433.79			
Other debt	\$0	\$0	\$0	\$281	\$1,304	\$4,213	\$26,113	\$1,089.46			
Total debt	\$0	\$1	\$2,351	\$7,690	\$18,605	\$62,366	\$144,742	\$15,081.00			
Portion of total debt that is derogatory	\$0	\$0	\$0	\$774	\$3,475	\$14,757	\$86,376	\$3,322.14			

Exhibit 4-3. Compass FSS Participants – Debt and FICO[®] Score at Baseline

SOURCE: Compass Working Capital administrative data, October 2010-June 2015.

NOTE: N=279 for all categories of debt. For FICO[®] Score, N=253 as FICO[®] Score percentiles exclude those without a FICO[®] Score. All debt categories include both derogatory and non-derogatory debt, with the exception of Portion of Total Debt That Is Derogatory, which includes only total derogatory debt.

As with the Compass FSS participants, the debt composition of individuals in the comparison group also varies considerably between households, with large debts held by a small proportion of people skewing the average upward. As discussed previously, credit card debt is lower in the comparison group sample (Exhibit 4-4) than in the Compass sample. So, too, are auto debt, student loan debt, and personal loan debt.

		Percentile								
	Min.	5 th	25 th	50 th	75 th	95 th	Max.	Average		
FICO [®] Score	441	491	553	604	657	762	780	611.7		
Auto debt	\$0	\$0	\$0	\$0	\$0	\$14,371	\$27,430	\$1,933.30		
Credit card debt	\$0	\$0	\$0	\$1,116	\$3,631	\$10,400	\$20,980	\$2,640.35		
Student debt	\$0	\$0	\$0	\$0	\$5,015	\$40,365	\$210,931	\$7,887.97		
Personal loan debt	\$0	\$0	\$0	\$0	\$0	\$1,152	\$16,987	\$201.50		
Total debt	\$0	\$104	\$1,959	\$6,190	\$12,583	\$30,841	\$70,143	\$9,218.41		
Portion of total debt that is derogatory	\$0	\$0	\$0	\$636	\$3,270	\$15,164	\$65,412	\$2,993.56		

Exhibit 4-4. Comparison Group – Debt and FICO[®] Score at Baseline

SOURCE: Experian credit bureau comparison sample credit report data, December 2010-December 2014. NOTE: N=1898 for all categories of debt. For FICO[®] Score, N=1525 as FICO[®] Score percentiles exclude those without a FICO[®] Score. Credit Card Debt and Total Debt categories include both non-derogatory debt and derogatory debt. Auto Debt, Student Debt, and Personal Loan Debt include only non-derogatory debt, so are not fully comparable with Compass FSS debt data and are included here to understand the debt profile of the comparison group sample only.

4.3 Comparison of Changes in FICO[®] Scores

This section describes changes in FICO[®] Scores between baseline and endline for Compass FSS participants and for comparison group households. The endline date is the most recent available FICO[®] Score as of June 2015 for Compass FSS participants and December 2014 for all comparison croup members. FICO[®] Scores can vary in multiple meaningful ways. Individuals may have a high or a low score, which has an effect on credit and interest rates available to them. Some have no FICO[®] Score calculated at all because of a thin credit file, which limits their access to credit substantially.

In this section, we first describe changes over time in FICO[®] Scores and whether the Compass FSS participants or comparison group members have FICO[®] Scores. We then measure the changes in outcomes for members of the two groups.

Exhibit 4-5 shows the changes in FICO[®] Score between baseline and endline for Compass FSS participants who have a score at baseline, including average, median, and more fine grained quartiles and percentiles of change. Compass participants saw a modest average increase in FICO[®] Score between baseline and endline (23 points) and a similar increase in the median score (22 points). Few Compass participants experienced a substantial decrease in FICO[®] Score (the 25th percentile of FICO[®] Score change was a loss of 7 points, and the 5th percentile was a loss of 68 points). Some experienced a substantial increase (the 75th percentile of FICO[®] Score change was a gain of 53 points).

In contrast, the comparison group members saw only a small increase in FICO[®] Score, 4 points on average and 8 points in the median increase. Notably, about half (52 percent) of the comparison group members saw an increase in FICO[®] Score or gained a FICO[®] Score between baseline and endline, whereas two-thirds (67 percent) of the Compass participants did.

Among the comparison group members, the spread of FICO[®] Score change was wider than for Compass FSS participants, and it skewed toward bigger losses. Substantial decreases were more

common among comparison group members—a finding consistent with the hypothesis that participation in the Compass FSS program (or the characteristics of individuals motivated to participate in Compass FSS) may protect against large losses in FICO[®] Score. Receiving housing assistance could play a role, as well, as comparison group members are unlikely to be in subsidized housing despite income levels roughly similar to Compass FSS participants'.

Exhibit 4-5. Compass FSS Participants versus Comparison Group: Changes in FICO®	Scores
between Baseline and Endline	

			Increased						
	Min.	5 th	25 th	50 th	75 th	95 th	Max.	Average	Score or Gained a Score
Compass (N=253)	-134	-68	-7	22	53	122	195	23.0	67.1%
Comparison group (N=1525)	-269	-120	-30	8	42	107	246	3.9	52.2%

SOURCE: Compass Working Capital administrative data, October 2010-June 2015. Experian credit bureau comparison sample credit report data, December 2010-December 2014.

Exhibit 4-6 outlines the changes in FICO[®] Score from baseline to endline for Compass FSS participants and comparison group members who lacked a FICO[®] Score at baseline. Notably, Compass participants with no FICO[®] Score at baseline were very likely (81 percent) to have a score at endline, whereas comparison group members who had no FICO[®] Score at baseline were most likely not to have one at endline either (44 percent). Furthermore, Compass participants who gained a score from baseline to endline had substantially higher average scores (637) than members in the comparison group who gained a score from baseline to endline (555). In all, the share of Compass FSS participants with a FICO[®] Score increased from 91 percent at baseline to 98 percent at endline, but the share of individuals in the comparison group with a FICO[®] Score stayed roughly the same.

Exhibit 4-6. Compass FSS Participants versus Comparison Group: Members without Credit Scores at Baseline

Compass FSS

- At baseline, 9.3 percent of Compass FSS participants had no FICO[®] Score.
- Of those who had no FICO[®] Score at baseline 80.8% had gained one at endline.
- Those participants who "gained" a FICO[®] Score had an average score of 636.8 at endline.

Comparison Group

- At baseline, 8.5 percent of comparison group members had no FICO[®] Score.
- Of those who had no FICO[®] Score at baseline 43.5% had gained one at endline.
- Those participants who "gained" a FICO[®] Score had an average score of 555.0 at endline.

SOURCE: Compass Working Capital administrative data, October 2010-June 2015. Experian credit bureau comparison sample credit report data, December 2010-December 2014.

NOTE: FICO[®] Score percentages are out of N=280 for Compass and N=1936 for the comparison group.

We also examined the extent to which Compass FSS participants and comparison group members were able to achieve scores that are high enough to access certain types of credit products. Though these is some variation in how lenders use credit scores to assess risk, a score of 660 is often used as a

cutoff for prime credit,⁴³ and some mortgage programs (e.g., Massachusetts Boston Housing Partnership's ONE Mortgage program) have required a score of 660 or above for potential borrowers to be approved for a loan.

As shown in Exhibit 4-7, at baseline, 22 percent of Compass FSS participants had FICO[®] Scores of 660 or more. More than 90 percent of Compass participants who had a score of 660 or above at baseline maintained a score at this level through endline. Another 16 percent did not have this score at baseline but *attained* a score at this level by endline. At endline, more than one-third (37 percent) of Compass FSS participants had a score of 660 or above.

Though the same proportion of comparison group members possessed a score at or greater than 660 at baseline, less than three-quarters (73 percent) of comparison group members who had a score of 660 or above at baseline maintained a score at this level through endline. Comparison group members were only half as likely (8 percent) as Compass participants to attain a score at this level between baseline and endline (a statistically significant difference between the groups (p<.01)). The proportion of the comparison group with this score remained largely unchanged at endline, at 24 percent; that difference between the samples also is statistically detectable (p<.01).

The difference in experiences between the Compass FSS participants and comparison group members is consistent with the hypothesis that participation in Compass may help participants gain a FICO[®] Score if they don't have one and also help participants maintain, gain, or increase a FICO[®] Score beyond this threshold level.

Exhibit 4-7. Compass FSS Participants versus Comparison Group: Share Who Gain, Lose, and Maintain a "Threshold" FICO[®] Score between Baseline and Endline

	Compass	Ν	Comparison Group	Ν	<i>p</i> -Value
660 or above at baseline	22.5%	280	21.7%	1936	.762
660 or above at endline	36.8%	280	24.0%	1936	.000***
660 or above at both baseline and endline	20.4%	280	15.9%	1936	.058*
Attained a FICO [®] Score of 660 or above between baseline and endline ^a	16.4%	280	8.1%	1936	.000***
Lost a FICO [®] Score of 660 or above between baseline and endline ^b	2.1%	280	5.8%	1936	.010**

SOURCE: Compass Working Capital administrative data, October 2010-June 2015. Experian credit bureau comparison sample credit report data, December 2010-December 2014.

^a Includes increasing score to \geq 660 or moving from no score to a score of \geq 660.

^b Includes decreasing score to <660 or moving from a score of ≥660 to no score.

*/**/*** indicates statistically different changes from baseline at the 10, 5, and 1 percent levels, respectively.

⁴³ For example, FDIC has included a FICO score of 660 or below as one trigger for defining a borrower as subprime; see <u>https://www.fdic.gov/about/comein/background.html</u>.

4.3.1 Difference in Changes in Credit Score between Compass and Comparison Groups

In this section, we compare the changes in FICO[®] Scores experienced by Compass FSS participants between baseline and endline with the changes over a similar time period experienced by comparison group members. (This type of analysis is called "difference in difference.") To understand whether the Compass FSS participants experienced gains that outpaced those of the comparison group, we have employed a test of statistical likelihood that the average differences in gains or losses between the two groups are meaningfully different from zero. In other words, we examined whether there is reason to believe that the changes experienced by Compass FSS participants are different from the changes experienced by the comparison group in ways that cannot easily be explained by random variation.

In examining these results, it is important to remember that the two samples have similar characteristics at baseline but also have some differences. In addition, Compass FSS participants all participate in housing assistance programs, whereas comparison group members are unlikely to have housing assistance. These caveats aside, the similarities in the comparison group at baseline and that we are comparing the changes between baseline and endline dates rather than the raw characteristics of the two samples suggest some meaningful differences between the two groups' progress over roughly comparable periods of time.

Exhibit 4-8 shows the difference in difference for three of the primary outcomes related to credit scores: change in FICO[®] Score for those households who start with a score, change in the percentage who have a FICO[®] Score, and change in the percentage who have a FICO[®] Score above 660. On all three outcomes, the Compass FSS participants performed better than the comparison group members, and all three of these differences in differences between the Compass FSS participants and the comparison group members are highly statistically significant (p<.01).

Compass						<i>p</i> -Value for Difference in					
	Baseline	Endline	Change	<i>p-</i> Value	N	Baseline	Endline	Change	<i>p-</i> Value	N	Difference
FICO® Score	616.9	639.9	23.0	.000***	253	611.7	615.6	3.9	.02200**	1,525	.000***
With a FICO [®] Score	91%	98%	7 рр	.000***	280	91%	91%	-1 рр	.18219	1,936	.000***
With FICO® Score above 660	23%	37%	14 рр	.000***	280	22%	24%	2 рр	.00714***	,1936	.000***

Exhibit 4-8. Compass FSS Participants versus Comparison Group: Average Change in Credit Score Statistics between Baseline and Endline

SOURCE: Compass Working Capital administrative data, October 2010-June 2015. Experian credit bureau comparison sample credit report data, December 2010-December 2014.

*/**/*** indicates statistically differences from baseline or statistically significant different changes from baseline at the 10, 5, and 1 percent levels, respectively.

4.4 Comparison of Changes in Debt

This section describes changes in debt between baseline and endline for Compass FSS participants and for comparison group members.

Exhibit 4-9 shows Compass FSS participants' changes in debt between baseline and endline, including average, median, and more fine grained quartiles and percentiles of change. Compass participants saw average decreases in credit card debt and in derogatory debt of \$655 and \$764, respectively. One-quarter of participants saw a reduction in credit card debt of more than \$1,000 between baseline and endline, whereas one-quarter saw an increase of more than \$350. Some Compass FSS participants also saw notable decreases in derogatory debt, and very few (5 percent or fewer) saw increases in derogatory debt. One-quarter of Compass participants decreased their derogatory debt by \$1,100 or more.

Overall, Compass FSS participants experienced an increase in average total debt, though the median change was slightly negative (reduction of \$91), indicating that the average is driven by a minority of participants whose debt increased. It is not entirely clear which components of debt drove the average increase in total debt. Average auto debt increased by \$885, but most (82 percent) participants either reduced their auto debt or maintained zero auto debt. Similarly, there was an average increase in student debt of \$1,621, but almost three-quarters of participants (74 percent) either reduced their student debt or maintained zero student debt.

Like total debt, as described above, that average increase in student debt appears to be driven by outliers (a minority of participants who take out a large amount of student debt during the period we are reviewing). Though a substantial share of Compass FSS participants had student debt at baseline, the majority did not. Student debt may be positive or negative for a household's financial health, depending on the reason for it and the ultimate results of pursuing a degree. Auto debt can also be positive for financial health in some circumstances – for example, when it is used to purchase a car to travel to and from work at a reasonable rate of interest.

			P	Percentil			Improved or			
N=279	Min.	5 th	25 th	50th	75 th	95 th	Max.	Average	No Debt	
Auto debt	-\$19,345	-\$9,545	\$0	\$0	\$0	\$16,626	\$37,810	\$884.61	81.7%	
Credit card debt	-\$41,359	-\$7,090	-\$1,040	\$0	\$353	\$4,602	\$12,435	-\$654.52	59.9%	
Student debt	-\$12,884	-\$2,472	\$0	\$0	\$0	\$15,586	\$34,750	\$1,621.37	73.5%	
Personal loan debt	-\$13,106	-\$1,773	\$0	\$0	\$0	\$1,177	\$7,560	-\$170.77	87.8%	
Other debt	-\$16,493	-\$2,480	-\$444	\$0	\$0	\$1,532	\$8,564	-\$272.10	74.6%	
Total debt	-\$35,536	-\$13,582	-\$2,662	-\$91	\$4,768	\$21,373	\$50,917	\$1,569.97	53.0%	
Portion of total debt that is derogatory	-\$52,971	-\$7,499	-\$1,101	\$0	\$0	\$2,517	\$43,188	-\$763.80	74.9%	

Exhibit 4-9. Compass FSS Participants – Changes in Debt Level between Baseline and Endline

SOURCE: Compass Working Capital administrative data, October 2010-June 2015.

Exhibit 4-10 shows comparison group members' changes in debt from baseline to endline. Whereas the Compass FSS participants saw a decrease in average credit card debt, the comparison group saw almost no change in its average (reduction of \$2). However, the median comparison group member

(and the median Compass participant) saw no change in credit card debt. In both samples, somewhat similar shares experienced a decrease or maintained no credit card debt (60 percent for Compass participants and 57 percent for the comparison group).

Overall, comparison group members saw larger increases in total debt than did Compass participants. (Comparison group members had an average increase of \$5,226 and a more modest median increase of \$301). As with the Compass sample, it is not clear which components of debt drove the average increase in total debt for the comparison group, and the components likely vary substantially among members of the group. The comparison group saw average auto debt increase by \$1,294 (about 50 percent more than the Compass group), but most (84 percent) either reduced their auto debt or maintained zero auto debt.

Similarly, comparison group members saw an average increase in student debt of \$2,448, but more than three-quarters of them (76 percent) either reduced their student debt or maintained zero student debt.

	Percentile									
N=1898	Min.	5 th	25 th	50 th	75 th	95 th	Max.	Average	Maintained No Debt	
Auto debt	-\$26,031	-\$8,019	\$0	\$0	\$0	\$16,732	\$51,100	\$1,294	83.6%	
Credit card debt	-\$20,980	-\$5,484	-\$878	\$0	\$824	\$6,218	\$23,003	-\$2	56.9%	
Student debt	-\$170,309	-\$4,956	\$0	\$0	\$0	\$19,322	\$143,809	\$2,448	76.0%	
Personal Ioan debt	-\$16,987	-\$728	\$0	\$0	\$0	\$79	\$21,902	\$5	94.7%	
Total debt	-\$57,567	-\$9,947	-\$2,123	\$301	\$7,111	\$32,563	\$211,430	\$5,226	42.9%	
Portion of total debt that is derogatory	-\$51,811	-\$4,789	-\$342	\$0	\$716	\$9,134	\$47,690	\$554	56.9%	

Exhibit 4-10. Comparison Group – Changes in Debt Level between Baseline and Endline

SOURCE: Experian credit bureau comparison sample credit report data, December 2010-December 2014.

4.4.1 Difference in Changes in Debt between Compass and Comparison Groups

In this section, we compare the change in debt levels for Compass FSS participants between baseline and endline versus the changes experienced by comparison group members over a similar time period (the difference in difference). We have employed a test of statistical likelihood that the average differences in gains or losses between the two groups are meaningfully different from zero.

As noted above, it is important to remember that the two samples have similar characteristics but also have differences along some measures. In addition, Compass FSS participants all participate in housing assistance programs and may have differences in motivation (Compass FSS participants chose to participate in a voluntary program), whereas most (or even all) comparison group members do not receive housing assistance and have not specifically elected to participate in FSS. These caveats aside, the similarities between the Compass FSS participants and the comparison group members at baseline and that we are comparing the change between baseline and endline rather than the raw characteristics at a point in time suggest the comparison between the two groups is a meaningful one.

Difference in Difference by Debt Categories

As shown in Exhibit 4-11 (page 66), total debt increased for both groups, but the Compass FSS households only experienced about a third of the increase that the comparison group members did (\$1,570 versus \$5,226). This distinction is particularly notable as a proportion of baseline debt. Though the total debt of Compass households increased by about 10 percent (from \$15,081), the total debt of the comparison group members increased by 57 percent (from \$9,218). Part of this disparity can be attributed to the markedly different levels that the groups started with—and potentially a regression to the mean. Still, the distinction is suggestive of a decline in the rate at which Compass FSS participants take on new debt. The change in total debt for each group is statistically significant at least at the *p*<.05 level. The difference in difference between the two groups is significant at the comparison group members did. The decline in the proportion of households who hold any debt at all is not statistically significant.

Compass FSS participants experienced an average decrease in total derogatory debt of \$764, whereas comparison group members saw an *increase* of \$554, both of which are statistically significant differences at least at the p<.05 level, and the difference in difference between the two was highly statistically significant (p<.01). Furthermore, the share of households with any debt that is derogatory declined 11 percentage points, from 65 percent to 54 percent among Compass households. Comparison group members saw a slight increase in the share with derogatory debt (from 61 percent to 66 percent).

On this measure, Compass households saw what appears to be real progress in eliminating derogatory debt, both on their own and as compared with the progress of the comparison group (p<.01).

Although the endline credit card debt of Compass FSS participants is similar to that of the comparison group members, the Compass households started with higher levels of credit card debt and experienced a decrease in average credit card debt of \$655, whereas comparison group members' average credit card debt remained essentially flat. The difference between the changes experienced by the two groups is highly statistically significant (p < .01). The share of Compass households with any credit card debt increased slightly between baseline and endline (4 percentage points), whereas the share of comparison group members with any credit card debt decreased by 8 percentage points. The difference in this change between the two groups is highly statistically significant (p < .01).

Credit card debt can be a major pitfall for individuals, but going from zero to non-zero credit card debt also might indicate that a household has gained access to credit that it did not have previously.

			Compass				<i>p</i> -Value for				
	Baseline	Endline	Change	<i>p</i> -Value	N	Baseline	Endline	Change	<i>p</i> -Value	N	Difference in Difference
Credit card debt	\$3,267.59	\$2,613	-\$655	.019**	279	\$2,640	\$2,639	-\$2	.984	1,898	.011***
With credit card debt	75%	79%	4 pp	.103	279	74%	66%	-8 pp	.000***	1,898	.000***
Total debt	\$15,081	\$16,651	\$1,570	.011**	279	\$9,218	\$14,444	\$5,226	.000***	1,898	.001***
With any debt	96%	97%	1 pp	.468	279	97%	96%	–1 рр	.293	1,898	.272
Total debt that is derogatory	\$3,322	\$2,558	-\$763.80	.022**	279	\$2,993	\$3,548	\$554	.000***	1,898	.000***
With any derogatory debt	65%	54%	–11 pp	.000***	279	61%	66%	5 pp	.000***	1,898	.000

Exhibit 4-11. Compass FSS Participants versus Comparison Group: Average Change in Comparable Debt Statistics between Baseline and Endline

SOURCE: Compass Working Capital administrative data, October 2010-June 2015. Experian credit bureau comparison sample credit report data, December 2010-December 2014.

NOTE: Credit card debt and total debt include the sum of both derogatory and non-derogatory debt for these categories.

*/**/*** indicates statistically different from baseline or statistically different changes from baseline at the 10, 5, and 1 percent levels, respectively.

Overall, Compass participants have seen notable and statistically significant gains in average FICO[®] Score and reductions in key types of debt (credit card and derogatory debt) as compared to the experience of the comparison group. Though there is some baseline variation between Compass FSS participants and comparison group members (including differences in estimated baseline earnings, baseline total debt, and the fact that Compass FSS participants receive housing assistance and chose to participate in the Compass FSS program), they are similar at baseline on other key factors (including FICO[®] Score, credit card debt, derogatory debt, and earnings).

While this comparison does not allow us to conclude definitively that the differences in change in credit and debt experienced between the Compass FSS participants and the comparison group over the study period are a result of Compass FSS program alone, the two groups' substantially different experiences since baseline suggests that the Compass FSS program helped participants increase credit and reduce key types of debt.

5. Conclusion and Questions for Future Research

As detailed in this report, we found that Compass FSS participants performed substantially better than the comparison groups in terms of: (a) growth in earnings, (b) reductions in welfare income, (c) growth in FICO[®] Scores; and (d) reductions in credit card and derogatory debt. Our results suggest that FSS can be an effective platform for helping participants in subsidized housing programs to make progress toward economic security. They also prompt a number of follow-up questions that would benefit from future research.

We outline below three sets of follow-up questions that may be of interest to Compass, HUD or the broader field:

First, what are the characteristics of a successful FSS program? FSS is a flexible program model, and other local FSS programs are likely to vary from Compass in both their programmatic approach and organizational characteristics. Are there certain programmatic approaches to working with FSS participants – such as financial coaching – that lead to more or less earnings growth and improvements in credit and debt outcomes? Are there particular organizational practices – for example, certain hiring criteria or standards, nature and frequency of on-the-job training, organizational culture, etc. – that lead to stronger or weaker outcomes for participants?

Second, what are the long-term outcomes for Compass FSS participants? The standard FSS contract of participation is for five years, with the possibility of an extension for up to two additional years. Our study tracked participants' earnings growth over an average of 40 months. Do the earnings of Compass FSS households continue to increase over the remaining course of their participation in FSS?⁴⁴ Do participants maintain their higher earnings after the conclusion of the program, and for how long? Do comparison households eventually catch up? Do Compass FSS participants maintain their higher credit scores, and to what extent do they benefit from the higher scores? These questions could be addressed when more participants complete the Compass FSS program.

Finally, what effect, if any, does FSS have on non-participating members of the FSS-participant households? We found that the earnings growth of households participating in FSS reflected a combination of earnings growth for the head of household and the earnings of other household members. We also found that the average number of earners in Compass households increased modestly over time. Who are these other earners? Are they adult children? Significant others or spouses? Did FSS have an effect on the earnings of these other household members and on the household composition itself and, if so, through what mechanism(s)? To the extent FSS encourages the addition of other adults, what effects does this have on such outcomes as household income and assets, the likelihood of leaving subsidized housing, or the presence of two parents in the household?

⁴⁴ The descriptive analysis presented in Chapter 2 of this report suggests the answer may be yes, but a larger sample or follow-up period would be needed to provide a definitive answer. We examine earnings change based on length of time in the program and generally find that earnings growth continues for FSS participants in years 4 and 5. However, our data do not extend beyond 5 years and the numbers of households in each cohort (especially those with 4 or 5 years of follow-up) are small.

Does FSS have positive spillover effects on children – for example, by enhancing their long-term earnings and financial well-being prospects?

We will be preparing an exploratory look at the costs and benefits of Compass's FSS program. In addition, the pending MDRC study of large FSS programs should help shed light on the outcomes of certain other FSS programs. We hope other researchers extend this research with a deeper look into other local implementations of this promising program.

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Appendix A. Detailed Data and Matching Methodology for Earnings and Benefits Quasi-Experimental Analysis

In order to conduct a rigorous quasi-experimental analysis of the Compass FSS program's impact on the earnings and benefits receipt of its participants, we selected comparison group members from PHAs in southern New England in areas with similarities to Cambridge and Lynn. We selected specific comparison households for Cambridge and Lynn Compass FSS participant households using a propensity score matching model designed to include features that are highly correlated with participation in Compass FSS (which is a voluntary program).

This section briefly describes (1) the data sources for the quasi-experimental impact analysis of the Compass FSS program on the changes in earnings and benefits receipt of its participants, (2) how we selected HCV programs in similar urban settings, and (3) how we selected comparable households from the list of selected HCV programs. The data sources described in this section are also the ones used to provide a detailed descriptive analysis of Compass FSS participants' changes in earnings and benefits receipt described in Chapter 2.

Data Sources and Compass FSS Enrollment over Time

This evaluation uses HUD data from the PIH Information Center (PIC) entered by housing authorities for PIC module Form HUD-50058 (Family Report, Applies to Public Housing, Housing Choice Voucher, and Section 8 Moderate Rehabilitation Programs). From HUD, Abt obtained PIC data for all households receiving Housing Choice Vouchers in all public housing authorities in Massachusetts, Rhode Island, and Connecticut who had a HUD-50058 record between July 1, 2007, and March 31, 2016.

Compass began providing the FSS program in Lynn in October 2010, and in Cambridge in November 2012. Participation in an FSS program is observable from the PIC records, as are earnings, demographics, and household composition.⁴⁵ A PIC record is generated for each household whenever the household enters the HCV program, exits the voucher program, has an annual income recertification, or has an interim income recertification, as well as at other discrete events (e.g.,

⁴⁵ Many MTW housing agencies, including Cambridge, do not submit to HUD the FSS addendum data needed to determine FSS participation from PIC transaction records. Accordingly, in order to generate the dates of entry and exit into the FSS program that were essential for our analysis, the Cambridge Housing Authority provided supplemental entry and exit information about its own FSS participants to HUD, which included these supplemental Cambridge Housing Authority data in the data we received.

moving addresses, gaining a child, correcting a previous record).⁴⁶ Only households participating in the HCV or public housing program have records in this system, and we only obtained records for HCV participants.

We wrote a computer program (using Stata statistical analysis software) to convert the Form 50058 records into a longitudinal dataset in which each household is one observation/row and data in different columns represent data from different time periods. We record program participation and calculate quarterly earnings, quarterly household composition, and quarterly benefits receipt for each household, based on each household's stream of 50058 forms over time. Using these records, it appears that 250 households participated in the Compass FSS programs in Lynn and Cambridge between January 2011 and March 2016.⁴⁷ Exhibit A-1 displays the number of participating households in each quarter.





⁴⁶ All PHAs in our sample conduct an annual reexamination of income of HCV households. Some PHAs require households that experience increases in income in between annual reexaminations to report them to the PHA through interim reexaminations. In order to get the most complete picture of changes in earnings over time, our main analysis looks at all reexamination data, including data from interim examinations. Of our two study sites, Lynn requires interim reexaminations but Cambridge does not. We are not aware of the interim reporting requirements of the comparison PHAs throughout the study period. Differences in interim reporting requirements across PHAs are a limitation of the analysis.

⁴⁷ Imputation of panel data for the longitudinal dataset may lead to slightly different data than HUD or Compass FSS administrative systems may hold, as our imputation method may differ from their systems to keeping cross-sectional data on HCV households.

The PIC dataset does not offer information about households prior to HCV program entry (which we call "left truncation"); nor does it follow households if they leave the HCV program (which we call "right truncation"). Therefore, we do not know households' true earnings and welfare receipt before they enter the HCV program or after they leave the HCV program. We also do not have data explaining why they entered or exited the HCV program.

To complete the panel dataset for households with left- or right-truncation quarters, we impute earnings and benefits receipt as equal to the closest observed earnings and benefits receipt. For example, if a household entered the HCV program in January 2011 with annual earnings of \$15,000, we would impute that the household's annual earnings throughout the period from January 2007 to January 2011 was \$15,000. Similarly, if a household left the HCV program in January 2013 with annual earnings of \$35,000, we would impute that the household is \$35,000. To reduce measurement error in our analysis sample, we exclude all households from our analysis if they have more than 5 continuous quarters of imputed data after January 2011. Sections below offer a detailed description of the challenges and decisions we considered with regards to inclusion of imputed data in the analysis sample.

PHAs for Comparison Households

FSS is a voluntary program for housing assistance recipients, so their choice and motivation to participate is an important factor in understanding who these households are and who the best comparison households would be. The ideal comparison group would consist of households that would decide to participate in the Compass FSS program if it were offered to them. Therefore, the HCV households in Lynn and Cambridge who do *not* choose to participate in the Compass FSS program are not a suitable comparison group, because they have declined to participate in the Compass FSS program even though it is available to them. Instead, we study the differences between the Lynn and Cambridge Compass FSS participants versus households in other HCV programs in southern New England.

Below, we first describe the selection of comparison HCV programs in southern New England where voucher householders are likely to experience similar employment opportunities as households in the Lynn and Cambridge programs. Second, we present the selection of specific households from within those selected comparison HCV programs.

Before we select HCV households similar to the Compass FSS participants in Lynn and Cambridge, we first study which cities and towns best resemble Lynn and Cambridge. Geographic selection is important, because the employment opportunities, and employment support opportunities such as public transportation and childcare options, vary across cities.

For PHAs in Massachusetts, Connecticut, and Rhode Island, we evaluate the characteristics of the census tracts in which HCV households for each housing authority live, listed below. All neighborhood characteristics come from the 2010 U.S. Census. These characteristics are first weighted based on how many voucher households live in a census tract, and then standardized according to the means and standard deviations of these characteristics across all PHAs. Using these standardized characteristics, we generate a "distance" metric against which the average voucher household census tract in one housing authority can be compared with the average voucher household

census tract in another housing authority. The distance metric allows us to compare housing authorities on several dimensions, all at the same time. We first standardize the measure for each PHA by subtracting the mean and dividing by the standard deviation, and then take the squared difference between each PHA and Lynn, and then again for each PHA and Cambridge.

The distance metric includes the following census tract variables:

- Percentage employed
- Average income
- Percentage of families below the poverty level
- Percentage Hispanic/Latino
- Percentage Black/African American
- Percentage age 65 and older
- Percentage single adult with child under age 18
- Percentage English spoken at home
- Number of people per square mile

In addition to this distance metric, we include only PHAs where less than 5 percent (as of 2014) of non-elderly, non-disabled households are in an FSS program.⁴⁸

We separately selected the 20 most comparable PHA service areas to Lynn, and the 20 most comparable PHAs to Cambridge using the methodology specified above. After consulting about the selected PHAs with HUD, we narrowed the list by excluding statewide PHAs and PHAs that are run by independent nonprofit organizations, as these may be different in important ways from the Cambridge and Lynn sites.

The lists of comparison PHAs for Lynn and Cambridge are displayed in Exhibit A-2. This set of housing authorities yielded 21,105 possible comparison households to consider in our analysis that do not have outside-of-sample imputations in and after 2011 (see Appendix B). There is some overlap between the comparison housing authorities for Lynn and for Cambridge.

⁴⁸ Including only PHAs with relatively small FSS programs allows better modeling of comparison group members. In PHAs with large FSS programs (or FSS programs serving a relatively high percentage of the target population), many of the households that would otherwise be good candidates for the comparison group may be participating in another FSS program. Our analysis limits these participants from the comparison group in order to estimate the absolute effects of the Compass FSS program rather than the relative effects between the Compass FSS program and other FSS programs.

Exhibit A-2. Comparison Housing Authorities

Lynn	Cambridge
Housing Authority of the City of Norwalk (CT)	Housing Authority of the City of Norwalk (CT)
Waterbury Housing Authority (CT)	Housing Authority of the City of Stamford (CT)
Housing Authority of the City of Stamford (CT)	Lowell Housing Authority
Willimantic Housing Authority (CT)	Boston Housing Authority
West Haven Housing Authority (CT)	Waltham Housing Authority
Lowell Housing Authority	Everett Housing Authority
Boston Housing Authority	Brookline Housing Authority
New Bedford Housing Authority	Newton Housing Authority
Everett Housing Authority	Belmont Housing Authority
Salem Housing Authority	Beverly Housing Authority
Southbridge Housing Authority	Salem Housing Authority
Abington Housing Authority	Wakefield Housing Authority
Holden Housing Authority	Natick Housing Authority
Haverhill Housing Authority	Watertown Housing Authority
Woonsocket Housing Authority (RI)	Saugus Housing Authority
	Pembroke Housing Authority
	Bridgewater Housing Authority

NOTE: All housing authorities are in Massachusetts, unless noted otherwise.

Although the comparison HCV programs are located in areas similar to Lynn and Cambridge, we do find that mean characteristics such as welfare receipt and income are not equivalent. Exhibit B-1 in Appendix B lists the average census tract statistics for Lynn and Cambridge HCV households, comparing them with average statistics for the selected HCV service areas, and the non-selected service areas. The Lynn and Cambridge areas are similar to the selected comparison HCV service areas on many characteristics. The main differences are that the Lynn and Cambridge areas are slightly more racially/ethnically diverse and have slightly lower overall employment rates, although slightly higher average earnings.

Selecting the Comparison Group Members (Propensity Score Matching)

The primary research question asks what effect the Compass FSS program would have on households most likely to sign to up for it if it were available to them. Therefore, we need a process to identify households who would sign up for Compass FSS if it were available to them. Fortunately, we find informative clues just by looking at the households in Lynn and Cambridge. Compass FSS program implementation began in Lynn in late 2010, but we can distinguish households who participate in the

program between 2011 and 2015 from households who do not participate in the program over that same period using *pre-2011* data.⁴⁹

One way to gauge whether the participants are distinguishable from non-participants is to look at whether the groups differ along the dimensions likely to predict future earnings growth. To find out which household covariates are most predictive of future earnings, we regressed all baseline covariates (demographic variables, length of participation in the voucher program, earnings and benefits patterns from 2007 to 2010) on 2015 earnings. The only variable that was not significant in that regression was race/ethnicity.

Compared with Lynn and Cambridge households who did not participate in the Compass FSS program at some point between 2011 and 2015, households in the Compass FSS program were younger, were less likely to have a disability, had more children, and had higher earnings, higher non-welfare sources of non-earnings income ("other income"), lower amounts of Social Security income, and lower total income after adjustments. Exhibit A-3 displays mean characteristics of households in the Compass FSS programs in Lynn and Cambridge and mean characteristics of voucher households in Lynn and Cambridge who did not participate in the Compass FSS program.

The "*p*-Value" column in Exhibit A-3 displays the probability that the two groups of households have different mean characteristics. A *p*-value of .010, for example, denotes a 1 percent chance that the means are not detectably different. For some measures, such as changes in earnings, the samples have high standard deviations and thus we cannot conclude that the differences in the groups' means are statistically significant.

⁴⁹ The Compass FSS households in Lynn and Cambridge enrolled at various times. Thus, by studying outcomes in the first quarter of 2016, we are averaging the program's effects over a duration that varies from 1 to 6 years (the average duration in our sample as of the first quarter of 2016 is 2.9 years). Unfortunately, there is no method using propensity scores to divide the treatment group into cohorts defined by time. Using the household characteristics in the data, there appears to be no discernable difference between households who joined in one year versus another. Therefore, no propensity score model could predict when a household would join in one year versus another (at least, within the period 2011 to 2015).

Exhibit A-3. Baseline Characteristics of Lynn and Cambridge HCV Households, by Compass FSS Participation Group

	Compass FSS Participants in Lynn, Cambridge		Non-Parti Lynn, Ca	<i>p</i> -Value	
	Mean	Stdev	Mean	Stdev	
Age in Dec 2010 (yrs)	40.4	9.1	48.8	14.7	.000***
Head of household had disability at time of enrollment	2%	15%	33%	47%	.000***
Years in voucher program as of Dec 2010	7.6	5.5	8.2	6.3	.252
Number of children < age 5, Q4 2010	0.3	0.6	0.2	0.5	.002***
Number of children age 5-18, Q4 2010	1.2	1.0	0.6	0.9	.000***
Number of adults, Q4 2010	1.5	0.8	1.4	0.7	.165
Annual earnings in Q4 2010	\$20,103	\$16,029	\$9,262	\$13,608	.000***
Change in earnings from Dec 2009 to Dec 2010	\$367	\$11,034	-\$121	\$7,833	.444
Change in earnings from Dec 2008 to Dec 2010	-\$1,348	\$13,055	-\$655	\$9,577	.372
Change in earnings from Dec 2007 to Dec 2010	-\$705	\$14,624	-\$805	\$10,228	.904
Annual welfare in Q4 2010	\$687	\$1,979	\$630	\$1,836	.694
Annual other nonwage income in Q4 2010	\$3,049	\$6,421	\$1,569	\$4,468	.000***
Annual Social Security income in Q4 2010	\$764	\$3,334	\$5,484	\$6,510	.000***
Annual adjusted income in Q4 2010	\$23,052	\$13,792	\$15,871	\$11,283	.000***
N	173		2,366		

NOTES: This exhibit compares characteristics of HCV households in Lynn and Cambridge who participated in the Compass FSS program with HCV households in Lynn and Cambridge who did not participate in the Compass FSS programs. The analysis excludes households with outside-of-sample imputed records in or after 2011 (see Chapter 2).

*/**/*** indicates statistically different between groups at baseline at the 10, 5, and 1 percent levels, respectively.

Because Compass FSS program participants are distinguishable from non-participants in Lynn and Cambridge, it is feasible to estimate a propensity score model for program participation. The propensity score model "scores" each household on its likelihood of joining the Compass FSS program if the program were available. In the analysis sample, we focus on 95 households in

Cambridge and 78 households in Lynn who joined the Compass FSS program at some point between January 2011 and March 2015.⁵⁰ There are 1,215 households in the Cambridge HCV program and 1,127 in the Lynn HCV program who did not participate in the Compass FSS program. Thus, when we estimate the propensity score models, we are aiming to detect a 7.3 percent participation rate in Cambridge, and a 6.5 percent participation rate in Lynn.

We estimated a logit propensity score model to estimate the probability that a household joins the Compass FSS program. We do this separately for Lynn and for Cambridge, because Lynn and Cambridge FSS participants will be matched to non-participants in comparison PHAs that are good matches for their city. The estimates show that the covariates have predictive power in determining participation. The covariates and coefficients are listed in Appendix C, which had chi-square statistics of 116 and 135 for Cambridge and Lynn, respectively (p<.001 in both cases). The pseudo-R-squareds are 0.17 and 0.24, respectively.

Exhibit A-4 shows the distribution of propensity scores for Compass FSS households and nonparticipating households in Lynn and Cambridge. Though there is overlap in propensity scores at the lower and upper bounds of the score, the Compass FSS households clearly have higher propensity scores on average. In other words, the model successfully predicts that the Cambridge and Lynn households who joined the Compass FSS program were more likely to do so than were households in Cambridge and Lynn who did not join the Compass FSS program.

	Percentiles								
	Min.	5 th	10 th	25 th	50 th	75 th	90 th	95 th	Max.
Cambridge									
Compass FSS	.003	.055	.068	.094	.128	.186	.242	.28	1
Non-participants	.000	.001	.001	.003	.048	.109	.168	.208	.476
Lynn									
Compass FSS	.005	.03	.051	.1	.179	.251	.352	.445	1
Non-participants	.000	.002	.004	.005	.016	.090	.183	.247	.683

Exhibit A-4. Propensity Scores for Compass FSS Participants and Non-Participants in Lynn and Cambridge

NOTE: These propensity scores are generated using the estimated propensity score model parameters listed in Appendix B. There are 173 Compass FSS households and 2,366 HCV households in Lynn and Cambridge who do not participate in Compass FSS.

⁵⁰ As mentioned in Chapter 2, we exclude households with outside-of-sample imputations in and after 2011. We also exclude households who joined the Compass FSS program in late 2010 when the program began in Lynn because there are only a small number of households (less than 20) and because of timing issues. Since the program began in late 2010, the majority of the participants' baseline year leading up to joining the program is 2010 rather than 2009.

As explained in the beginning of this section, households in Lynn and Cambridge who do not participate in the Compass FSS program are not suitable comparison households for analyzing earnings outcome measures because they declined to participate in the program even when it was available to them. Therefore, we use the estimates from the propensity score model to generate propensity scores for all of the HCV households in the selected comparison PHAs. For each Compass FSS household, we select three comparison households from the comparison PHAs (from the list of eligible comparison PHAs for that city: see Exhibit A-2) whose propensity scores most closely match that Compass FSS households' scores.⁵¹

This exercise results in a comparison group that matches the treatment group's distribution of propensity scores exactly. Exhibit A-5 displays the distribution of propensity scores. As shown in Exhibit A-4, the distributions of propensity scores of the Compass FSS households and the selected comparison group households from the comparison PHAs are identical. The distribution of the propensity scores of households from comparison PHAs who are excluded from the study is different.



Exhibit A-5. Distribution of Propensity Scores

NOTE: The distribution was estimated using Stata's "kdensity" command.

The selected comparison households are similar to the Compass FSS households with respect to all characteristics that are most associated with future earnings. Exhibit A-6 (on page 83) displays the average characteristics for the Compass FSS households and the selected comparison group

⁵¹ Comparison household selection is done "without replacement," and thus the ordering of the comparison households in the dataset matters. We randomly sort the comparison households prior to selection by generating a random number for each one, and sorting on those random numbers.

households. A *p*-value greater than .010 (no stars) indicates that we cannot conclude that the means of two groups are distinguishable, and a *p*-value less than .010 indicates statistical significance. Of the 14 variables we analyze, none is statistically different at baseline. With respect to most characteristics, the Compass FSS households and comparison households are statistically different from households in comparison PHAs who were excluded from the study sample due to their propensity scores ("Excluded" column in Exhibit A-6).

	Compass FSS	Comparison		Excluded	
	Mean (Stdev)	Mean (Stdev)	<i>p</i> -Value	Mean (Stdev)	<i>p</i> -Value
Age in Dec 2010	40.44 <i>(</i> 9.14)	39.93 <i>(</i> 9.38)	.608	48.42 (14.43)	.000***
Head of household had disability at time of enrollment	2% (0.15)	3% (0.17)	.659	41% <i>(0.49)</i>	.000***
Years in voucher program as of Dec 2010	7.62 (5.46)	7.82 (5.23)	.727	8.11 (5.49)	.244
Number of children < age 5, Q4 2010	0.32 <i>(0.60)</i>	0.31 <i>(0.55)</i>	.770	0.20 <i>(0.49)</i>	.001***
Number of children age 5-18, Q4 2010	1.18 <i>(1.00)</i>	1.37 (1.13)	.105	0.76 (1.05)	.000***
Number of adults, Q4 2010	1.49 <i>(0.77)</i>	1.42 <i>(0.68)</i>	.396	1.39 <i>(0.66)</i>	.055*
Annual earnings in Q4 2010	\$20,103 <i>(\$16,029)</i>	\$18,926 <i>(\$15,960)</i>	.494	\$6,982 (\$11,915)	.000***
Change in earnings from Dec 2009 to Dec 2010	\$367 (\$11,034)	\$755 (\$9,956)	.732	-\$226 (\$6,998)	.271
Change in earnings from Dec 2008 to Dec 2010	-\$1,348 (\$13,055)	\$104 (\$ <i>12,790</i>)	.297	-\$546 (\$8,849)	.238
Change in earnings from Dec 2007 to Dec 2010	-\$705 (\$14,624)	\$844 (\$13,907)	.313	-\$711 (\$9,735)	.993
Annual welfare receipt in Q4 2010	\$687 (\$1979)	\$1,055 (\$2,493)	.129	\$2,137 (\$3,956)	.000***
Annual other non-wage income in Q4 2010	\$3,049 <i>(\$6,421)</i>	\$4,043 (\$6,786)	.166	\$2,183 <i>(\$4,694)</i>	.016**
Annual Social Security income in Q4 2010	\$764 (\$3,334)	\$945 (\$2,773)	.583	\$6,384 (\$6,701)	.000***
Annual adjusted income Q4 2010	\$23,052 (\$13,792)	\$20,835 (\$12,449)	.117	\$14,185 <i>(\$9,610)</i>	.000***
Welfare receipt at baseline	12% (0.32)	17% (0.37)	.181	43% (0.50)	.000***
Ν	173	593		16,701	

Exhibit A-6. Comparison of Compass FSS Households, Comparison Households, and Excluded Households in the Selected Comparison PHAs

NOTE: This analysis excludes households with outside-of-sample imputed records in or after 2011 (see Chapter 2).Comparison households and excluded households stem from data on HCV households in comparison HCV programs (see Section 3.1) who did not participate in the Compass FSS program. We assign sample weights so that the total weight of the comparison households is equivalent to the total weight of the Compass FSS households.

One issue in the comparison group formation is participation in FSS programs. The Compass FSS households in Lynn and Cambridge enrolled at various times, and thus by studying outcomes in the first quarter of 2016, we are averaging the program's effects over a duration that varies from 1 to 6 years (the average duration in our sample as of the first quarter of 2016 is 2.9 years). Some of the comparison HCV programs in southern New England have FSS programs, but those FSS programs are not operated by Compass. Comparison PHAs were selected only if they had an FSS participation rate of 5 percent or less. Exhibit A-7 shows the percentage of the comparison group households enrolled in an FSS program, by quarter. The percentage of the selected comparison group who are enrolled in an FSS program increases from 4.2 percent at the beginning of 2011 to 4.6 percent by the end of 2014, but generally remains very small throughout.



Exhibit A-7. FSS Program Participation in the Treatment and Comparison Groups

NOTE: The numbers of Compass FSS households and selected comparison households are 256 and 771 respectively. The comparison households were selected using a propensity score matching approach descripted in Chapter 3 of this report.

In summary, our methodology selected comparison households who live in similar types of neighborhoods as the Compass FSS households, have the same likelihood of joining the Compass FSS program if it were available to them, and are similar on most characteristics most predictive of future earnings growth.

Appendix B: Imputation in Data Records

As described in Appendix A and the main body of the report, our main data source is HUD data from the PIH Information Center (PIC). A PIC record is generated for each household whenever the household enters the HCV program, exits the voucher program, has an annual income recertification, or has an interim income recertification, as well as at other discrete events (e.g., moving addresses, gaining a child, correcting a previous record). We wrote a Stata computer program to convert the Form 50058 records into a longitudinal dataset in which each household is one observation/row and data in different columns represent data from different time periods. We calculate quarterly earnings, quarterly household composition, and quarterly benefits receipt for each household, based on their stream of 50058 forms over time.

The dataset does not offer information about households prior to HCV program entry ("left truncation"); nor does it follow households if they leave the HCV program ("right truncation"). For a household's left- or right-truncation quarters, we impute earnings and benefits receipt as equal to the closest observed earnings and benefits receipt.

We believe that some instances of imputation are more prone to measurement error than others:

- For households who simply have an annual recertification record every year, there is likely measurement error in imputed off-quarter data (data in the quarters between annual recertification). We classify these instances as "within-sample imputation."
- There is likely worse measurement error in quarters when the household does not participate in the voucher program. We classify these instances as "outside-of-sample imputation."
- There are instances where records seem to be missing; for example, we might find the last (and/or first) record on a file for a household may be an annual recertification in 2013 even though we do not find an entry record or recertifications prior to 2013. In these cases, we view imputation outside of the fifth quarter before or after an orphan record as "outside-of-sample imputation" (the same type of error as the previous type mentioned).

We are most concerned about outside-of-sample imputation, as this imputation could lead us to measurement error in the run up to a household joining the voucher program, or in the years after exiting the program. Economists would predict earnings to be *higher* in the years prior to joining the voucher program than they are at time of entry and in years after exiting the program, because (a) households entering subsidized housing are at a time when they are most in need of assistance, perhaps due to a job loss or other negative income shock, and (b) households have an incentive to reduce their income upon gaining entry into the voucher program, as housing rent is proportional to income. Therefore, we think outside-of-sample imputations are negatively biased: they likely understate earnings and total income. Exhibit B-1 shows the percentage of households who have outside-of-sample imputed records in each quarter if we do not limit the analysis to households without outside-of-sample imputation.



Exhibit B-1. Percentage of Records That Are Outside-of-Sample Imputations

NOTE: The numbers of Compass FSS households and selected comparison households are 256 and 771, respectively. The comparison households were selected using the propensity score matching approach as described in this report.

The out-of-sample imputation rate for Compass FSS households and selected comparison households is high in the period prior to the intervention, but also high in 2015 and 2016 in the quarters in which we measure outcomes. In the quarters for which we will use outcome measures, the proportion of records that are outside-of-sample imputations for comparison households is high (18 percent) and more than twice the proportion of records that are outside-of-sample imputations for the Compass FSS group.

The high and asymmetric imputation rates could compromise our study, especially if outside-ofsample imputations are systematically biased downward, as hypothesized: that is, asymmetric negative bias in imputed incomes would lead us to estimate an impact *larger* than the true one. For this reason, we decided that our main analysis will include only households that have *no* outside-ofsample imputations after 2011. Imposing this restriction, we also obtain a sample with slightly lower imputation rates in the baseline period. Exhibit B-2 displays the imputation rates for the final analysis sample we obtain when imposing restrictions about outside-of-sample imputation (the exhibit does not display outside-of-sample imputation rates for quarters after 2011 because they are 0 percent for both groups in all quarters).





NOTE: The numbers of Compass FSS households and selected comparison households are 173 and 519, respectively. The comparison households were selected using the propensity score matching approach as described in this report.

The disadvantage to our restricted analysis of households without outside-of-sample imputations after 2011 is that our estimates will exclude any highly successful Compass FSS households who were able to move toward complete self-sufficiency and leave the voucher program, as well as exclude any unsuccessful FSS household who left the HCV program without graduating from FSS.

APPENDIX C. CENSUS TRACT CHARACTERISTICS, WEIGHTED BY NUMBER OF VOUCHER HOUSEHOLDS IN EACH TRACT

Appendix C. Census Tract Characteristics

Exhibit C-1. Census Tract Characteristics, Weighted by the Number of HCV Holder Householders in Each Tract

	Lynn & Cambridge	Selected Comparison PHAs	Excluded Comparison PHAs
Percentage of all persons age 65 older	12%	10%	12%
Percentage of all voucher households with a disability	28%	25%	27%
Percentage unemployed, all persons age 16 and older	9%	6%	9%
Percentage employed, all persons age 16 and older	58%	62%	57%
Percentage of voucher households where wages are major source of income	31%	37%	29%
Percentage of all households that are White	53%	59%	62%
Percentage of all households that are Black/African American	25%	15%	16%
Percentage of voucher households that are Black/African American	36%	36%	24%
Percentage of total population that are Hispanic	21%	22%	24%
Percentage of voucher householders that are Hispanic	29%	29%	36%
Percentage who speak a language other than English at home, all persons age 5 and older	60%	62%	65%
Percentage of voucher householders that are women	81%	80%	83%
Mean household income, all households	\$74,061	\$64,683	\$60,810
Mean household income, voucher households	\$17,331	\$16,433	\$15,328
Median household income, all households	\$56,771	\$49,109	\$47,546
Percentage below the poverty level, all households	20%	21%	21%
Percentage of voucher households with extremely low income	77%	78%	79%
Percentage of voucher households with very low income	94%	95%	96%
Percentage of all households with single adult with children under age 18	12%	15%	15%
Percentage of voucher households with single adult with children under age 18	39%	41%	43%
Percentage of voucher households with two or more adults and children under age 18	4%	3%	4%
Percentage of voucher households qualifying for 2 bedrooms	34%	32%	35%
Percentage of voucher households qualifying for 0-1 bedroom	30%	29%	28%
Percentage of voucher households qualifying for 3+ bedrooms	36%	39%	37%
Average months on waiting list, voucher households	24	30	43
Ratio of voucher households to total households	0.031	0.036	0.031
Number of PHAs	2	27	171
Number of HCV households in those PHAs	418	28,057	88,391

Appendix D. Full Regression Results

D.1. Propensity Score Model

Logistic Regression Summary: Lynn

The log likelihood was -218 and the log likelihood ratio test resulted in a chi square statistic of 135 (p< .001). The pseudo R-squared is 0.237.

Baseline Variable	Coef.	Std. Err.	<i>p</i> > z
Time in HCV	-0.00418	0.03173	.895
Age	-0.01165	0.01546	.451
Num child < age 5	0.18612	0.23845	.435
Num child age 5-18	0.38963	0.12843	.002
Num adults	0.25917	0.20882	.215
Disabled	-0.52832	0.74232	.477
Earnings amount	0.00026	0.00015	.087
Earnings 5-10k	-0.87241	1.10863	.431
Earnings 10-15k	-1.96297	1.59012	.217
Earnings 15-20k	-2.48163	2.04008	.224
Earnings 20-25k	-2.75559	2.39617	.250
Earnings 25-30k	-2.78088	2.66146	.296
Earnings > 30k	-3.03082	2.96733	.307
Welfare amount	0.00526	0.01775	.767
Other income amount	0.00002	0.00004	.620
Social Security amount	-0.00009	0.00005	.072
Receipt of any welfare	-17.47665	39.20758	.656
Welfare amount, squared	0.00000	0.00000	.890
Earnings amount, squared	0.00000	0.00000	.100
Earnings amount* Welfare amount	0.00000	0.00000	.945
Earnings amount * Other income amount	0.00000	0.00000	.656
Welfare amount * Other income amount	0.00000	0.00000	.766
Welfare receipt * Earnings amount	-0.00054	0.00146	.710
Earnings amount * Social Security amount	0.00000	0.00000	.761
Welfare amount, cubed	0.00000	0.00000	.995
(Earnings amount* Welfare amount) squared	0.00000	0.00000	.957
Earnings squared * Welfare receipt	0.00000	0.00000	.562
Constant	-3.33100	0.78206	.000

Logistic Regression Summary: Cambridge

The log likelihood was -282 and the log likelihood ratio test resulted in a chi square statistic of 116 (p<.001). The pseudo R-squared is 0.17.

Baseline Variable	Coef.	Std. Err.	<i>p</i> > z
Time in HCV	0.00828	0.02022	.682
Age	-0.03384	0.01327	.011
Num child < age 5	-0.14001	0.22168	.528
Num child age 5-18	0.07836	0.12206	.521
Num adults	-0.16646	0.17551	.343
Disabled	-1.80644	1.07559	.093
Earnings amount	0.00008	0.00007	.251
Earnings 5-10k	-0.88547	0.96286	.358
Earnings 10-15k	-0.11437	0.94797	.904
Earnings 15-20k	0.13339	1.12698	.906
Earnings 20-25k	-0.66311	1.33161	.618
Earnings 25-30k	-0.47141	1.49201	.752
Earnings > 30k	-0.51217	1.79079	.775
Welfare amount	0.00306	0.01818	.866
Other income amount	0.00007	0.00003	.006
Social Security amount	-0.00011	0.00008	.183
Receipt of any welfare	-9.43532	32.47733	.771
Welfare amount, squared	0.00000	0.00000	.969
Earnings amount, squared	0.00000	0.00000	.382
Earnings amount* Welfare amount	-0.00003	0.00473	.994
Earnings amount * Other income amount	0.00000	0.00000	.327
Welfare amount * Other income amount	0.00000	0.00000	.529
Welfare receipt * Earnings amount	0.04948	7.35014	.995
Earnings amount * Social Security amount	0.00000	0.00000	.858
Welfare amount, cubed	0.00000	0.00000	.942
(Earnings amount* Welfare amount) squared	0.00000	0.0000	1.000
Earnings squared * Welfare receipt	0.00000	0.00071	1.000
Constant	-1.70727	0.70453	.015

D.2. Treatment Effect Regression Coefficients

Most Recent Earnings						
Covariate	Estimate	Standard Error	<i>p</i> -Value			
Time in HCV	238.831	141.442	.0917			
Age	-243.419	90.850	.0075			
Num child < age 5	-2410.195	1306.075	.0654			
Num child age 5-18	1967.853	703.071	.0053			
Num adults	865.844	1119.323	.4394			
Disabled	-4253.198	5083.261	.4030			
Earnings amount	0.546	0.159	.0006			
Earnings 5-10k	1767.591	3719.180	.6347			
Earnings 10-15k	-3308.978	3565.807	.3537			
Earnings 15-20k	-5509.003	3924.282	.1608			
Earnings 20-25k	-6702.349	4535.529	.1399			
Earnings 25-30k	-3186.234	4896.069	.5154			
Earnings > 30k	1542.640	6427.455	.8104			
Welfare amount	0.793	1.049	.4496			
Other income amount	0.137	0.128	.2859			
Social Security amount	-0.240	0.275	.3821			
Receipt of any welfare	-9880.547	6746.162	.1434			
Treatment	6304.903	1371.334	.0000			
	R-squared =	0.2634				
	N =	766				

The tables below provide regression coefficients for each impact variable.

Average Earnings						
Covariate	Estimate	Standard Error	<i>p</i> -Value			
Time in HCV	130.481	74.690	.0811			
Age	-69.829	47.974	.1459			
Num child < age 5	-693.526	689.683	.3149			
Num child age 5-18	522.538	371.262	.1597			
Num adults	1302.780	591.067	.0278			
Disabled	-3480.194	2684.254	.1952			
Earnings amount	0.706	0.084	.0000			
Earnings 5-10k	1103.160	1963.941	.5745			
Earnings 10-15k	1492.506	1882.951	.4282			
Earnings 15-20k	-899.803	2072.246	.6643			
Earnings 20-25k	-3207.572	2395.020	.1809			
Earnings 25-30k	-1904.229	2585.406	.4616			
Earnings > 30k	818.813	3394.065	.8094			
Welfare amount	0.873	0.554	.1153			
Other income amount	0.231	0.068	.0007			
Social Security amount	-0.066	0.145	.6483			
Receipt of any welfare	-4898.640	3562.361	.1695			
Treatment	3630.888	724.143	.0000			
	R-squared =	0.5828				
	N =	766				

Most Recent Welfare						
Covariate	Estimate	Standard Error	<i>p</i> -Value			
Time in HCV	25.802	17.655	.1443			
Age	-14.692	11.340	.1955			
Num child < age 5	669.033	163.024	.0000			
Num child age 5-18	30.992	87.757	.7241			
Num adults	49.207	139.714	.7248			
Disabled	-1091.844	634.493	.0857			
Earnings amount	-0.007	0.020	.7124			
Earnings 5-10k	-1440.881	464.228	.0020			
Earnings 10-15k	-1257.125	445.084	.0049			
Earnings 15-20k	-694.787	489.829	.1565			
Earnings 20-25k	-749.367	566.125	.1860			
Earnings 25-30k	-1138.584	611.128	.0628			
Earnings > 30k	-1209.208	802.275	.1322			
Welfare amount	0.043	0.131	.7424			
Other income amount	-0.022	0.016	.1716			
Social Security amount	0.017	0.034	.6156			
Receipt of any welfare	-41.850	842.056	.9604			
Treatment	-496.197	171.170	.0039			
	R-squared =	0.1210				
	N =	766				

Average Welfare						
Covariate	Estimate	Standard Error	<i>p</i> -Value			
Time in HCV	13.107	13.395	.3281			
Age	-13.089	8.604	.1286			
Num child < age 5	571.235	123.686	.0000			
Num child age 5-18	246.465	66.581	.0002			
Num adults	-30.248	106.000	.7755			
Disabled	-889.024	481.386	.0652			
Earnings amount	-0.010	0.015	.4981			
Earnings 5-10k	-569.854	352.207	.1061			
Earnings 10-15k	-1009.661	337.683	.0029			
Earnings 15-20k	-650.775	371.630	.0803			
Earnings 20-25k	-1008.641	429.515	.0191			
Earnings 25-30k	-996.460	463.659	.0319			
Earnings > 30k	-893.654	608.681	.1425			
Welfare amount	0.194	0.099	.0512			
Other income amount	-0.007	0.012	.5621			
Social Security amount	-0.007	0.026	.7870			
Receipt of any welfare	901.443	638.863	.1587			
Treatment	-761.264	129.866	.0000			
	R-squared =	0.3891				
	N =	766				

Most Recent Social Security and Pensions					
Covariate	Estimate	stimate Standard Error p-Value			
Time in HCV	-37.060	29.760	.2134		
Age	63.135	19.115	.0010		
Num child < age 5	49.343	274.807	.8576		
Num child age 5-18	27.907	147.931	.8504		
Num adults	251.534	235.513	.2859		
Disabled	5919.392	1069.552	.0000		
Earnings amount	0.011	0.033	.7418		
Earnings 5-10k	-944.612	782.540	.2278		
Earnings 10-15k	-219.815	750.269	.7696		
Earnings 15-20k	-466.899	825.695	.5719		
Earnings 20-25k	-433.206	954.305	.6500		
Earnings 25-30k	257.116	1030.165	.8030		
Earnings > 30k	-1190.175	1352.379	.3791		
Welfare amount	0.098	0.221	.6568		
Other income amount	0.020	0.027	.4577		
Social Security amount	0.709	0.058	.0000		
Receipt of any welfare	347.438	1419.437	.8067		
Treatment	-246.815	288.538	.3926		
	R-squared =	0.3735			
	N =	766			

APPENDIX D: FULL	REGRESSION RESULTS
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Average Social Security and Pensions					
Covariate	Estimate Standard Error p-\		<i>p</i> -Value		
Time in HCV	-25.426 18.566		.1712		
Age	29.026	11.925	.0152		
Num child < age 5	7.871	171.434	.9634		
Num child age 5-18	54.802	92.285	.5528		
Num adults	109.694	146.921	.4555		
Disabled	2108.574	667.225	.0016		
Earnings amount	-0.001	0.021	.9641		
Earnings 5-10k	-464.908	488.176	.3412		
Earnings 10-15k	-224.422	468.045	.6317		
Earnings 15-20k	-132.131	515.098	.7976		
Earnings 20-25k	-51.485	595.330	.9311		
Earnings 25-30k	188.988	642.654	.7688		
Earnings > 30k	-419.660	843.662	.6190		
Welfare amount	0.039	0.138	.7746		
Other income amount	0.011	0.017	.5233		
Social Security amount	0.853	0.036	.0000		
Receipt of any welfare	324.069	885.495	.7145		
Treatment	-189.514	180.000	.2927		
	R-squared =	0.5889			
	N =	766			

Most Recent Other Income					
Covariate	Estimate	<i>p</i> -Value			
Time in HCV	-13.318	31.729	.6748		
Age	16.961	20.380	.4055		
Num child < age 5	637.618	292.989	.0298		
Num child age 5-18	332.908	157.718	.0351		
Num adults	-118.058	251.095	.6384		
Disabled	-526.164	1140.317	.6446		
Earnings amount	-0.058	0.036	.1011		
Earnings 5-10k	-67.251	834.316	.9358		
Earnings 10-15k	1292.175	799.910	.1066		
Earnings 15-20k	1041.699	880.326	.2371		
Earnings 20-25k	2450.723	1017.446	.0163		
Earnings 25-30k	1432.560	1098.325	.1925		
Earnings > 30k	2186.265	1441.857	.1299		
Welfare amount	-0.143	0.235	.5428		
Other income amount	0.160	0.029	.0000		
Social Security amount	-0.005	0.062	.9379		
Receipt of any welfare	1507.873	1513.352	.3194		
Treatment	192.890	307.628	.5308		
	R-squared =	0.0911			
	N =	766			

Average Other Income					
Covariate	Estimate	Estimate Standard Error p-\			
Time in HCV	-0.246	21.987	.9911		
Age	23.443	14.123	.0973		
Num child < age 5	476.578	203.032	.0192		
Num child age 5-18	356.255	109.294	.0012		
Num adults	-189.453	174.001	.2766		
Disabled	-72.046	790.202	.9274		
Earnings amount	-0.047	0.025	.0576		
Earnings 5-10k	722.318	578.153	.2119		
Earnings 10-15k	1451.559	554.311	.0090		
Earnings 15-20k	1023.850	610.037	.0937		
Earnings 20-25k	2192.273	705.056	.0019		
Earnings 25-30k	1703.633	761.103	.0255		
Earnings > 30k	2310.072	999.159	.0210		
Welfare amount	-0.110	0.163	.4986		
Other income amount	0.327	0.020	.0000		
Social Security amount	0.002	0.043	.9595		
Receipt of any welfare	1120.215	1048.703	.2858		
Treatment	-18.585	213.176	.9305		
	R-squared =	0.3709			
	N =	766			

Appendix E. Changes in Unadjusted Means for Compass FSS Participants and Comparison Group

Exhibit E-1 describes the growth in earnings and public benefits receipt over the time of the study period for the Compass FSS participants and the comparison group households selected using the propensity score matching approach as described in this report. It displays the average baseline values, the average outcome variables, and the average change in the measure since baseline. We conducted a simple *t*-test to test whether this change is significant (i.e., significantly different from zero).

Note that the descriptive statistics (unadjusted means) for the Compass FSS participants reported in Chapter 3 differ from those reported in Chapter 2 because in the quasi-experimental analysis we focused on a smaller cohort of Compass FSS participants and examined changes over a fixed period of time, rather than since enrollment in FSS.

	Compass FSS Households			Comparison Households				
Outcome	Baseline	Endline	Growth	<i>p</i> -Value	Baseline	Endline	Growth	<i>p</i> -Value
Earnings								
Most recent	\$20,102.77	\$29,088.40	\$8,985.63	<.001 ***	\$18,926.49	\$22,876.06	\$3949.58	.007***
Average annual	\$20,102.77	\$23,717.93	\$3,615.16	<.001 ***	\$18,926.49	\$19,695.94	\$769.45	.397
Welfare								
Most recent	\$686.74	\$620.96	-\$65.78	.074*	\$1,055.44	\$1,158.78	\$103.34	.697
Average annual	\$686.74	\$830.82	\$144.08	.363	\$1,055.44	\$1,787.96	\$732.52	<.001 ***
SSI, SSDI, and Social Security, and Pension Income								
Most recent	\$763.60	\$1,498.74	\$735.14	.021**	\$944.65	\$1,948.57	\$1,003.92	<.001 ***
Average annual	\$763.60	\$1,206.76	\$443.16	.024**	\$944.65	\$1,597.73	\$653.08	<.001 ***
Other Income								
Most recent	\$3,049.16	\$1,765.27	-\$1,283.89	.017**	\$4,034.47	\$1,827.17	-\$2,207.30	<.001 ***
Average annual	\$3,049.16	\$2,152.82	-\$896.34	.030**	\$4,034.47	\$2,578.94	-\$1,455.53	<.001 ***

Exhibit E-1. Descriptive Analysis of Outcomes for	r Compass FSS and Comparison Group
Households	

NOTES: This table provides the unadjusted means for the impact analysis on earnings and benefits receipt. As described in Chapter 3 and Appendix A, the impact analysis uses regression-adjusted means to further refine the balance of samples at baseline.

There are 173 in the treatment group and 541 in the control group. Sample weights are used so that the effective sample size in the control group is 173, the same as the treatment group.

*/**/*** indicates statistically different from baseline within each group at the 10, 5, and 1 percent levels, respectively.