Workshop on Labour Force Participation and Economic Growth

14-15 April 2005
Lambton Rooms, InterContinental Hotel, Cnr Grey & Featherston Streets, Wellington

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January 2005

*We are grateful to SDRC for research support and for making the SSP data available, and to Douglas Tattrie for assistance with the data and comments on earlier work. The conclusions in this paper are the sole responsibility of the authors, and do not represent the opinions or conclusions of SDRC or the sponsors of the Self Sufficiency Project.

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JEL No. I38

ABSTRACT

In the SSP Applicant Experiment, members of a randomly assigned treatment group of new welfare entrants were informed that if they were still on welfare after a year they would become potentially eligible to receive a generous earnings subsidy. Those who satisfied the waiting period, then left welfare and began working full time within another year, were entitled to receive subsidy payments for up to 36 months whenever they were off welfare and working full time. A simple optimizing model suggests that the program rules created a series of incentives: (1) an incentive to prolong the initial spell on welfare to achieve potential eligibility; (2) a subsequent incentive to establish subsidy entitlement by finding a job and leaving welfare in the period from 12 to 24 months after initial entry; (3) an incentive to choose work over welfare during the three years that subsidies were available. We develop an econometric model of welfare participation in the absence and presence of these incentives that allows us to identify these effects. The combination of the incentive effects explains the time profile of the experimental impacts, which increased welfare participation in the first year after initial entry and lowered it over the next 2-5 years. We also use the model to compare the impacts of the SSP subsidy offer on the stock of long term welfare recipients and on the flow of new welfare applicants.

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During the 1990s the Canadian government funded a large scale social experiment to test the effects of a time-limited earnings subsidy for welfare leavers. The subsidy program, known as the Self Sufficiency Project or SSP, was targeted to single parents who had been on public assistance for at least a year. One part of the SSP demonstration offered the subsidy to a randomized treatment group drawn from the stock of long-term welfare recipients.1 The other – the SSP Applicant Experiment – went even further and presented an offer of potential subsidy eligibility to a randomized group of recent welfare entrants.2 The goals of the Applicant experiment were to test whether welfare entrants would prolong their stay on public assistance to achieve eligibility for SSP, and to evaluate the long run consequences of offering SSP as a permanent feature of the welfare system.

In addition to the one year "waiting period" requirement, eligibility for SSP payments was limited in other important ways. First, payments were only available to those who were working full-time. Second, individuals had to begin receiving SSP within a year of completing the waiting period (i.e. within 2 years of having entered welfare) – otherwise they lost all future eligibility. Those who met the first two deadlines could receive payments for up to three years in any month they were off welfare and working full time.

Data for the treatment group of the Applicant Experiment and a randomized control group were collected for 7 years after random assignment, providing information on the short-term and longer-run impacts of the program on welfare participation and labor market outcomes. Simple comparisons between the treatment and control groups show that the offer of SSP raised welfare participation by 3-4 percentage points by the end of the waiting period. In subsequent months it lowered welfare participation

1 See Michalopoulos et al. (2000) for a description of this experiment and a summary of its impacts.

2 See Ford et al. (2003) for a description of the Applicant experiment and summary of its main impacts. The importance of considering the potential effect of program benefits on the size of the program caseload has been emphasized in studies of the negative income tax (e.g., Ashenfelter, 1983) and in theoretical analyses of welfare participation (Moffitt, 1996). The existing literature on "entry effects" is summarized in Card and Robins (2004).

and raised the full-time employment rate, with a peak impact of about 10 percentage points (on both outcomes) in the period from 24-30 months after initial entry. These impacts faded over time, however. By 48 months after initial entry the impact on welfare participation had fallen to 5 percentage points, and by 84 months the welfare participation rates of the treatment and control groups were nearly equal. The time profile of experimental impacts in the post-waiting period of the SSP Applicant experiment is similar to the profile of impacts in the SSP Recipient experiment (which offered subsidy payments with no waiting period to long-term welfare participants). Nevertheless the size of the effects in the Applicant experiment was larger, considering that the behavioral impact of the Applicant Experiment was driven by the 50 percent of the experimental population that satisfied the waiting period requirement (Ford et al., 2003).

To understand this pattern of impacts we begin by developing a simple theoretical model of the behavioral effects of the SSP Applicant Experiment. Extending the dynamic search model developed in Card and Hyslop (2004) we show that Applicant Experiment created three incentives: (1) an "eligibility" incentive for everyone in the treatment group to remain on welfare for a year to become eligible for the subsidy; (2) an "establishment" incentive for members of the treatment group who satisfied the waiting period requirement to find a job and leave welfare within the next 12 months; and (3) an "entitlement" incentive for members of the treatment group who established SSP eligibility to work full time and remain off welfare in the three year period during which subsidy payments were available.

Simple comparisons between the treatment and control groups of the Applicant Experiment cannot distinguish these separate incentive effects, since the later effects only apply to a subset of the treatment group. Thus, we extend the econometric model developed in Card and Hyslop (2004) for analyzing the SSP Recipient study to incorporate the waiting period requirement in the Applicant study. This extended model allows us to identify the three incentive effects and estimate the impact of the earnings subsidy on welfare entry and exit rates among those who achieved eligibility.[3]

Our empirical results show that the time profile of the experimental impacts observed in the SSP Applicant study can be explained by a combination of the eligibility incentive (which increased welfare participation during the waiting period), the establishment incentive (which led to a rapid rate of welfare-leaving among members of the program group who satisfied the waiting period requirement), and the longer-term entitlement incentives of the program. We also find evidence that the impact of the subsidy persisted after SSP payments ended, although the effect appears to have dissipated by the very end of the follow-up period (about two years after all payments ended). Since our analysis of wage outcomes suggests that the program had little permanent effect on wages, we conclude that the persistence of the impacts on welfare participation and employment arose through other channels.

I. The SSP Applicants Demonstration - Description and Overview of Impacts

a. Income Assistance Programs and the SSP Experiment

The income support system for low income families in Canada, known as Income Assistance (IA), reduces benefits dollar-for-dollar for any earnings beyond a modest set-aside amount.[4] The implicit 100 percent tax rate on earnings and the availability of other benefits for IA recipients (e.g., dental services) reduce the incentives for IA recipients to ever leave the system. Rising welfare caseloads in the 1980s led to concerns that the system was promoting long-term dependency, in part because of the limited financial incentives for work. Against this backdrop, the Self Sufficiency Project (SSP) was conceived as a test of a generous time-limited earnings subsidy. The SSP project consisted of two main

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[3]As noted by Ham and Lalonde (1996), even with a randomly assigned intervention the estimation of dynamic impacts requires a full specification of the process generating individual welfare histories.

[4]The IA program is operated at the provincial level, but all the provincial programs share several important features, including a dollar-for-dollar benefit reduction rate. See Human Resources and Development Canada (1993) for a detailed inventory and description of income support programs in Canada in the early 1990s.

demonstrations: the SSP "Recipient" study (SSP-R), conducted on a sample of long-term welfare recipients;[5] and the SSP "Applicant" study (SSP-A), conducted on a sample of new welfare applicants.

The SSP demonstration was designed to evaluate the effects of an earnings subsidy available to long-term IA recipients. For this reason, and as a background to the SSP-Applicant study, it is useful to first briefly summarize the Recipients study. SSP-R was conducted in the provinces of British Columbia and New Brunswick, and involved randomizing a group of single parent IA recipients who had been on welfare for at least a year into either a control group (who remained in the regular welfare system) or a program group, who were offered the SSP subsidy. At least three features of the SSP subsidy distinguish it from other work-based subsidy programs. First, payments were restricted to individuals who were off IA and working full time. Second, individuals had to take up the subsidy offer within a year of being informed of their potential eligibility -- otherwise, they lost all future eligibility. Third, the SSP subsidy was time-limited: those who established eligibility could receive the subsidy any time over the next three years that they were working full time and off IA.

The Applicant study offered the same package of subsidy benefits as SSP-R to a group of *new welfare entrants* in British Columbia, who were informed that if they remained on IA for the next year, they could become eligible for SSP. The primary goal of SSP-A was to determine whether the potential availability of SSP benefits would lead to a significant change in IA leaving behavior by new welfare entrants (see Berlin et al, 1998). A secondary goal was to offer a longer-term perspective on the costs and benefits of SSP, since if it were made a permanent feature of the Canadian welfare system, eventually all the recipients of SSP would be people who had entered IA and met the one-year waiting period.

Table 1 summarizes the main features of the Applicant study, including the eligibility criteria for

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[5] In addition, there was a smaller demonstration conducted on a subset of the Recipient sample, the SSP "Plus" study, that included both financial incentives and program services. See Lin et al (1998) for a comprehensive description of the SSP Recipients program and results from the first 18 months of the experiment, Michalopoulos et al (2000) for a summary of results in the first 36 months, and Michalopoulos et al (2002) for the final report on the experiment.

the experimental sample and details of the subsidy formula. Sample members were selected from a pool of single parents over the age of 18 who had recently started a "new" spell of IA. Specifically, they could not have received IA payments in the previous 6 months.[6] After random assignment, members of the program group received a "treatment" consisting of a letter and brochure explaining the SSP program. They were also mailed a reminder letter 7 months after random assignment. Those who satisfied the waiting period requirement by remaining on welfare for a year were then informed of their eligibility and invited to attend a group session to explain the mechanics of the supplement program.[7]

The SSP subsidy formula is equivalent to a negative income tax with a 50 percent tax rate, a "guarantee level" somewhat above average welfare benefits (but independent of family size) and a full-time hours requirement.[8] The formula was designed to significantly enhance the financial incentives for work. For example, in 1996 a single parent with one child in British Columbia was entitled to a basic Income Assistance grant of around $1,000 per month. If she were to leave IA and work 35 hours per week at a minimum wage job ($7 per hour), she would earn $1,061 before tax, providing almost no financial incentive to leave welfare. If she was also entitled to SSP, however, she would receive an additional $1,037 in supplement payments (half the difference between her earnings and the benchmark level of $3,135), raising the payoff to work. Since subsidy payments were taxable, and also affected daycare costs under the provincial cost formula, the payoff net of taxes and transfers was only about two-

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6 No further limitations were placed on the sample. Thus, the experimental sample is in principle representative of the population of IA applicants in British Columbia. Roughly 90 percent of people who were contacted to participate in the experiment signed an informed consent decree and completed the baseline survey, and were then randomly assigned (Lin et. al, 1998, p.8).

7 As explained below, the actual eligibility rule was that people had to receive IA in 12 of the 13 months since their initial entry into IA. This rule allowed for 1 month gaps caused by such features as the receipt of child support payments, which could be large enough to offset IA payments for a month.

8 In a conventional negative income tax with constant tax rate t and guaranteed (or minimum) income G, an individual with earnings y receives a subsidy of G-ty. This is equivalent to an earnings supplement equal to t times the difference between actual earnings and the "break-even" level B = G/t .

thirds as big as the pre-tax payoff, but still relatively large (see Lin et al, 1998, Table G.1).

Although the SSP payment formula is relatively straightforward, the other eligibility requirements are more complex. People in the program group had to first stay on welfare for a year, and then leave IA and find a full time job within the next year in order to become eligible for payments. The program therefore provided an unusual combination of incentives to stay on welfare (in the first year after entering IA), then leave quickly (in the year after satisfying the waiting period rule), and then stay off welfare (in the three years following the establishment of eligibility). Before turning to a more complete analysis of these incentives, we summarize some of the key experimental findings from the SSP-Applicant study.

b. The SSP-Applicant Sample Characteristics

The data associated with the SSP Applicant experiment were derived from three sources. Information on IA participation and payments was obtained from provincial administrative records. SSP participation and supplement payment data were collected from SSP administrative records. Finally, demographic and labor market outcome data were obtained from surveys conducted at regular intervals beginning with a baseline survey just prior to random assignment, and four follow-up surveys at 12, 30, 48, and 72 months post-assignment. The experimental sample consisted of 3,315 individuals, 1,667 in the control group and 1,648 in the program group. Of these, we have excluded 32 observations whose records show either no IA receipt in the six months before or after the date of random assignment, or an unusual gap between the date of entry into IA and the date of random assignment.[9] This leaves us with an analysis sample of 3,283 observations: 1,651 in the control group, and 1,632 in the program group.

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[9] We exclude 5 observations who had no IA receipt within 6 months of random assignment (3 controls and 2 programs); 1 control observation' whose first month of IA receipt was 5 months prior to random assignment; 23 observations who began receiving IA 4 months prior to random assignment (12 controls and 11 programs); and 3 program observations whose records show that they first received IA in the month after random assignment.

Table 2 provides an overview of the characteristics of our SSP-A analysis sample. Columns 1 and 2 show the mean characteristics of the control and program groups respectively. Columns 3 – 6 compare the characteristics of specific subgroups, according to whether or not they satisfied the waiting period rule for potential SSP eligibility. Finally, the last two columns in the table (7 and 8) describe the subgroups of the SSP-eligible program group, classified by whether they did or did not successfully initiate subsidy payments within the allotted time frame.

As expected given random assignment, the baseline characteristics of the program and control groups are statistically indistinguishable. The SSP-A sample is 90 percent female, with an average age of 32.5 years and an average of 1.5 children. About a quarter of sample members had never been married, 30 percent were foreign-born, and one-third grew up in single parent families. Most (70 percent) were randomly assigned in the month after their IA reference spell began, but 7 percent were assigned in the same month their spell started, 20 percent were assigned 2 months after the start of the spell, and 3 percent were assigned 3 months after. This means there is some variation between "months since random assignment" and "months since initial entry into welfare". Since SSP eligibility rules relate to timing from the start of an individual's spell, we normalize all dates to be relative to the start of the reference spell.[10]

In comparison to the SSP-Recipient study participants (e.g. see Table 2 in Card and Hyslop, 2004), SSP-A participants had more previous work experience (10 years versus 7), were more likely to be working at the time of the baseline survey (25% versus 20%) and had substantially lower prior IA experience (4 months average use in the last 3 years for SSP-A sample members versus 30 months among SSP-R sample members). In addition, SSP-A participants were more likely to have ever been married,

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[10] The Data Appendix discusses this and other data issues. In particular, we adopt the convention that month 0 corresponds to the first month of IA receipt in the reference spell. The delay between entry into IA and random assignment varied complicates the interpretation of the program group's behavior, since people could have been on IA for 0, 1, 2, or 3 months before finding out about their program status. This issue is discussed in Card and Robins

and to have graduated from high school (62 percent versus 45 percent). These and other differences between the SSP-R and SSP-A participants confirm that the characteristics of new welfare applicants differ substantially from those of the existing stock of welfare recipients.[11]

The next four columns of Table 2 describe the characteristics of the ineligible and eligible subsets of the control and program groups – i.e. the subsets that successfully satisfied the waiting period requirement to become potentially eligible for SSP. (Of course members of the control group were not actually eligible). Overall, 57 percent of the program group achieved eligibility compared to 54 percent of the control group, implying a 3 percentage point (or 3/46=6.5 percent) delayed exit rate associated with the offer of SSP. Looking within the program group, those who became eligible were younger, less educated and less likely to be working at the baseline than those who did not. It is also interesting to compare the eligible program group to people in the control group who satisfied the eligibility criteria even though they could not receive the subsidy: The eligible program group is comprised of this "windfall" group (who make up approximately 54/57 of the group) and a smaller group who changed their behavior in order to become eligible (approximately 3/57 of the group). Perhaps because the windfall group is so large there are few notable differences between the eligible program group and the potentially eligible control group.

The final two columns of Table 2 report the characteristics of the eligible program subgroups that did and did not establish SSP entitlement. Not surprisingly, the entitled subgroup is better educated and was more likely to be working at the baseline than the non-entitled subgroup. The SSP program group can be divided into three mutually exclusive subgroups: those who left IA relatively quickly failed to become eligible (representing 43%=701/1632 of the total); the "eligible non-entitled" subgroup who

(2004), but we ignore it here.

[11] SSP-A was only conducted in one of the two sites used in SSP-R. However, this does not explain much of the difference in characteristics of the sample members in the two experiments.

became eligible but never received a subsidy payment (representing 33%=544/1632 of the total) and the "eligible entitled" subgroup who received at least one subsidy payment (representing 24%=387/1632 of the total). Comparisons across the 3 subgroups suggest that ineligible group has the most favorable labor market characteristics at the baseline interview (e.g., the highest level of previous work experience, the highest likelihood of a college degree, and the lowest fraction with a child under 6), whereas the eligible non-entitled subgroup had the worst labor market characteristics, and the eligible entitled group was somewhere in between. This ranking is consistent with the "two-sided selection" of the eligible entitled group. The most "job ready" people presumably left before achieving eligibility, whereas the least "job ready" of the eligible subgroup could not move to full-time employment quickly enough to become entitled to SSP.

c. Experimental Impacts on Welfare

Graphical descriptions of the experimental impact of the SSP program on IA participation are provided in Figures 1a-1c. Figure 1a shows the average IA participation rates of the control and program groups, together with the estimated program impact (calculated as the difference between the program and control group), in each month from the start of the IA reference spell (month 0) until the end of the time window in which data are available for all sample members (month 84). The delayed-exit effect of the SSP offer is illustrated by the positive program impact on IA participation in months 3-13: this impact rises to 3 percentage points near the end of the waiting period. After month 13 the IA participation rate of the program group drops relatively quickly, leading to a negative program impact that peaks in absolute value at –11 percentage points in month 27. The negative program impact persists but declines steadily in size to only –3 percentage points in month 60, at which point all SSP payments have ended. The impact continues to decline gradually after this point and is negligible by month 84.

Figures 1b and 1c plot the (smoothed) welfare exit and entry rates of the control and program groups over this same period. Because of the selective nature of the risk sets for exit and entry, the differences between the rates of the two groups are not strictly experimental impacts. However, the patterns of differences between the program and control groups are consistent with the impacts on IA participation. Specifically, the program group's exit rate was up to 1 percentage point lower than the control group's over the initial eligibility period, then averaged about 2 points higher in the following 12-18 months, about 1 point higher from month 18 to month 72, and finally turned negative (about –0.5 points) in the final 12 months or so of the period. The higher exit rate of the program group over the interval from 60-72 months is suggestive of a persistent program impact beyond the end of SSP payments. The IA entry rates in Figure 1c show broadly patterns. The program group's welfare entry rate was 1-2 percentage points higher than the control group's over the initial eligibility period, then averaged about 0.5 points lower in the next year or so. The gap in entry rates was on average slightly negative over the period from month 24 to month 60, and then was essentially zero over the final 24 months of the experimental sample period.

d. Experimental Impacts on Labor Market Outcomes

Labor market data for SSP-A participants was collected from retrospective questions in the baseline survey and the follow-up surveys at 12, 30, 48 and 72 months after random assignment. We use these data to estimate the experimental impacts of SSP on employment and monthly earnings of the program participants, and also to construct the mean hourly wages of the two groups in each month. Unfortunately, labor market data are missing for people who failed to respond to the follow-up surveys and only extend up to 74 months after initial entry into welfare for most people in the sample.

Figure 2a compares the full-time employment rate of the program group with that of the control group over months 0-74. Note that the rate for both groups starts out at just over 10 percent and that the control group's rate rises steadily over time. In light of the results in Figure 1a, it is surprising that the full time employment rate of the program group is slightly above the rate for the control group. The combination of a higher IA participation rate and a similar full time employment rate suggests that some program group members may have been accepting full time work but remaining on IA in order to retain SSP eligibility. Tabulations confirm this suspicion: in the 11th month after IA entry, 13.9% of the program group was on IA and working full time, versus 10.9% of the control group, accounting for virtually all of the impact on IA. The program group's full time employment rate rises steeply in months 12-26 resulting in a peak impact of 11 percentage points in month 26. The impact then falls gradually to 5.5 percent by the end of the entitlement period (month 60), and 2.5 percent in month 74.

Figure 2b compares the average hourly wage rates of the employed subgroups of the control and program groups. This figure shows that program group members who were working in the waiting period (months 1-12) and during the SSP establishment window (months 13-24) earned slightly higher average wages than control group members. The average wage difference in months 1-20 is 30-70 cents per hour, or about 3-6 percent. Average wages for the two groups converge by month 24, and track pretty closely after that. This pattern of mean wages is quite different than the pattern observed in SSP-R. In that experiment, the average wages of the program group were typically below the wages of the control group, with a gap that was larger in months with a bigger gap in employment between the two groups. The difference in mean wages in Figure 2b is essentially uncorrelated with the gap in full time employment in Figure 2a, or with the difference in overall employment rates.

In Card and Hyslop (2004), we showed that under certain assumptions it is possible to estimate the "average marginal wage" for the extra hours generated by the SSP program. Specifically, under the assumptions that SSP had no effect on wages for people who would have worked in the absence of the program, and that SSP had only positive effects on hours, the ratio of the program impacts on earnings and hours gives an estimate of the average marginal wage. We used this procedure to estimate the average marginal wages for the SSP-induced hours in each month of SSP-A. Consistent with the patterns in Figure 2b, the average marginal wage is slightly above the average wage of control group workers in the early months of the experiment, but tracks the mean wages of the control group very closely in the later months. Again, this is different from the results of a similar analysis in the SSP Recipient experiment (Card and Hyslop, 2004, Figure 5) which shows average marginal wages very close to the minimum wage. We infer that the Recipient experiment induced people with relatively low wage opportunities to leave welfare, whereas the offer of SSP in the Applicant experiment affected people with average wage or even above-average wage opportunities.

Figure 2c compares the average monthly earnings of the control and program groups. In months 1-12 average earnings are quite similar for the two groups, despite the somewhat higher hourly wages of the program group. The program group's earnings rise steeply relative to the control group over the following 12-18 months, with a peak difference of $220 per month in month 26, equivalent to 40 percent gain in monthly earnings for the program group relative to the controls. The earnings difference then declines over months 26-48, and finally stabilizes at about $100 per month over the remainder of the sample period.

An interesting and somewhat puzzling difference between the results in Figures 2a and 2c, on one hand, and Figure 1a-1c, on the other, is the seemingly greater persistence in the SSP impacts on labor market outcomes than on welfare participation. For example, in month 60, the impact on IA participation is -2.8 percentage points, while the impact on full-time employment is +5.5 percentage points. Similarly, at month 72 the impact on IA participation is -1.9 points while the impact on full time employment is +4.2 points. We are unsure of the reasons for this gap. In any case, we conclude that the observed persistence in the SSP program effect in IA participation after the end of supplement payments (i.e., after month 60) may if anything understate the persistence in SSP's effects. This observed persistence is quite different from the pattern in the SSP Recipient experiment, which showed minimal impacts on employment or earnings within a year of the end of supplement payments.

II. A Simple Model for the Behavioral Impacts of the SSP-Applicants Experiment

To help clarify the incentive effects of the SSP-Applicant experiment, this section presents a simple theoretical model of work and welfare participation in the presence of the subsidy program. This model is a simple extension of the dynamic search model developed in Card and Hyslop (2004) for the SSP-Recipient experiment, to include the dynamic behavior over the initial 12-month period from the start of a new welfare spell to the close of the waiting period for SSP eligibility. We first briefly recap the Recipient model, and then outline the extension for the Applicant study.

The model is a standard discrete time search model (e.g., Mortensen, 1977, 1986) in which a risk neutral single parent has two options, welfare participation or full time employment, and individuals maximize expected future income using a monthly discount rate of r. Welfare pays a monthly benefit \$b and yields a flow payoff of b. Full time employment at a monthly wage of \$w yields a flow payoff of w-c, where c reflects the disutility of work relative to welfare (including child care costs, work expenses, the value of foregone leisure, and potential stigma effects). We assume that each month an individual receives a single job offer with probability λ, and that the arrival rate of offers is the same for workers and nonworkers.[12] Wage offers are drawn from a stationary distribution with density f(w) and cumulative distribution F(w). Finally, we assume a constant rate of job destruction δ, which applies to new as well as existing jobs.

In the absence of a wage subsidy program optimal behavior in this model is characterized by a stationary value function U(w) that gives the discounted expected value associated with a job paying wage w, and a value V^0 of welfare participation. Individuals employed at a wage w accept any offer paying more than w, while those on welfare follow a reservation wage strategy and accept any job paying

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[12] A key simplifying assumption is that wage opportunities do not depend on previous work effort. Based on the fact that the average marginal wage for hours of work attributed to SSP does not rise relative to the mean wage of the

more than R, defined by $U(R)=V^0$. Under the assumptions of the model it is readily shown that the optimal reservation wage is R=b+c (see Card and Hyslop, 2004, for details).

If an SSP subsidy is made available, an eligible individual currently on welfare has to evaluate three separate value functions: $V_i(t)$, the value of not working in month t, conditional on not yet having established entitlement; $U_e(w,d)$, the value of a job paying a wage w conditional on SSP-entitlement with d months of elapsed entitlement; and $V_e(d)$, the value of not working conditional on entitlement with d months of elapsed entitlement. The rules of SSP provide a link between these functions and the value functions in the absence of the program. In particular, $V_i(t)=V^0$ for $t\geq13$, and $U_e(w,d) = U(w)$ and $V_e(d) = V^0$ for all d>36, because of the time-limited (12 month) establishment and (36 month) entitlement periods respectively. A revealed preference argument establishes that $U_e(w,d) > U(w)$ for all w and any $d\leq36$, since the subsidy paid to a worker earning a wage w is strictly positive. From this it follows that $V_i(t)$ is decreasing in t since less time is available to establish entitlement, and that $U_e(w,d)$ and $V_e(d)$ are both decreasing in months of elapsed entitlement since the entitlement period is finite.

As in the absence of a subsidy, people who are SSP-entitled and working accept any job offer that pays more than their current wage, while those who are on welfare with d months of elapsed entitlement follow a reservation wage strategy and accept any job paying more than $R_e(d)$, defined by $V_e(d) = U_e(R_e(d),d)$. Since people can quit jobs that are no longer acceptable once their SSP entitlement ends, the optimal reservation wage for an SSP-entitled nonworker equates the net income from a reservation-wage job to the flow value of welfare, b+c. Since b and c are fixed, R_e is independent of d and is defined by the equality $R_e+s(R_e) = b+c$, where s(w) is the subsidy for working at a wage rate w.[13]

Furthermore, SSP-eligible individuals who are still on welfare in month t and not yet established

control group, we believe this assumption is reasonable.

[13]Since $s(w)\geq0$, the reservation wage for those with SSP-entitlement is below the reservation wage R in the absence of the program. Indeed since R=b+c, we have that $R_e+s(R_e) = R$. Note that R_e could be below the minimum wage,

SSP entitlement have a reservation wage R(t) satisfying the condition $V_i(t) = U_e(R(t),1)$. It follows from this, and the fact that $V_i(t)$ is decreasing in t, that the reservation wage R(t) is decreasing in t: i.e. eligible individuals with fewer months to establish entitlement will accept lower wage jobs. Moreover, the reservation wage in the first month of eligibility, R(1), is strictly less than the reservation wage once entitled, since a full-time job for someone who is not yet entitled provides the same flow benefits as for someone who is entitled, and also guarantees future eligibility: i.e. $R_e > R(13) \geq R(14) .... \geq R(24)$.

Extending this search model to the Applicant case requires modeling dynamic behavior over the pre-eligibility waiting period that covers the first 12 months of a welfare spell. During this period, a potentially eligible individual has to evaluate the following two value functions: $V_i^P(t)$, the value of welfare in month t conditional on not having left welfare and being potentially SSP-eligible; and $U_i^P(w,t)$, the value of taking a job paying wage w in month t and also losing eligibility, conditional on being potentially eligible before taking the job. First, note that $V_i^P(12) = V_e(0) \geq V^0$, since SSP-eligibility is achieved after 12-months, and so the value of not working in month 12 is the value of not working conditional on eligibility with 0 months of elapsed eligibility. Similarly, $V_i^P(t) \geq V^0$ for t=1, ..., 12, since there is a positive option value to being on welfare and potentially SSP-eligible relative to being on welfare without SSP-eligibility. Second, note that $U_i^P(w,t) = U(w)$ for t=1, ..., 12, since if someone takes a job before achieving SSP-eligibility they lose their eligibility. Thus, the value of working is the same as in the absence of SSP. The reservation wage for an individual still on welfare after t months, $R^P(t)$, satisfies the condition: $V_i^P(t) = U_i^P(R^P(t),t) = U(R^P(t)) \geq V^0$. This implies that $R^P(t) \geq R$, since the reservation wage for someone who remains potentially SSP-eligible is greater than in the absence of SSP. Furthermore, the reservation wage rises during this pre-eligibility period because the present discounted value of the option value associated with achieving SSP-eligibility increases as the eligibility date approaches – i.e. $R^P(t+1) \geq R^P(t) \geq R$, for t=1, ..., 11.

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however SSP rules required participants to earn at least the minimum wage.

The effects of SSP on the welfare/work decision can be summarized by the difference between the reservation wage profiles of a representative welfare recipient in the presence or absence of SSP. Figures 3a-c show the reservation wage R=b+c in the absence of SSP, together with the sequence of reservation wages for a recent welfare entrant who is offered potential SSP eligibility, under three scenarios. Figure 3a shows the sequence for someone who leaves welfare during the 12 month waiting period and therefore loses SSP eligibility. Figure 3b describes the sequence for someone who stays on welfare for the full 12 month waiting period and becomes eligible for the SSP offer, but fails to establish entitlement. Finally, Figure 3c shows the sequence for someone who becomes eligible for SSP and successfully establishes entitlement for the subsidy in month t_e.

During the 12 month waiting period the reservation wage of someone who is potentially eligible for SSP is above R and increasing. From month 12 to month 24 (the entitlement window), the reservation wage for someone who is SSP-eligible is below R and declining. For those who establish entitlement, the reservation wage immediately jumps up (at month t_e) and then remains constant over the entitlement period. In all cases the reservation wage reverts to R=b+c, either after potential eligibility is lost (for those who leave welfare in the pre-eligibility period), or at the end of the entitlement window (in month 24) for those who become SSP eligible but fail to establish entitlement, or in month t_e+36 for those who do successfully initiate supplement payments between month 12 and 24.

The path of the optimal reservation wage illustrates the three different incentive regimes experienced by members of the SSP-A treatment group. First, during the 12 month waiting period members of the treatment group have a high and increasing reservation wage relative to members of the control group, leading to a slower exit rate from welfare. Although the SSP rules allowed individuals to be off-welfare for a single month during the first year and still maintain eligibility, loss of eligibility is essentially determined by the first exit from welfare during this period. This has implications for modeling the pre-eligibility waiting period, which we discuss in the next section in the context of our econometric modeling. Second, for program group members who become eligible, there is a low and declining reservation wage up to the establishment of entitlement in month t_e, or 24 months after the start of the reference spell for those who don't establish entitlement, leading to a faster rate of transition from welfare to work than would be expected in the absence of SSP. Finally, those who establish entitlement then adopt a higher reservation wage, but still lower than in the absence of SSP, implying that they are more likely to leave welfare and re-enter work than otherwise similar members of the control group. The jump in the reservation wage at t_e implies that some people who accepted low-paying jobs to gain eligibility would be expected to quit and return to welfare almost immediately. Once SSP eligibility or entitlement ends, the reservation wage returns to its level in the absence of the program and the behavioral effects of SSP disappear. Again, as a result of the jump in the reservation wage at the close of entitlement, people holding jobs paying less than the reservation wage in the absence of SSP would be expected to quit and re-enter welfare.

As discussed in Card and Hyslop (2004), this model is clearly oversimplified but provides a stylized guide to the potential effects of SSP. For example, the model assumes that the cost of work (c) is constant over time and is unaffected by previous work experience. A model with habit persistence might imply that individuals who work more when SSP is available eventually lower their reservation wages, leading to a persistent effect on employment and IA. The model also assumes that people either receive welfare or work full time when, in fact, some people leave welfare *without* entering full time work. In our empirical model, we distinguish between leaving welfare and becoming SSP-entitled to allow for this.

It is worth emphasizing that in this stylized model SSP causes higher employment and lower IA participation in the post-waiting period by inducing people to accept lower wage jobs than they would in the absence of the program. This prediction may seem inconsistent with the results in Figure 2b, which imply that the extra jobs attributable to SSP paid roughly "average" wages. There is not necessarily an inconsistency, however, since it is possible that the single parents induced to work in the Applicant experiment were those with relatively high wage opportunities *and* relatively high reservation wages in the absence of SSP.

III. An Econometric Framework for Estimating the Impacts of SSP on Welfare

In this section we turn to the specification of an econometric model for estimating the program impacts in the SSP-Applicant study. The model builds on the framework we developed in Card and Hyslop (2004) for studying the impacts of the SSP-Recipient study, and incorporates the insights of the theoretical benchmark model as well as the program rules outlined in Section I.

As in our previous paper we adopt a panel data approach rather than a hazard modeling approach because of the high incidence of multiple spells in the data, and the need to parsimoniously specify the effects of unobserved heterogeneity on IA participation, SSP eligibility, and SSP entitlement. Relative to the SSP-Recipient study, the model for SSP-A is complicated by the eligibility waiting period rule. In principle, SSP eligibility is a deterministic function of the sequence of IA participation outcomes in the 13 months following initial entry. Thus, it would be theoretically possible to specify a model for IA outcomes in months 1-13, and a treatment effect for members of the program group, and derive a model of the eligibility process.[14] Such an approach is complicated by the fact that eligibility status in SSP-A is not perfectly explained by the observed IA histories.[15] For this reason, and in the interests of simplicity, we follow an alternative approach of combining a simple model of eligibility status at the end of the waiting period with a model of IA participation over months 13-84 and a model of the SSP-entitlement process for people in the program group who became eligible for SSP.

To proceed formally let S_i be an indicator for whether individual i satisfies the waiting period

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[14] Card and Robins (2004) present a number of simple models along these lines.

[15] There are 8 people in the SSP-A program group who were eligible for SSP but whose IA records show 2 months off IA in the waiting period.

requirement and hence, if in the SSP program group, potentially eligible to receive the SSP subsidy offer; let E_{it} represent an indicator for whether individual i has established SSP entitlement as of the start of month t; and let y_{it} be an IA participation indicator that equals 1 if individual i receives IA in month t and 0 otherwise. We consider models for the joint probability:

$$P(S_i; E_{i13},..,E_{iT}; y_{i13},...,y_{iT} \mid P_i, x_{i13},...,x_{iT}),$$

where P_i is an SSP program group indicator, $\{x_{it}, t=13,\ldots,T\}$ is a sequence of observed covariates for individual i, and T=84 is the latest month with IA participation information for all observations.

Extending the framework developed in Card and Hyslop (2004) for analyzing IA participation and SSP entitlement in SSP-R, we model this joint probability as:

$$\begin{aligned} &P(S_i; E_{i13},..,E_{iT}; y_{i13},...,y_{iT} \mid P_i, x_{i13},...,x_{iT}) \\ &= \int_\alpha \left\{ P(S_i \mid P_i,\alpha_i).\prod_t P(y_{it}, E_{it} \mid y_{it-1},...,E_{it-1},...,S_i,P_i,\alpha_i) \right\} f(\alpha_i)d\alpha_i \\ &= \int_\alpha \left\{ P(S_i \mid P_i,\alpha_i).\prod_t P(E_{it} \mid E_{it-1},...,S_i,\alpha_i).P(y_{it} \mid y_{it-1},y_{it-2},E_{it},E_{it-1},...,S_i,\alpha_i) \right\} f(\alpha_i)d\alpha_i \end{aligned}$$

where α_i is a random effect that captures both unobserved and potentially observable heterogeneity. We adopt the convention that a higher value of α_i is associated with a higher probability of welfare participation, holding constant all other factors. Given that treatment status is randomly assigned, we assume that the distribution of the random effects is the same for both the program and control groups. The probability model assumes that eligibility status (S_i) is determined independently of subsequent SSP entitlement and IA participation; that conditional on eligibility, entitlement status (E_{it}) is determined independently of current or lagged IA participation; and that current IA participation (y_{it}) depends on two lags of participation and entitlement status. We outline and discuss each of these three components of the model in more detail below, and clarify how the SSP treatment effects enter the framework.

a. Modeling SSP Eligibility

For an individual to be potentially eligible for SSP, the rules required that they receive IA for at least 12 of the 13 months from the start of their reference spell. We model this probability using a simple logistic model:

(1) $$S_i(P_i,\alpha_i) = 1(\delta_0 + \delta_1\alpha_i + (\delta_2 + \delta_3\alpha_i)P_i + u_i \geq 0) \ ,$$

where u_i is a logistically distributed error term. The probability of eligibility for a member of the control group depends on a constant δ_0 and on the heterogeneity component α_i through the "loading factor" δ_1. We would expect $\delta_1>0$, since individuals who have higher propensity to receive IA should be more likely to satisfy the waiting period requirement. The probability of eligibility for a member of the program group differs from this base level by the constant δ_2 and by the interaction $\delta_3\ \alpha_i$. To the extent that members of he program group have an incentive to delay their exit from IA, we expect $\delta_2>0$. The sign of δ_3 depends on whether high or low propensity welfare users respond more or less to the SSP delayed-exit incentive.

b. Modeling SSP Entitlement

Our model of the SSP entitlement process is based on the model used in Card and Hyslop (2004) to model entitlement in the SSP-Recipient study. Clearly, entitlement depends on having achieved eligibility (i.e. E_{it}=0 for all t≥13 if S_i=0). For members of the program group who attain eligibility, E_{it} will make at most a single transition from 0 to 1 some time in the second year after first entering IA. This process is naturally modeled using a hazard model for the event of establishing entitlement in month t. We assume that the entitlement hazard depends on the number of months the end of the waiting period, and on the individual heterogeneity component, and is independent of current or lagged IA status <u>conditional</u> on S_i (i.e. entitlement depends only on the first 12-months of IA participation, and only through the eligibility indicator). More formally, we assume:

(2) $$P(E_{it} \mid E_{it-1}, E_{it-2}, \ldots, S_i, \alpha_i) = \begin{cases} 0 & if\ t \leq 12, or\ S_i = 0, or\ E_{it-1} = 0 \,\&\, t > T_e \\ \Phi\left(d_E(t) - k(\alpha_i)\right) & if\ E_{it-1} = 0, S_i = 1 \,\&\, 13 \leq t \leq T_e \\ 1 & if\ E_{it-1} = 1 \end{cases}$$

where Φ(.) is the standard normal distribution function, $d_E(t)=d_{E0} + d_{E1}(t-12)$ is a linear function of time since the end of the waiting period (month 12), $k(\alpha_i) = k_0\alpha_i$ is a linear function of the random effect, and T_e is the last month for individuals to establish entitlement for SSP payments. Although the SSP rules stated that the establishment window was limited to 12 months (implying T_e=24), there was considerable slippage in the ending date of the window, and there are members of the program group who receive their first subsidy check as late as month 30. (A similar issue arises in SSP-R). Even allowing for a 2 month delay (as we do) between establishing entitlement and receiving a first payment, this still implies establishment occurred as late as month 28 (16 months from the start of the establishment window). As discussed in the data appendix, in order to allow administrative delays and laxity etc, we assume T_e=26, thus allowing a 14-month establishment window, and set the establishment date to month 26 for all cases where it seems to have occurred later.

c. M*odeling the IA Participation Dynamics*

The final component of the framework is a dynamic model for IA participation behavior over the period beginning in month 13 – i.e. corresponding to the second year and beyond of welfare receipt for long-term recipients. Again, we adopt an analogous specification for this model as in Card and Hyslop (2004). That is, we consider a class of panel binary response models that allow for second order state dependence dynamics, unobserved heterogeneity, and SSP treatment effects for those who establish entitlement.

More specifically, we consider models in the following class:

(3) $$P(y_{it} \mid y_{it-1}, y_{it-2}, S_i, E_{it}, E_{it-1}, \ldots, S_i, \alpha_i)$$
$$= L\{\alpha_i + d_y(t) + (\gamma_{10} + \gamma_{11}\alpha_i)y_{it-1} + (\gamma_{20} + \gamma_{21}\alpha_i)y_{it-2} + (\gamma_{30} + \gamma_{31}\alpha_i)y_{it-1}y_{it-2} + \tau(t,S_i,E_{it},t^e_i,y_{it-1},\alpha_i)\},$$
$$t=13, \ldots, T=84$$

where L{.} represents the logistic distribution function, $d_y(t) = d_{y0} + d_{y1}(t-12) + d_{y2}(t-12)^2 + d_{y3}(t-12)^3$ is a cubic trend in the number of months since month 12, and $\tau(t,S_i,t^e_i,y_{it-1},\alpha_i)$ captures the behavioral impact of SSP on applicants IA participation, where $t^e_i = \min_t \{E_{it}=1\}$ represents the month in which individual i established SSP entitlement. We assume that the behavioral impact of SSP on those who become entitled for subsidy payments consists of an "establishment effect" that reflects the initial move off IA required as part of the entitlement process, and an "entitlement effect" that is operative for the remainder of the 3 year period in which subsidy payments are available. In particular, we begin with a specification for $\tau(.)$ that assumes the effects are constant across individuals:

$$(4) \qquad \tau(t,S_i,t^e_i,y_{it-1},\alpha_i) = S_i.E_{it}.\{ 1(t^e_i \leq t \leq t^e_i+J-1).(\tau_{00}.1(y_{it-1}=0) + \tau_{01}.1(y_{it-1}=1)) + 1(t^e_i+J \leq t \leq t^e_i+35).(\tau_{10}.1(y_{it-1}=0) + \tau_{11}.1(y_{it-1}=1))$$

where J=3 is the duration of the transitional period during which the establishment effect is active, the parameters τ_{00} and τ_{01} represent the "establishment" effects of SSP entitlement during this transition period for individuals who were off- and on-IA respectively in the previous month, and likewise the parameters τ_{10} and τ_{11} represent the "entitlement" effects of SSP entitlement during the entitlement period running from. t^e_i+3 to t^e_i+35.

A final issue in modeling IA dynamics from month 13 onward is the specification of the initial conditions (y_{i11},y_{i12}) for this process. To deal with this issue we use the empirical distribution of (y_{i11},y_{i12}) conditional on S_i from the combined SSP-A sample. This is an over-simplification because it ignores any variation in the likelihood of a specific initial condition with respect to the value of the random effect. Among the subset who are classified as eligible for SSP, however, 95% have the initial condition $(y_{i11},y_{i12})=(1,1)$, so the potential for variability with the unobserved heterogeneity component is limited. The distribution of initial conditions is more variable for those who are classified as ineligible, though even here 75% have $(y_{i11},y_{i12})=(0,0)$. Thus, we believe this simple approach provides a reasonable approximation to the process generating the initial conditions.

d. Estimation Results

Table 3 presents estimates of a series of alternative specifications of the model represented by equations (1)—(4). We begin by estimating two specifications for the control group only. The objective here is to provide a suitable baseline model for subsequently adding the entitlement model and the treatment effects. The results for the controls-only models are presented in columns (1) and (2) of the table.

The first specification assumes that the random effects are drawn from a normal distribution with mean 0. The estimated parameters of the eligibility model (presented in the upper rows of the table) suggest that the probability of eligibility is very strongly correlated with the random effect. This makes sense, given that eligibility is roughly the same as not having left welfare by month 12. The estimated state dependence parameters show very high persistence in IA status, and an important "second order" component. The pattern of the state dependence effects is very similar to the pattern obtained in models for the control group of SSP-R, reported in Card and Hyslop (2004, Table 4).

The second model (column 2) generalizes the distribution of heterogeneity somewhat by assuming that α_i is drawn from a mixture of either a normal distribution, or a point mass at α_i=infinity. The latter represents a group of what might be called a "pure leavers": people who leave IA within a year of initial entry into welfare, are never eligible for SSP, and never appear in the welfare system again. The results for this specification yield a precisely estimated "pure-leaver" probability of about 15 percent. This specification also yields a significant improvement in the log-likelihood associated with the model. The addition of a point mass of pure leavers leads to a slight reduction in the magnitudes of the state dependence parameters in the participation equation, and also a reduction in the estimated loading factor in the eligibility equation, but all these parameters remain highly significant.[16]

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[16] The parameters of the eligibility and IA participation model only pertain to the sample observations that are NOT assumed to be pure leavers.

Both of these models accurately predict the fraction of the control group that achieved potential SSP eligibility (54 percent), and also do a good job predicting the time profile of IA participation rates for the overall control group. However, the normal heterogeneity model tends to under-predict the participation rate of the ineligible subgroup over the period from months 48-84, while over-predicting the eligible subgroup's participation rate in the same period. In contrast, the model that combines normal heterogeneity and a mass of pure leavers predicts the IA participation rates of the two subgroups in months 48-84 relatively well, but over-predicts the ineligible groups' participation rate over the period from months 13-48. In order to summarize how these (and subsequent) models perform in predicting the distribution of IA participation histories over months 13-84, we compare the actual and predicted fractions of the control group that fall in 20 mutually exclusive cells defined by the total number of months on IA over months 13-84 and the number of transitions between IA states.[17] We construct an overall summary statistic based on the sum of the squared differences between the actual and predicted frequencies in each cell,[18] using 40 simulations of each model to derive the predicted cell counts. Based on this measure, the second model (GOF=145) provides a somewhat better fit to the IA histories than the first model (GOF=154), although neither performs particularly well in this regard.

We now turn our attention to models that attempt to simultaneously fit both the control group and the program group. A series of increasingly complex specifications is presented in columns (3)-(10) of Table 3. The first model, in column (3), extends the simple normal heterogeneity model of column (1) to

[17]Overall there are 2^{72} possible welfare histories over 72 months. In order to ensure reasonable cell sizes, we aggregate the number of months on IA into 6, 12, or 18 month groups (except for 0 and 72 months), and group the numbers of transitions into 0 (implying either always on or always off IA), 1 (i.e. a single transition over the period), "2+ even" (implying an individual's final, month-84, state is the same as their initial, month-13, state), and "3+ odd" (implying their final state differs from their initial state). The cells used in our comparisons, together with the actual and predicted frequencies from our preferred model from column (4) of Table 3, are shown in Table 4.

[18]This idea of comparing the actual and predicted frequencies from multinomial models has been used by Card and Sullivan (1988), Chay and Hyslop (2001), and Card and Hyslop (2004). We construct the standard Pearson statistic, $\Sigma_j (O_j - E_j)^2/E_j$, where O_j and E_j are the observed and predicted frequencies in cell-j, j=1, …, 20. As the expected frequency is based on a model fit to the same data, the statistic does not necessarily have a chi-squared distribution with J-1=19 degrees of freedom. For this reason, we do use these statistics as informal summary

include the SSP-entitlement process and SSP treatment effects for members of the program group. In fitting this specification we also generalize it slightly by including interactions between the random effect and the state dependence parameters. A slightly more general model in column (4) extends the definition of the SSP treatment effects to allow these effects to persist after subsidy payments end. In particular, this specification assumes that a fraction of the entitlement-period treatment effects continue beyond the entitlement period. The specifications in columns (5)—(7) remove this persistence effect, but include a mixed normal/"pure-leaver" heterogeneity model. The model in column (5) provides a basic extension of the model for the controls in column (2). The model in column (6) considers a slight generalization of the treatment effects specification in which we allow the establishment effects to be different in the first year of the establishment period than in the subsequent two years. The specifications in columns (8)—(10) return to the pure normal heterogeneity specification. The model in column (8) adds interactions between the random effect and state dependence effects. The model in column (9) extends this by adding interactions between the random effect and the linear and quadratic time trend terms. Finally, the specification in column (10) allows a fraction of the entitlement treatments to persist beyond the post-entitlement period.

A brief overview and summary of the results from these models is as follows. First, the model innovations introduced in the different specifications are all statistically significant, in the sense that a likelihood ratio test rejects the null hypothesis of no innovation. For example, comparing the specification in column (5) which adds two parameters for persistence in the treatment effects to the simpler specification in column (4) leads to a likelihood ratio test statistic of 19.6, which is highly significant. Second, all the specifications predict the fractions of both the control and program groups that achieve eligibility reasonably accurately. The predicted fractions are between 54 and 55 percent for the control group and between 57 and 58 percent for the program group for all models. Third, the

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measures of fit.

parameter estimates of the SSP establishment model are very similar across the models, and the models yield estimates of the fraction of the eligible program group that actually received SSP payments that are all very similar, and close to the actual fraction (42%). Likewise, the models have very similar predictions for the distribution of establishment dates among the eligible program group. Finally, the estimated treatment effect parameters from the various models are all fairly similar in size and magnitude.

The main distinguishing feature of different models are how well they fit the observed patterns of IA participation over the period of months 13-84, and their differing abilities to explain the distribution of IA histories over the 20 cells described above. Across all the different specifications, the fits for the control group are noticeably better than for the program group. In particular, many of the models have difficulty tracking the dip in IA participation rates of the program group in months 15-35. Typically, the models tend to under-predict the size of the program effect observed in months 15-35, and also tend to over-predict IA participation for the eligible program subgroup in the later months of the data period (months 48-84) while simultaneously under-predicting IA participation of the ineligible subgroup.

Although the evidence does not unambiguously favor one specification over the others, our preferred specification is the model reported in column (4). This model is reasonably parsimonious, yet captures many salient features of the data, including the tendency for the program impacts to persist after subsidy payments ended. It also seems to provide the best fit to the IA histories and treatment effects. Visual inspections of the predicted and actual IA participation profiles for the treatment and control groups suggest that this model has the lowest bias of any of the models in the table. This is confirmed by the fact that the model achieves the lowest goodness of fit statistic for the program group. We now discuss the estimates and predictions of this model in more detail before considering how to use it to simulate the different impacts of the SSP-Applicant and Recipient studies.

Looking first at the parameters of the eligibility model, the estimates of the constant parameter δ_0 and the loading factor δ_1 are very similar in the controls-only model in column (1) and the joint model in column (4). The program group-specific coefficients in the eligibility model show a higher probability of eligibility for the program group ($\delta_2>0$), and a negative but insignificant interaction with the heterogeneity component. The estimated state dependence parameters are also similar in the models in columns (4) and (1).

The entitlement selection parameter estimates from the model in column (4) are similar to the estimates from the other models in Table 3, and are broadly in line with the analogous parameters estimated in Card and Hyslop (2004) for the SSP-R study. In particular, we find that the entitlement hazard rises linearly with time, and varies negatively on the random effect. The negative value of the loading factor (k_0) in the entitlement hazard implies that individuals with a lower probability of welfare participation are more likely to establish entitlement and take-up the SSP offer.

The estimated treatment effects associated with the transitional period show that the establishment of SSP eligibility is associated with a sharp drop in IA participation. Again, the estimated effects are quite similar across models, and also similar to our estimates from the Recipient study. The interaction of the random effect with the transitional period treatment effect on IA exits is large and negative, suggesting that the establishment process has a bigger effect on exits (i.e., a more negative effect on the probability of remaining on IA, conditional on being on IA in the previous month) for individuals who have a higher underlying propensity to remain on IA. Indeed, the predicted probabilities of leaving IA from this model are roughly the same for people with different values of the α_i's, presumably reflecting the fact that most people who established SSP entitlement were off IA for at least a month in the transitional period.

The estimated treatment effects associated with the entitlement period are negative and statistically significant, but smaller than the transitional period effects. This pattern is consistent with the implications of our benchmark theoretical model, which implies that once people establish their SSP entitlement, they will raise their reservation wage and become more selective about what job to hold. A final important feature of the model in column (4) is the post-subsidy persistence parameters. The estimates of these parameters imply that 28 percent of the exit-effect and 41 percent of the entry-effect persisted after people exhausted their entitlement for SSP.

How well does this model explain the data? First, as noted earlier and shown in the bottom rows of Table 3, the model accurately predicts the fractions of the control and program groups that become eligible, the fraction of the program group that establishes entitlement, and the mean number of months until the establishment of SSP entitlement. However, as with each of the specifications estimated, the model does relatively poorly in the more difficult task of predicting the IA histories over the 13-84 month period. The goodness of fit statistics at the bottom of Table 3 comparing the actual and predicted frequencies across the 20 cell summary of the IA histories have values of 141.4 for the control group and 180.4 for the program group.

Table 4 shows the predicted and actual distributions of the control and program groups across the 20 cells used in our summary goodness of fit statistics. Inspection of the table shows that one of the major sources of poor fit for the model is the set of observations who are off IA in every month. For example, in the control group this cell has 396 observations (24% of the control population) but the predicted number is only 322.5 (19.5% of the control population). Likewise in the program group the cell accounts for 360 observations (22.1% of the program group sample) but the model only predicts 308 people in the cell (19% of the sample). Counterbalancing these under-predictions, the model tends to *over-predict* the fraction of the sample that is observed on IA for 1-6 months. As might be expected, alternative models that include a fraction of "pure leavers" provide much better predictions for the fractions of people who are off IA in all months. Surprisingly, however, these improvements are offset by worse fits in other parts of the table. Overall, we conclude that the simple model in column (4) of Table 3 provides reasonable predictions for the observed distributions of IA histories, albeit not accurate enough to pass conventional chi-squared tests.

Figure 4 compares the predicted profiles of IA participation from the model in column (4) with the actual profiles for the SSP-A treatment and control groups. The predictions for both groups are reasonably accurate although, as noted earlier, the model over-predicts IA participation for the program group in months 24-36, and slightly under-predicts IA participation rate in months 45-54. Over the entire 72 months from month 13 to month 84, the root-mean-squared prediction error for the control group is 0.0053, while the root-mean-squared prediction error for the program group is 0.0085.

Further insights into the model's fit are provided in Figures 5a, 5b, and 5c, which compare the actual and predicted IA participation rates for various subgroups of the control and program groups. Figure 5a compares the model's fits to the actual IA profiles of the eligible and ineligible subsets of the control group. The model does reasonably well, although in the last year of the sample (months 72-84) it tends to over-predict the IA participation rate of the ineligible subgroup and under-predict the rates for the eligible subgroup. Figure 5b compares the actual and predicted participation patterns for the eligible and ineligible subsets of the program group. Again, the model does reasonably well, although as with the corresponding subgroups of the control group, it tends to over-predict the IA participation of the ineligible subgroup in the late months of the sample, and simultaneously under-predict the rates for the eligible subgroup. Finally, Figure 5c presents comparisons of the actual and fitted IA profiles for the subsets of the eligible program group who did or did not manage to establish SSP entitlement. This figure shows that most of the tendency to over-predict welfare use of the eligible program group in the later months of the experiment arises because the model over-predicts welfare use of the eligible subgroup who failed to establish entitlement. In contrast, the tendency to over-predict IA participation of the overall eligible program subgroup between months 24 and 30 arises because the model has some difficulty reproducing the continuing dip in IA participation during this period among the eligible program subgroup who eventually became entitled to SSP. Some of the problem may be due to difficulties in precisely measuring when eligible program group members first established their SSP entitlement.

Another way to evaluate the model is to compare the predicted gaps in IA participation between the treatment and control groups with the actual gaps. This exercise is presented in Figure 6a. Consistent with the patterns in Figure 5c, the model under-predicts the SSP impacts on IA participation in months 18-36, but provides reasonably accurate predictions over the rest of the data period. Interestingly, the predicted treatment effect at the end of the sample period is larger than the actual gap, suggesting that the model's assumption of a lasting treatment effect may be incorrect. Nevertheless, a model with persistent treatment effects provides a substantially better fit to the observed profile of treatment effects than the same model with no persistence (in column (3)).

A key feature of the SSP Applicant experiment is that eligibility for subsidy payments was limited to the subset of welfare entrants who stayed on IA for a year. Thus, the treatment effects in SSP-A were confined to the eligible program subgroup. Figure 6b compares the predicted and actual gaps in IA participation between the eligible program group and the subset of the control group who satisfied the eligibility criterion. An issue with this comparison is that the eligible program group is bigger: it includes all people who would have remained on IA for a year even in the absence of the program (whose potential experiences are mimicked by the actual data for the eligible control group) as well as a smaller subgroup of people who changed their behavior in order to become eligible for SSP.[19] Setting this point aside for the moment, the model does a relatively good job of explaining the gaps in IA participation between the eligible program group and the eligible control group. The "flip side" of this comparison is presented in Figure 6c, where we present the predicted and actual gaps in IA participation between the ineligible program group and the ineligible control group. The profile of actual differences displays an unexpected pattern, falling in the first 24 months of the experiment, rising between months 24 and 36, and finally stabilizing at about 1-2% after month 36. We believe the variability in the actual profile is attributable to

[19] Note that this feature is built in to our econometric model.

random factors. By contrast the profile of predicted differences is roughly constant, and slightly positive. The positive average value of the predicted gap reflects the fact that the coefficient δ_3 in the eligibility model (reflecting the interaction of the random effect with the program group dummy) is negative. Thus, our selection model implies that program group members with high values of the random effect were less likely to become SSP-eligible than similar people in the control group. Consequently, the *ineligible* program group includes an over-sample of people with high values of the random effect, relative to the ineligible control group, leading to a predicted positive gap in IA participation between the ineligible program group and the ineligible controls.

The other models presented in Table 3 lead to broadly similar predictions as those shown in Figures 4, 5a-5c, and 6a-6c, although the specifications that ignore the possibility of persistence tend to fit the actual data a little worse. An interesting comparison is to the model in column (10), which formally nests the model in column (4). Relative to the simpler specification, this model includes interaction terms between the random effect and the state dependence parameters. The estimates of these parameters are large in magnitude and highly significant, and their addition leads to a drop in the log likelihood of 61.3 (which is highly significant). Nevertheless, the model does not actually yield better goodness of fit statistics for either the control group or the program group, nor are the mean squared prediction errors of the richer specification any smaller.

e. Decomposing SSP's Effects

By simulating the models in Table 3 with the various treatment effects turned on or off it is possible to gain some additional insights into the behavioral responses of the program group, and in particular into the "hump shaped" pattern of SSP impacts on IA participation. Figure 7 conducts this exercise using the model in column (4) of Table 3. We first simulate the IA participation rates of the control group. Then, we simulate the rates for the program group, beginning by assuming that the only treatment effects are the transitional effects associated with the establishment of subsidy entitlement. The resulting profile of treatment effects peaks at about -5 percentage points in month 26, then dissipates relatively quickly. Next, we simulate the rates for the program group, including both the transitional effects and the establishment period effects. The predicted treatment effects under this scenario peak at about -8.5 percentage points in month 26, remain relatively large until about month 54 (when people began to exhaust their three year entitlements to subsidy payments), then fade relatively quickly. In the final simulation we include he transitional effects, the establishment period effects, and the persistent (post-subsidy-exhaustion) effects. This is the profile that most closely matches the actual profile of the difference in IA participation between the program group and the control group.

The results in Figure 7 suggest that the observed experimental impacts in the SSP Applicant experiment can be explained by a combination of the transitional effects (associated with the requirement that people leave IA to establish an entitlement to SSP payments), the entitlement period effects generated by the availability of the subsidy, and the post-subsidy exhaustion effects, which seem to have persisted for at least a year and possibly for up to two years after people were no longer receiving SSP payments.

IV. Comparisons Between the Applicant and Recipient Experiments

So far we have focused on analyzing the SSP Applicant experiment. In this section, we briefly describe our attempts to compare the experimental responses observed in the SSP Applicant experiment and in the parallel Recipient experiment. In the Recipient experiment, SSP was offered to a sample of people drawn from the *stock* of long-term welfare recipients served by Income Assistance offices in certain areas of New Brunswick and British Columbia. As we noted in Section I, this group is noticeably different from the sample in the SSP Applicant experiment, which was drawn from the *flow* of new welfare entrants.

The first step in our comparison strategy was to use our model for the SSP-A control group (specifically, the model in column 4 of Table 3) to simulate a stock sample of IA recipients. The stock of IA recipients at a point in time consists of people who entered IA 1 month ago, plus people who entered 2 months ago and have not yet left, and so on. To simulate the stock sample, we simply assume that there is a steady monthly inflow of new IA entrants with the same distribution of heterogeneity as we estimate from the model in column 4 of Table 3. Our model allows us to simulate IA behavior over a time frame of up to 72 months. We therefore allow the inflow process to run for 6 years, and capture all the individuals who are predicted to still be on IA at the end of the period. Among the people in the stock sample with at least 1 year on IA, 51% are estimated to have been on IA for 3 or more years. This compares to 42% of the SSP-R sample who were on IA for 3 or more years as of their baseline interview.

In the next step, we estimated the distribution of random effects among people in the stock sample who were on IA for a year or longer. Relative to the assumed distribution among new IA entrants (which has mean 0 and standard deviation 1.33) this distribution is shifted to the right, with mean 1.14 and standard deviation 1.03. Finally, we assumed that a random sample of people with this distribution of heterogeneity was made eligible for SSP, and another identical sample was followed as a control group. We used the parameters from the model in column 4 of Table 3 to then simulate the IA histories of the treatment and control groups, treating each observation as starting at month 13 with $(y_{11}, y_{12}) = (1,1)$. (In the simulation we assume that the treatment effects of SSP did not persist beyond the end of supplement payments). We then compared the implied series of treatment effects from this simulation to the observed treatment effects in SSP-R, and the predicted treatment effects estimated in Card and Hyslop (2004) for the SSP-R sample.[20]

The results of the comparison are shown in Figure 8. Evidently, our estimates of the treatment

[20] We also compared the predicted time path of IA participation from the simulation to the path actually observed in SSP-R. The paths track very closely for about a year, then depart slightly, and then converge somewhat. After 66 months, the predicted fraction of the SSP-R control group on IA from the SSP-A-based simulation is 42%, the actual fraction on IA was 45%. We regard this as a remarkably good prediction.

effects of SSP-A, when applied to a stock sample of long term IA recipients meant to mimic the SSP-R sample, generate experimental impacts that are substantially larger than the ones actually observed in the Recipient experiment. For example, at month 24, the actual treatment effect on IA participation observed in SSP-R was about -10 percent. The parameters from our model of SSP-A imply a treatment effect of about 14%. These comparisons are similar to the informal comparisons noted in Ford et al (2003), which are based on rescaling the estimated SSP-A impacts to reflect the fact that only about one-half of the experimental population achieved eligibility. Although very similar models seem to be able to describe the impacts observed in the two SSP experiments, the results of our comparisons suggest that the magnitudes of the experimental impacts observed in SSP-R and SSP-A cannot be easily reconciled.

V. Conclusions

In this paper we develop and estimate an econometric model of the behavioral effects of the SSP Applicant Experiment. We use a simple search-theoretic model to show that Applicant experiment created three incentives: (1) an eligibility incentive for new welfare entrants to remain on welfare for a year to become eligible for the subsidy; (2) an establishment incentive for people who satisfied the waiting period requirement to find a job and leave welfare within the next 12 months; and (3) an entitlement incentive for those who established SSP eligibility to work full time and remain off welfare over the 36 months that subsidy payments were available. Conventional comparisons between the treatment and control groups of the experiment cannot separately distinguish these effects. Thus, we extend the econometric model developed in Card and Hyslop (2004) for analyzing the SSP Recipient experiment to incorporate the waiting period requirement in the Applicant study.

Our empirical results show that the time profile of the experimental impacts in the SSP Applicant study can be explained by a combination of the eligibility incentive (which increased welfare participation during the waiting period), the establishment incentive (which led to a rapid rate of welfare-leaving among members of the program group who satisfied the waiting period requirement), and the longer-term entitlement incentives of the program. We also find evidence that the impact of the subsidy persisted after SSP payments ended. Finally, we use our estimated model to attempt to reconcile the magnitudes of the treatment effects observed in the Recipient and Applicant experiments. Although very similar models can describe the impacts observed in the two experiments, we are unable to explain why the impacts are so different in size.

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Data Appendix

This appendix explains various aspects of the data used in this study concerning timing conventions, and variables used and created.

a. Timing conventions

Unless otherwise explicitly stated, all dates in the analysis are relative to the start month of the IA reference spell. As shown in table 2, these start months range from 3 months prior to the month of random assignment until the month of random assignment.

b. Determining Eligibility-status and date Eligibility was Achieved

We have used the binary variable "Eligible" in the original SSP-Applicants data extract as the indicator of eligibility status. We edited one observation in the program group with Eligible=0, but with a specified eligibility date ("Eligdate") and received SSP payments, to be Eligible=1. Although a date of eligibility ("Eligdate") is provided for observations with Eligible=1, preliminary analysis suggested that simply assuming eligibility occurs 12 months after the first month of the reference spell, as in the program rules, appears to be more internally consistent with the data. For this reason, we have adopted this assumption to date the eligibility for those individuals who achieve eligibility status.

c. SSP Entitlement-status, the month Entitlement was Established, and the Transition Period

The entitlement status for the program group individuals who have Eligible=1 is determined by whether or not they ever received supplementary payments. The original dataset contains a variable "tkupdate" that specifies the start of the entitlement period. However, from preliminary analysis of the patterns of supplementary payment receipt around this variable date, we prefer instead to estimate the establishment month directly from the patterns of supplementary payments. In particular, we took the first month supplementary payments were received less 2 months (to reflect processing lags and delays between first working fulltime, filing pay stubs and receiving the supplement payments) as our initial estimated establishment month. This resulted in a range for the estimated establishment months of 12-28 (months relative to the start of the reference spell). We then allowed a 14 month establishment window rather than 12 as specified in the SSP rules for processing delays and/or administrative flexibility in the application of the rules, and censored this date at month 25 (this affects 12 out of 387 entitled individuals: 10 with month=26, and 1 each with month=27 and 28). Recognizing a delay occurs between establishing entitlement and leaving IA, we add 1 month to these dates for our analysis of welfare dynamics, giving the range of establishment months from 13 to 26. Finally, as in Card and Hyslop (2004), we assume a 3 month transition period beginning in the month entitlement is established, during which an entitled individual is obliged to leave IA.

Table 1: Key Features of the SSP Applicants Demonstration

A. Program Eligibility

· Eligibility limited to single parents who are new applicants for Income Assistance (IA) – not on IA in 6 months prior to current application.

· Sample members drawn from IA registers in British Columbia, with random assignment between February 1994 and March 1995.

· 1,667 single parents assigned to the program group; 1,648 assigned to the control group.

B. Program Features

· Eligibility for subsidy payments required program group members to remain on IA for 1 year (12 out of 13 months following start of IA reference spell).

· Of those who become eligible, payments are only available to members who successfully initiate their first supplement payment within one year of becoming eligible (13-24 months after start of IA reference spell). Subsidy payments are available for 36 months from time of first payment.

· Subsidy payments available to program group members who work at least 30 hours per week (over a four-week or monthly accounting period), and earn at least the minimum wage.

· Once established, program group members can return to IA at any time. Subsidy is re-established when an eligible person begins working full time again. Recipients are ineligible for IA while receiving subsidy payments.

· Subsidy equals one-half of the difference between actual earnings and an earnings benchmark, set at $3,083 per month in British Columbia in 1993, and adjusted for inflation in subsequent years.

· Subsidy payments are unaffected by unearned income or the earnings of a spouse / partner, and are treated as regular income for income tax purposes.

· Employers are not informed of SSP status. Program group members apply for subsidy payments by mailing copies of payroll forms.

Table 2: Characteristics of SSP Applicants Experimental Samples

	Control Group	Program Group	Control Group, by Eligibility Status: Ineligible	Control Group, by Eligibility Status: Eligible	Program Group, by SSP: Eligibility Status: Ineligible	Program Group, by SSP: Eligibility Status: Eligible	Program Group, by SSP: Establishment: No takeup	Program Group, by SSP: Establishment: Takeup
Fraction Female	0.915	0.896	0.897	0.931	0.879	0.910	0.910	0.910
Average Age	32.4	32.7	33.1	31.8	33.3	32.2	32.4	32.0
Fraction Under 25	0.146	0.157	0.115	0.172	0.138	0.172	0.182	0.158
Fraction Never Married	0.245	0.227	0.222	0.264	0.217	0.234	0.230	0.240
Average Number Children < 6	0.61	0.62	0.56	0.65	0.53	0.68	0.71	0.64
Average Number Children 6-15	0.81	0.77	0.80	0.82	0.76	0.78	0.76	0.81
Average Number Children 16-18	0.13	0.13	0.15	0.12	0.15	0.11	0.11	0.12
Fraction Foreign Born	0.309	0.299	0.235	0.372	0.246	0.339	0.369	0.295
Fraction Grew Up with 2 Parents	0.647	0.655	0.661	0.636	0.680	0.636	0.626	0.650
Fraction High School Graduate	0.622	0.630	0.677	0.575	0.666	0.603	0.543	0.683
Fraction College Graduate	0.130	0.138	0.157	0.106	0.162	0.119	0.109	0.134
Start of IA reference-spell relative to Random assignment:								
3 months prior	0.026	0.022	0.033	0.020	0.023	0.022	0.026	0.016
2 months prior	0.213	0.187	0.202	0.222	0.170	0.200	0.206	0.191
1 month prior	0.692	0.721	0.701	0.685	0.742	0.706	0.700	0.713
month of RA	0.069	0.070	0.065	0.073	0.066	0.073	0.068	0.080
No. Months on IA Prior 3 Years	3.5	3.8	3.7	3.4	3.9	3.8	3.7	3.8
Fraction Working at Baseline	0.253	0.257	0.372	0.152	0.348	0.188	0.140	0.256
Average Years Work Experience	9.6	10.0	10.9	8.5	11.2	9.1	8.5	9.8
Fraction SSP Eligible	0.541	0.570	0	1	0	1	1	1
Fraction Take-up SSP	---	0.237	---	---	0	0.416	0	1
Number of Observations	1,651	1,632	758	893	701	931	544	387

Note: Sample excludes observations who were not on IA in the 6 months before or after random assignment, and whose IA reference spell started either 4 months before, or 1 month after, random assignment.

Table 3: Estimated Dynamic Models for IA Participation for Control and Program Groups

	Controls Only		Controls and Programs							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Eligibility Selection Parameters:										
Constant	0.24	0.66	0.23	0.24	0.61	0.62	0.62	0.25	0.24	0.27
	(0.06)	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)
Program dummy			0.16	0.14	0.13	0.12	0.13	0.14	0.12	0.10
			(0.08)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.08)	(0.08)
α_i	0.93	0.67	0.96	1.01	0.72	0.72	0.71	0.76	1.04	0.77
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.06)	(0.10)	(0.06)
Program * α_i			-0.14	-0.12	-0.19	-0.19	-0.18	-0.15	-0.27	-0.04
			(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.08)	(0.11)	(0.08)
State Dependence Parameters:										
Y(t-1)	5.43	5.30	5.49	5.48	5.36	5.38	5.36	5.64	5.59	5.61
	(0.07)	(0.07)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)
Y(t-1) * α_i						-0.45		-0.60	-0.92	-0.51
						(0.06)		(0.05)	(0.09)	(0.05)
Y(t-2)	2.17	2.09	2.19	2.19	2.09	2.21	2.08	2.42	2.32	2.42
	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)
Y(t-2) * α_i						-0.27		-0.40	-0.58	-0.41
						(0.05)		(0.04)	(0.06)	(0.04)
Y(t-1) * Y(t-2)	-1.76	-1.64	-1.73	-1.72	-1.61	-1.75	-1.61	-1.98	-1.89	-1.99
	(0.09)	(0.09)	(0.06)	(0.06)	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)
Y(t-1) * Y(t-2) * α_i						0.77		0.76	1.10	0.70
						(0.08)		(0.06)	(0.10)	(0.06)
Standard Deviation of	1.42	1.23	1.33	1.33	1.18	1.19	1.18	1.66	1.09	1.64
Random Effect	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.05)	(0.03)	(0.05)	(0.06)	(0.07)

Table 3: Estimated Dynamic Models for IA Participation for Control and Program Groups (Continued)

	Controls Only		Controls and Programs							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Entitlement Selection Parameters:										
Constant			-1.83	-1.83	-1.88	-1.87	-1.88	-1.85	-1.86	-1.85
			(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
linear term			0.16	0.14	0.16	0.16	0.15	0.16	0.16	0.12
			(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
loading on α_i			0.18	0.11	0.19	0.21	0.18	0.14	0.24	0.04
			(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)
Transitional Period Treatment Parameters:										
Exit			-2.42	-2.44	-2.58	-2.55	-2.61	-2.42	-2.45	-2.50
			(0.14)	(0.16)	(0.13)	(0.13)	(0.13)	(0.14)	(0.13)	(0.17)
Exit * α_i			-0.79	-0.82	-0.79	-0.83	-0.78	-0.57	-0.48	-0.62
			(0.15)	(0.14)	(0.16)	(0.16)	(0.16)	(0.12)	(0.19)	(0.12)
Entry			-1.39	-1.43	-1.44	-1.46	-1.46	-1.43	-1.39	-1.70
			(0.33)	(0.38)	(0.29)	(0.28)	(0.29)	(0.33)	(0.31)	(0.43)
Entry * α_i			-0.12	-0.15	-0.11	-0.05	-0.11	-0.02	0.08	-0.01
			(0.33)	(0.31)	(0.35)	(0.33)	(0.35)	(0.26)	(0.39)	(0.25)
Entitlement Period Treatment Parameters:										
Exit			-0.72	-0.83	-0.77	-0.73	-0.59	-0.62	-0.58	-0.74
			(0.14)	(0.15)	(0.12)	(0.12)	(0.16)	(0.13)	(0.12)	(0.15)
Exit * α_i			-0.30	-0.42	-0.28	-0.29	-0.26	-0.27	-0.40	-0.37
			(0.13)	(0.11)	(0.13)	(0.13)	(0.14)	(0.09)	(0.14)	(0.07)
Exit * (First-year)							-0.59			
							(0.16)			
Entry			-0.52	-0.70	-0.61	-0.60	-0.56	-0.56	-0.41	-1.12
			(0.12)	(0.13)	(0.11)	(0.10)	(0.14)	(0.12)	(0.12)	(0.16)
Entry * α_i			-0.05	-0.11	0.03	0.06	0.08	-0.06	-0.14	0.02
			(0.13)	(0.11)	(0.14)	(0.14)	(0.14)	(0.11)	(0.15)	(0.08)
Entry * (First-year)							-0.17			

(0.15)

Table 3: Estimated Dynamic Models for IA Participation for Control and Program Groups (Continued)

	Controls Only		Controls and Programs							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fraction of Entitlement Treatment that Persists:										
Exit-rate				0.28						0.44
				(0.09)						(0.07)
Entry-rate				0.41						0.78
				(0.13)						(0.09)
Probability of		0.15			0.14	0.14	0.14			
Pure-leaver		(0.01)			(0.01)	(0.01)	(0.01)			
log Likelihood	-34510.38	-34399.49	-35720.25	-35710.46	-35602.89	-35574.14	-35593.49	-35663.60	-35600.05	-35649.17
Likelihood-Ratio statistic	---	221.78	---	19.58	234.72	57.50	18.80	113.30	127.10	122.58
(degrees of freedom)		(1)		(2)	(1)	(3)	(2)	(3)	(2)	(2)
Fraction Eligible:										
Controls	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.55	0.55	0.55
Programs	---	---	0.58	0.58	0.58	0.57	0.58	0.58	0.58	0.57
Fraction SSP-Entitled	---	---	0.24	0.24	0.24	0.24	0.24	0.24	0.23	0.24
Average Month Established	---	---	19.34	19.32	19.41	19.29	19.39	19.33	19.28	19.27
Goodness of Fit:										
Controls	154.05	144.92	137.55	141.42	125.02	122.83	122.41	141.14	167.93	160.95
Programs	---	---	183.61	180.41	196.18	195.21	197.66	189.98	232.42	187.50

Note: Standard errors in parentheses. See text for model specifications and other details. All models include a cubic time trend in the IA Participation equation; the model in column (9) also includes linear and quadratic interactions with the random effect (α_i). All models are estimated by maximum likelihood using

Gaussian quadrature with 10 evaluation points. Goodness of Fit statistics calculated from comparing actual and predicted summaries of IA Participation histories.

Table 4: Summary of IA Participation Patterns of Control and Program Groups – Actual and Predicted

Months on IA in 13-84	Summary of Actual Patterns: Number of Transitions					Summary of Prediction Patterns: Number of Transitions				
	0	1	2+ Even	3+ Odd	Total	0	1	2+ Even	3+ Odd	Total
Control Group										
0	396	0	0	0	396	322.5	0	0	0	322.5
1-6	0	104	90	28	222	0	115.5	134.1	35.6	285.2
12-23	0	69	31	43	143	0	57.4	52.2	61.6	171.1
13-24	0	84	47	127	258	0	63.4	61.8	118.4	243.7
25-36	0	58	30	91	179	0	31.1	42.3	99.5	172.8
37-54	0	52	44	96	192	0	25.0	60.0	106.5	191.5
55-71	0	33	106	44	183	0	21.8	131.6	51.7	205.1
72	78	0	0	0	78	59.2	0	0	0	59.2
Total	474	400	348	429	1651	381.7	314.1	482.0	473.2	1651
Program Group										
0	360	0	0	0	360	308.1	0	0	0	308.1
1-6	0	175	86	31	292	0	159.8	126.6	47.9	334.4
12-23	0	105	48	58	211	0	80.8	53.4	87.5	221.7
13-24	0	85	49	111	245	0	52.4	62.9	136.0	251.3
25-36	0	34	41	87	162	0	21.7	46.3	87.4	155.3
37-54	0	53	42	67	162	0	16.8	59.8	78.2	154.9
55-71	0	23	92	28	143	0	16.0	106.6	40.3	162.8
72	57	0	0	0	57	43.6	0	0	0	43.6
Total	417	475	358	382	1632	351.7	347.5	455.6	477.2	1632

Note: The predicted summaries of IA Participation patterns are based on 40 simulations using the model for both the Control and Program presented in column (4) of table 3.

Figure 1a: Income Assistance Participation Rates – Control and Program Groups

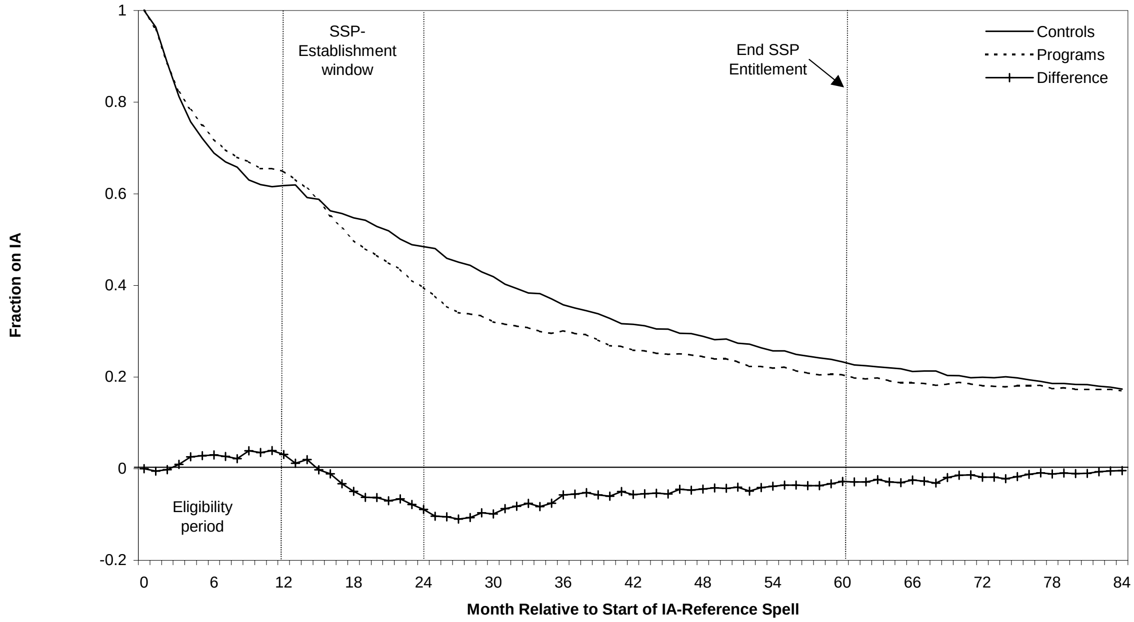

Figure 1b: Smoothed Exit Rates from Income Assistance – Control and Program Groups

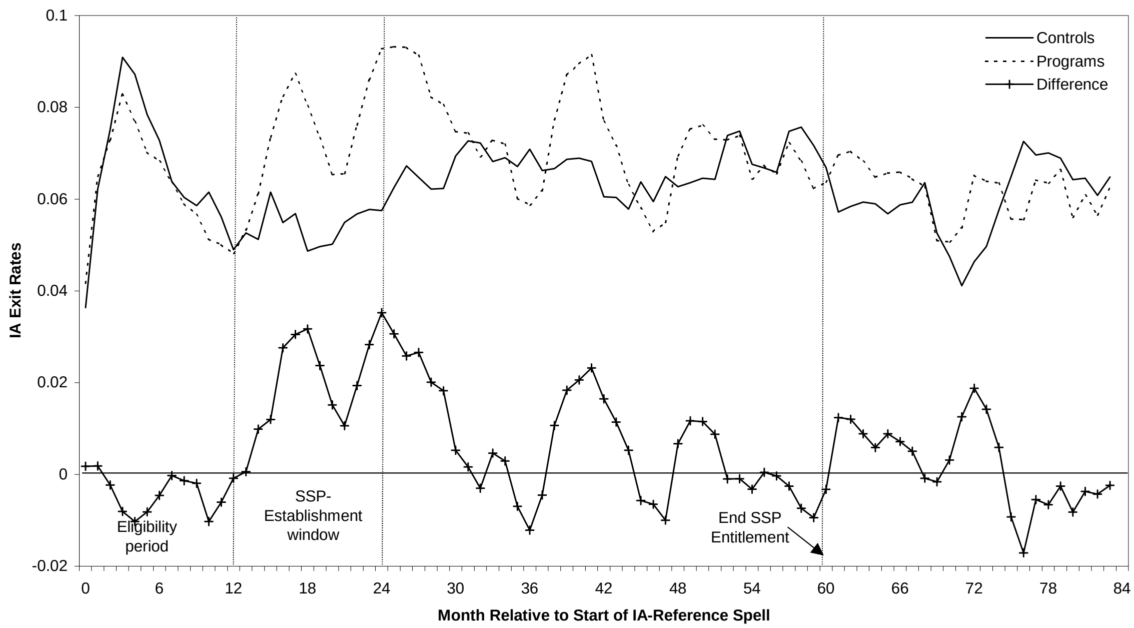

Figure 1c: Smoothed Entry Rates to Income Assistance – Control and Program Groups

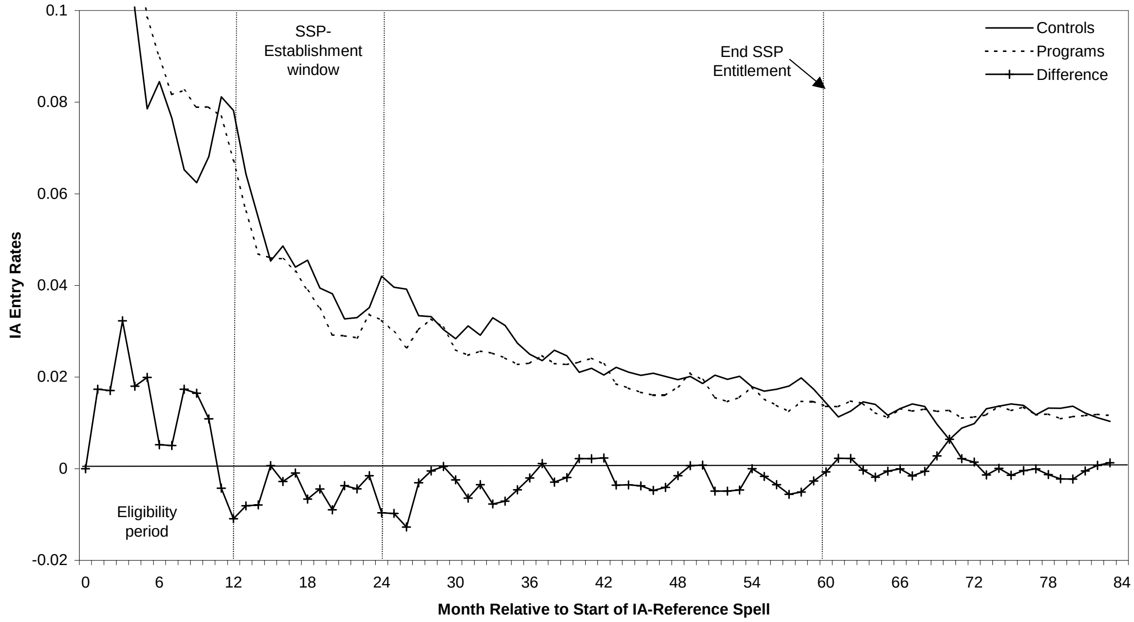

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Figure 2a: Fulltime Employment Rates – Control and Program Groups

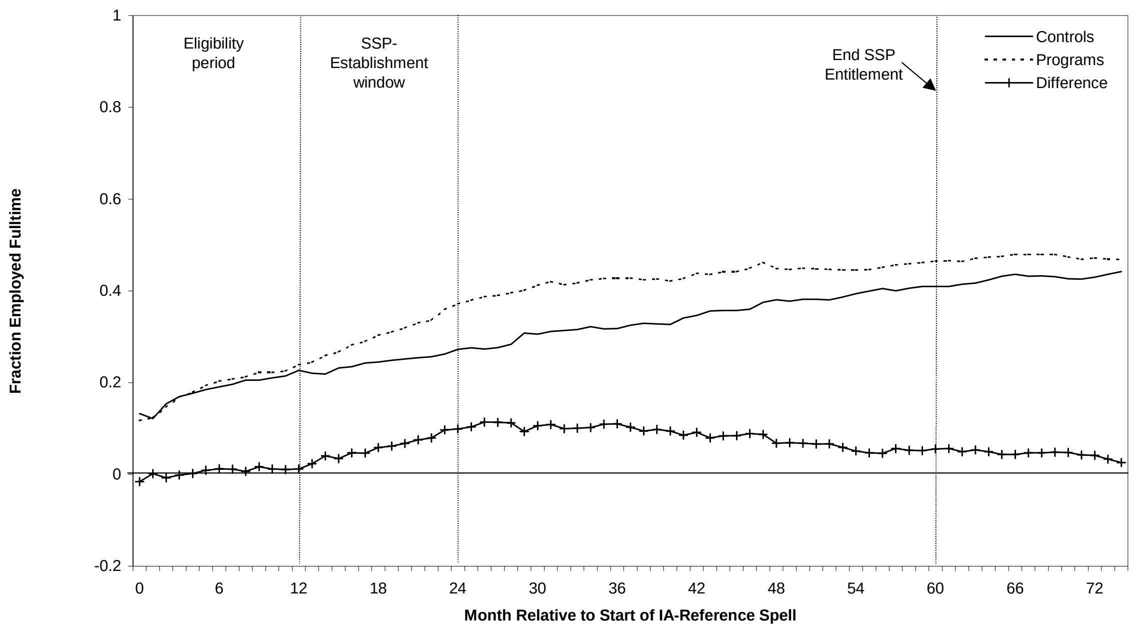

Figure 2b: Wage Rates – Control and Program Groups

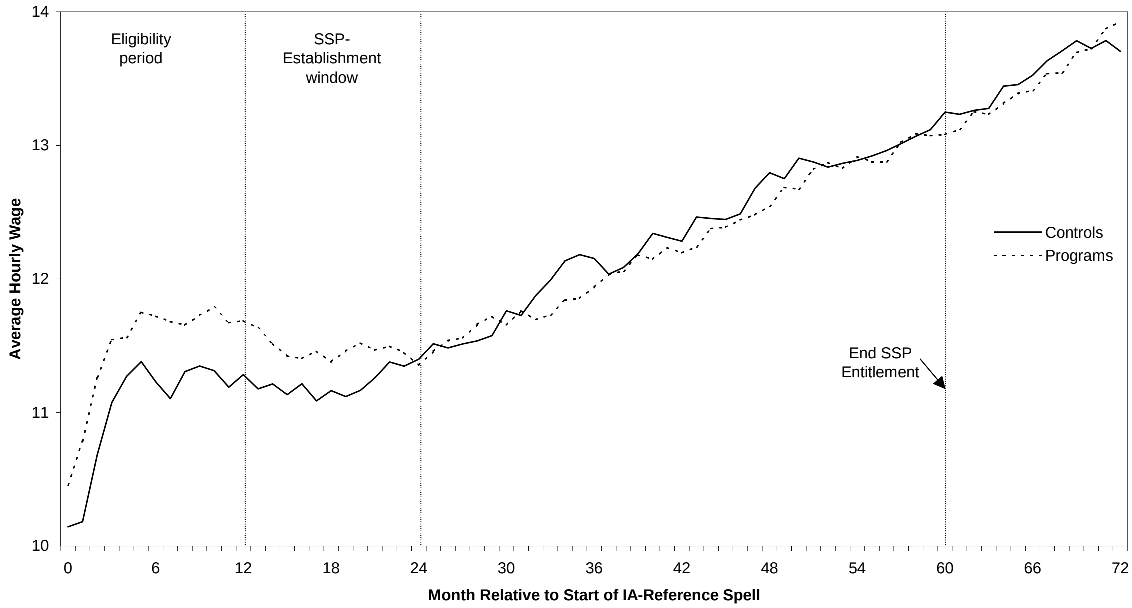

Figure 2c: Monthly Earnings – Control and Program Groups

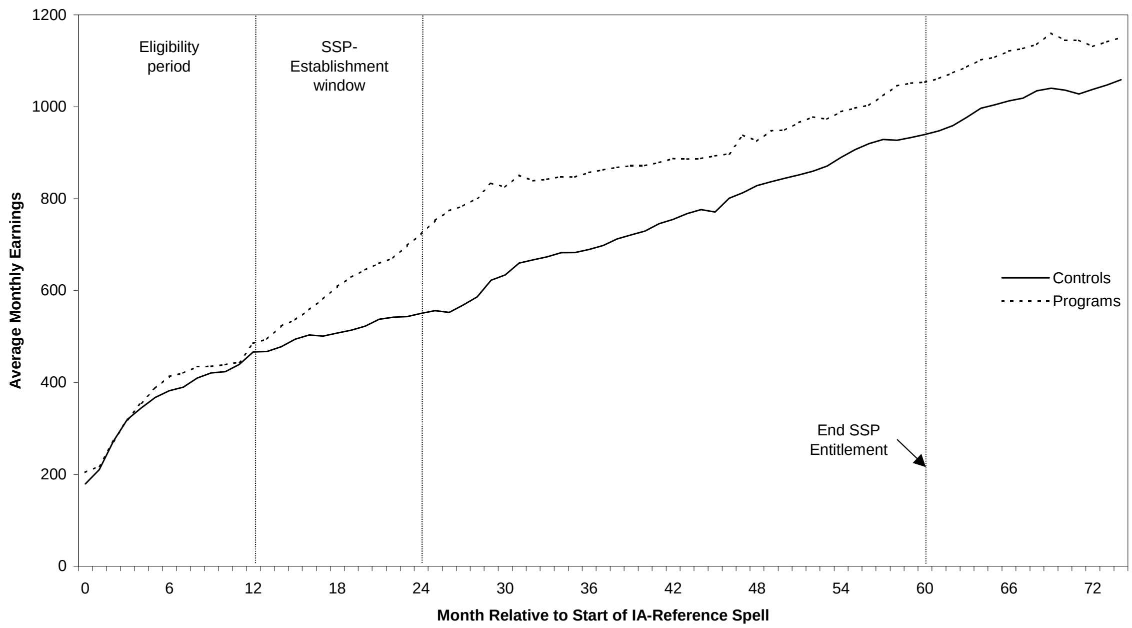

Figure 3a: Reservation Wage of Ineligible Program Group Member

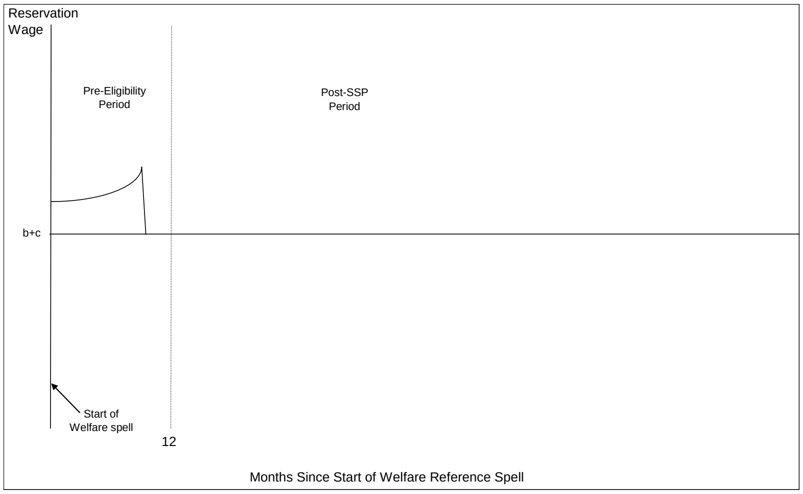

Figure 3b: Reservation Wage of Eligible but Not-Entitled Program Group Member

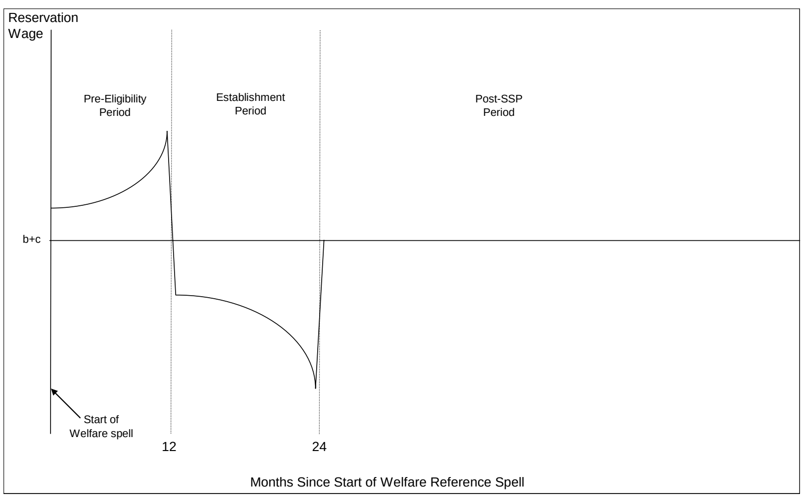

Figure 3c: Reservation Wage of Eligible and Entitled Program Group Member

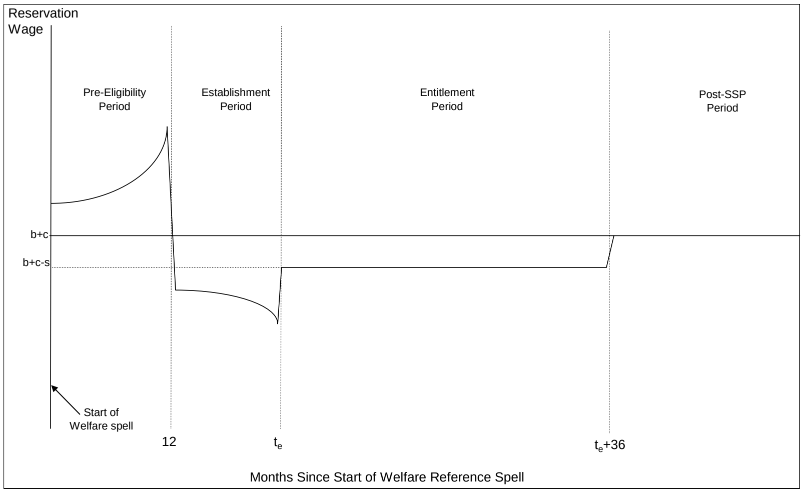
Reservation
Wage
Pre-Eligibility
Period
Establishment
Period
Entitlement
Period
Post-SSP
Period
b+c
b+c-s
Start of
Welfare spell
12
t_e
t_e+36
Months Since Start of Welfare Reference Spell

Figure 4: Actual and Predicted IA Rates for Control and Program Groups

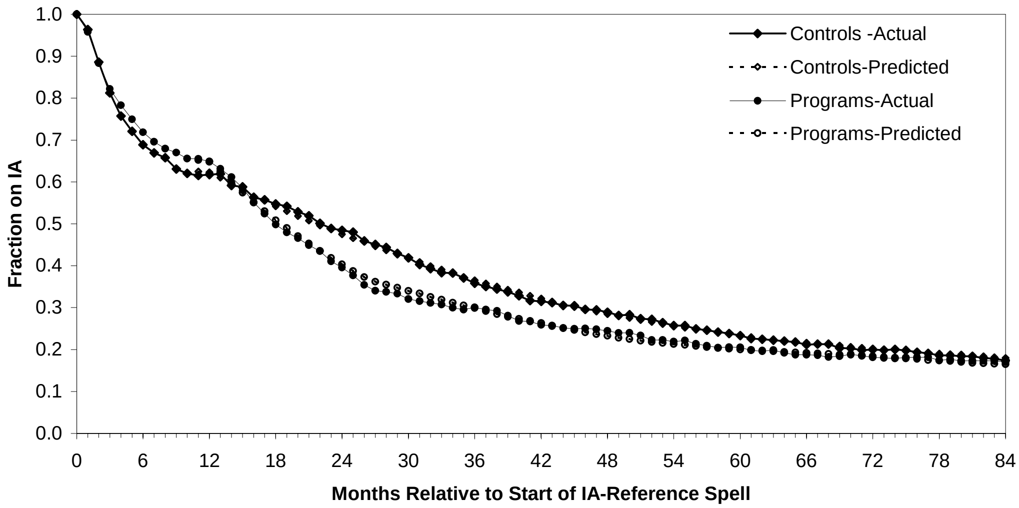

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Figure 5a: Actual and Predicted IA Rates for Eligible and Ineligible Control Subgroups

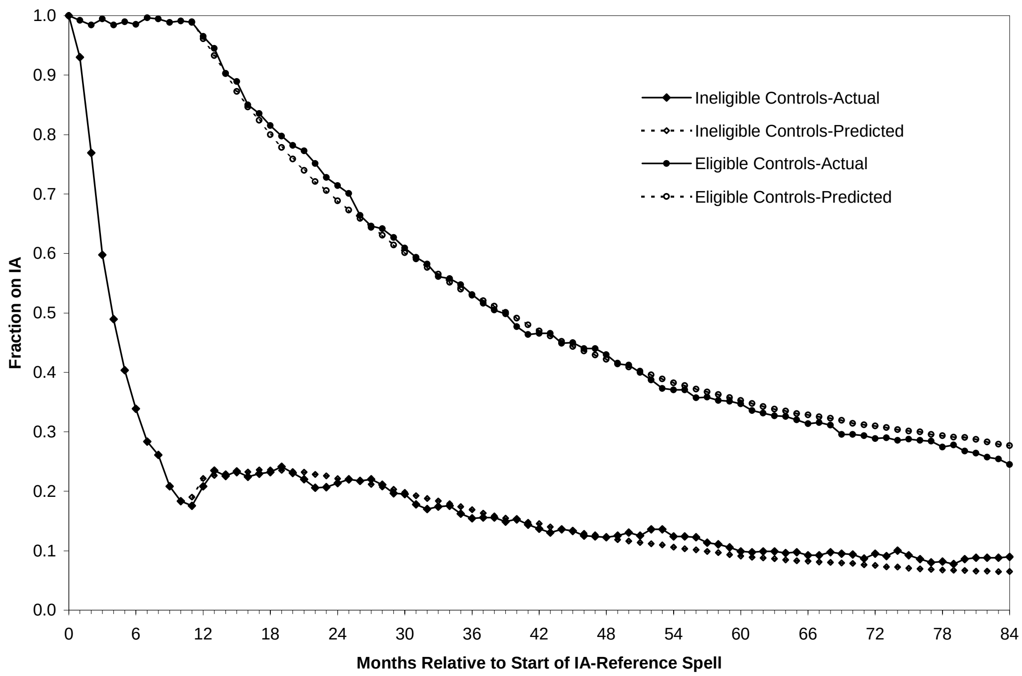


Figure 5b: Actual and Predicted IA Rates for Eligible and Ineligible Program Subgroups

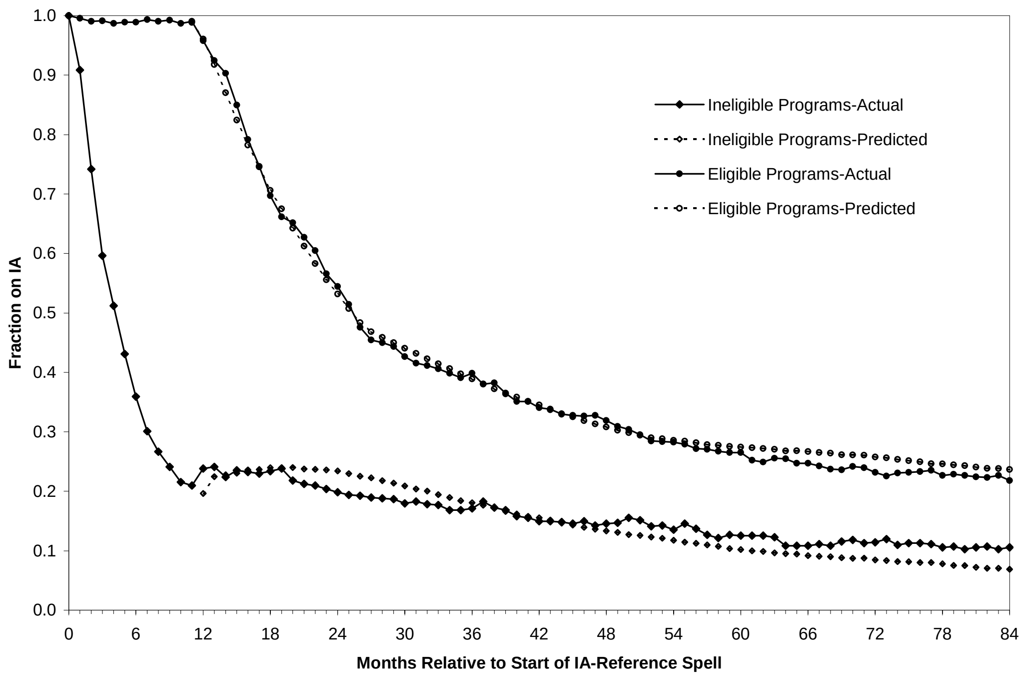


Figure 5c: Actual and Predicted IA Rates for Eligible Program Subgroups

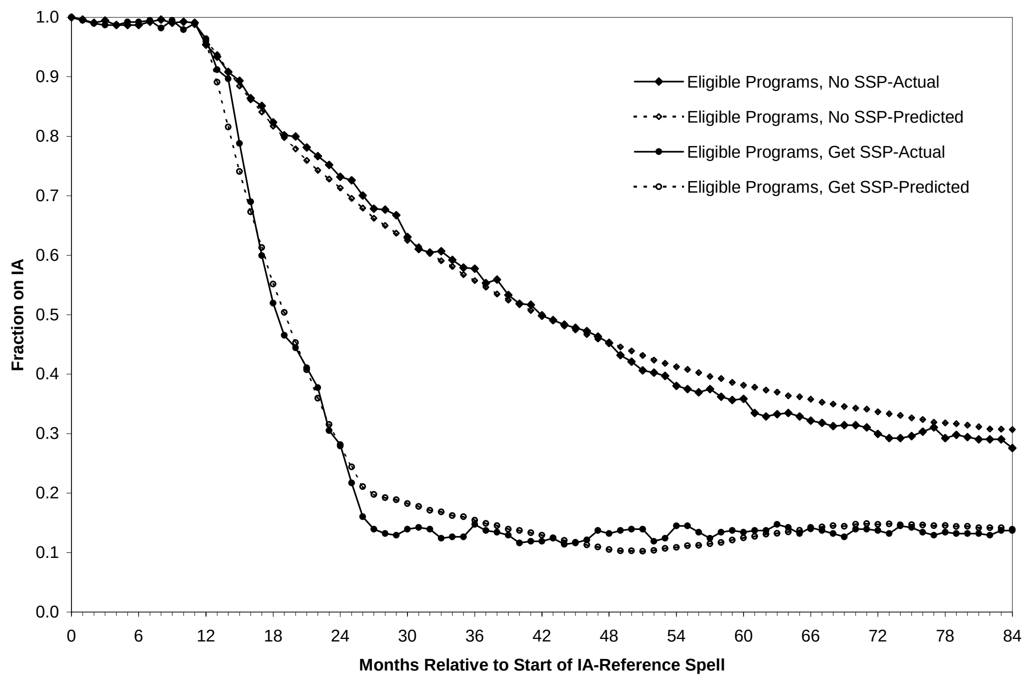


Figure 6a: Actual and Predicted Treatment Effects on IA Participation

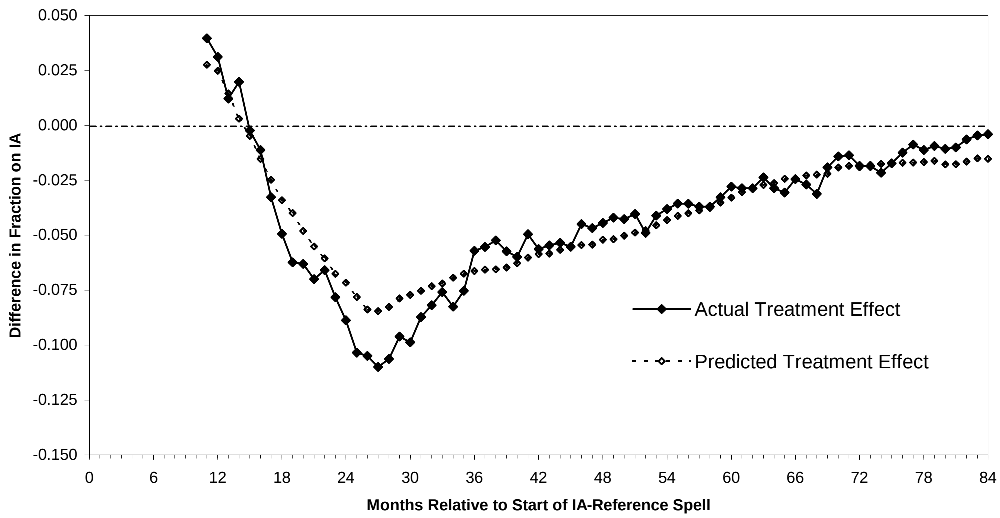


Figure 6b: Differences in IA Participation – Eligible Programs Versus Eligible Controls

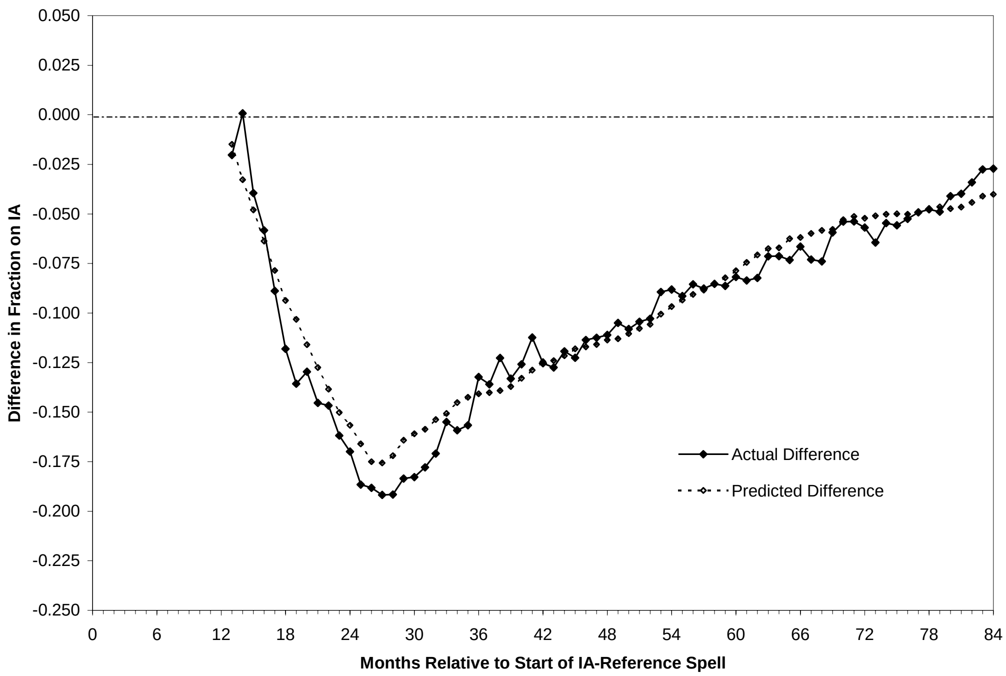


Figure 6c: Differences in IA Participation – Ineligible Programs Versus Ineligible Controls

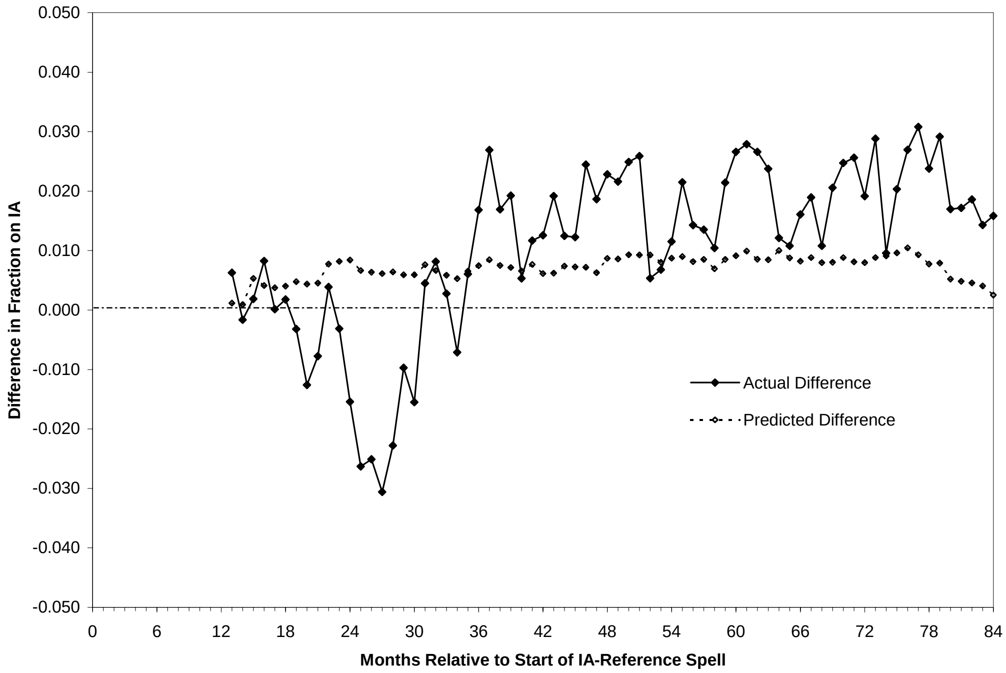


Figure 7: Decomposition of Predicted Treatment Effects on IA Participation

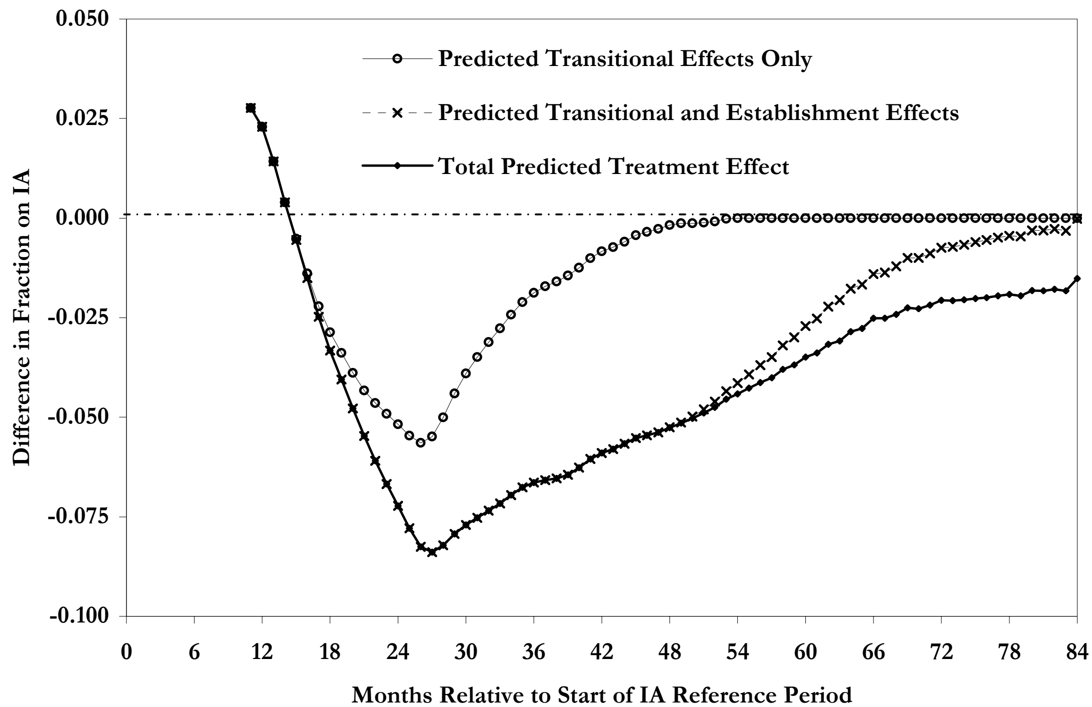
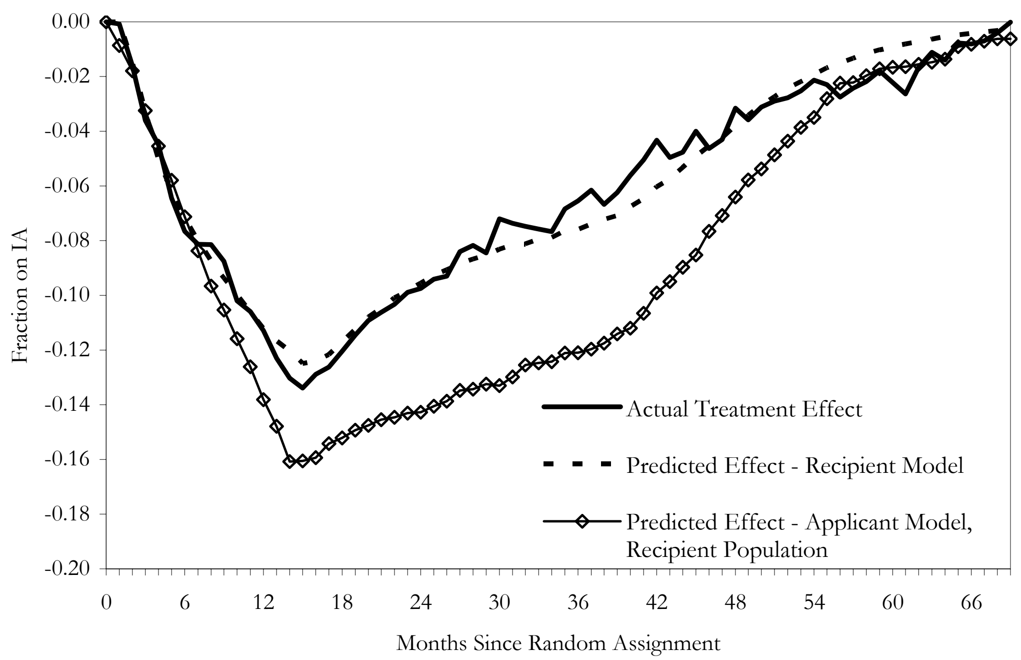


Figure 8: Comparison of Actual Treatment Effect in Recipient Experiment and Implied Effect from Applicant Experiment for Recipient Population



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