

## **The Effect of Public Insurance Coverage for Childless Adults on Labor Supply\***

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### Abstract

This study provides plausibly causal estimates of the effect of public insurance coverage on the employment of non-elderly, non-disabled adults without dependent children (“childless adults”). We use both a regression discontinuity design and propensity score matching differences in differences to take advantage of the sudden imposition of an enrollment cap to compare the labor supply of enrollees to eligible applicants placed on a waitlist. We find enrollment into public insurance leads to sizable and statistically meaningful reductions in employment up to at least 9 quarters later, though the estimated size of this reduction varies from 2 to 10 percentage points depending upon the model used. In light of these results, policymakers should be prepared for a reduction in labor supply among childless adults affected by the Medicaid expansion under the Affordable Care Act.

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## *I. Introduction*

Medicaid is currently the third largest federal domestic spending item after Medicare and Social Security and the second largest state spending item after education. Nearly 60 million low-income adults and children benefit from the program and up to 21.3 million additional low-income adults are could eventually gain coverage under Medicaid expansions associated with the 2010 Affordable Care Act (ACA; Stephens 2013).<sup>1</sup> Given the large and increasing population served by the program, knowing how Medicaid and other public health insurance programs affect the labor supply of recipients and their family members has become increasingly important for understanding the total costs of the program.

Economic theory predicts that cash and in-kind transfer programs generally should reduce labor supply, and extensive empirical research typically has shown that most such programs do reduce labor supply. However, the literature on Medicaid's effect on the labor supply of low-income parents is mixed. While initial work finds strong work disincentives (Ellwood and Adams (1990), Moffitt and Wolfe (1992)), later papers find weaker or even positive effects (Yelowitz 1995, Montgomery and Navin 2000, Ham and Shore-Sheppard 2001 and 2005, Hamersma and Kim 2009, Hamersma 2010, Strumpf 2011). The inconclusive nature of the existing literature suggests effects are heterogeneous across populations and time periods studied.

We contribute to this literature by providing plausibly causal estimates of the effect of means-tested public insurance coverage on the employment of non-elderly, non-disabled adults without dependent children ("childless adults"). Researchers have largely been unable to explore the effects of Medicaid eligibility on the labor supply of childless adults, as states have only recently begun extending coverage to this population. A recent paper by Garthwaite et al. (2013) examines eligibility contractions in Tennessee's program (TennCare), which had been available to childless adults until July 2005, and found both large reductions in Medicaid coverage and large increases in employment rates among childless adults in Tennessee following this contraction. These results are consistent with a 60 percentage point

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<sup>1</sup> Approximately half these projected new adults live in states where, as of March 5, 2013, governors either had not yet decided to expand or oppose the Medicaid expansion (Kaiser Family Foundation, 2013).

reduction 60 percentage points, in labor supply stemming from the availability of public insurance.

Baicker et al. (2013) examined the impacts of Medicaid on the employment of recipients through the Oregon Health Insurance Experiment and found modest labor supply effects, of 1.6 percentage points, that are not statistically different from zero.

Learning about the likely labor market effects of the ACA on low-income childless adults is of critical policy importance. Initial Congressional Budget Office projections suggested that the version of the legislation signed into law would have increased coverage by 33 million people by 2019, with Medicaid accounting for about half these gains and low-income childless adults comprising the majority of the Medicaid expansion population (Congressional Budget Office 2012a). While the subsequent Supreme Court decision making the ACA-related Medicaid expansion a state option will certainly reduce the magnitude of the coverage increases, it remains the case that childless adults are projected to gain large-scale eligibility for Medicaid in 2014 (Congressional Budget Office 2012b).

In this study, we exploit a recent policy reversal in Wisconsin, during which a major public insurance expansion for adults without dependent children (“childless adults”) was implemented and, several months later, abruptly frozen. Individuals who applied after the program was frozen were placed on a waitlist. Those on the waitlist would only be allowed to enroll in the program once enrollment dropped below the capped level, which did not occur at any time during our study period. We obtain estimates of the causal effect of Medicaid on the labor supply of childless adults by comparing the labor market outcomes of those who applied prior to the program freeze and received benefits to those who applied after the program freeze and did not receive benefits.

We use two complementary empirical strategies. First, we use a regression discontinuity design that employs the timing of the enrollment suspension and waitlist introduction. Second, we use a propensity score matching difference in differences approach that matches plan enrollees with waitlisted applicants on their observable characteristics. While the regression discontinuity design likely has

stronger internal validity, the propensity score matching difference in differences approach allows us to take advantage of a greater amount of our data.

A particular strength of our study is that we rely on the state's own administrative records rather than on self-reported enrollment, employment, and earnings data. The data for our study are Medicaid enrollment files merged with quarterly unemployment insurance earnings reports from Wisconsin. The Medicaid records allow us to observe all enrolled and waitlisted applicants, including their exact date of application. The unemployment insurance earnings records are from employer reporting to the state and allow us to observe quarterly wages from all employers, changes in employer, and any spells of non-employment lasting more than one quarter. We merge the two administrative datasets using Social Security numbers.

We find public insurance enrollment reduces the likelihood an adult in our sample will be employed by 2.4 to 5.9 percentage points in the difference-in-difference models and by 6.1 to 10.6 percentage points in the regression discontinuity models. These effect sizes are similar to magnitudes found in the current literature on the labor supply effects of other types of health insurance programs and the sign is consistent with both the theoretical and empirical literatures on the effects of cash and transfer programs on labor supply.

## *II. Program Background*

Launched in January 2009, Wisconsin's BadgerCare Plus Core Plan provides health insurance to adults with no dependent children who have incomes below 200% of the Federal Poverty Line (FPL). The state of Wisconsin applied for and received a federal 1115 waiver to extend some health benefits to this population. Once enrolled, members receive a managed care benefit package and face little cost-sharing. With few exceptions, coverage is not available to persons who already have any form of private health insurance, quit their job, or voluntarily dropped any health insurance in the 12 months prior to application. The program initially required a \$60 application fee and sliding scale premiums for those

with incomes from 150-200% FPL. Upon enrollment, members were eligible to receive benefits for a period of 12 months, when eligibility would be reevaluated.

Enrollment began January 1, 2009 for a limited group and opened to the public on July 1, 2009. Application levels immediately exceeded projections and program budget, with enrollment reaching a high of 65,057. On October 5, 2009, then-Governor Jim Doyle announced at a news conference that Core Plan applications would be suspended effective October 9, 2009 at noon. The suspension was stated by the Governor to result from unanticipated demand for the program and was reported in newspapers statewide.

Subsequent eligible applications were placed on a waitlist. Waitlisted applicants were not required to pay the application fee, and were told that once openings in Core were available they would be notified. The waitlist had reached 89,412 individuals by December 2010. The state has sought to decrease overall Core Plan enrollment to a sustainable level, and has thus not been enrolling waitlisted applicants as current Core Plan members leave the program. The only waitlisted applicants ever enrolled were a small number who were eligible for a medical waitlist bypass because of cancer or heart disease. The presence of a waitlist, imposed quickly based only on state budget criteria and not on participant characteristics, provides a natural and ready comparison group for those enrolled in the Core Plan. Those on the waitlist wanted and were eligible to enroll, but were not able to do so before the enrollment suspension went into effect.<sup>2</sup>

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<sup>2</sup>A stop-gap program with more limited benefits, called the BadgerCare Plus Basic Plan, was promised for waitlisted applicants at the time of the announcement. The Basic Plan was formally announced in January 2010 and coverage was eventually offered to those enrolled on the waitlist effective in July 2010. The state legislature required the Basic Plan to be self-supporting through premiums. Participants in Basic were required to remain eligible for the Core Plan; this meant, among other requirements, their incomes had to remain below the 200% FPL threshold. Adverse selection has been a problem for the Basic Plan: enrollment in the program was closed on March 19, 2011 and enrollees saw multiple increases in required premiums over time. According to a state press release, (<http://www.dhs.wisconsin.gov/News/PressReleases/2011/031811.htm>) these changes were made because program expenditures had outpaced revenues. Enrollment in Basic reached a high of 6,013 in April 2011 (reflecting March applicants) and has steadily declined since.

Core Plan enrollment to date has not been opened up to waitlist applicants, and attrition had reduced enrollment levels to approximately 24,000 as of July 2012. Attrition can occur through a change in eligibility (such as an out of state move, a change in insurance status such as eligibility for insurance through a new job, or a change in categorical eligibility criteria), or failure to re-enroll on the part of the beneficiary. In addition, effective July 1, 2012 non-payment of newly required monthly premiums for enrollees with incomes above 133% FPL and a change in income eligibility prior to the end of the 12 month enrollment period became possible reasons for a change in eligibility. Wisconsin's governor and legislature chose not to participate in federally incentivized Medicaid expansions under the Affordable Care Act; however, effective April 1, 2014 all childless adults with income under 100% FPL will be allowed to enroll in the Medicaid program and all adults with incomes over 100% FPL will be required to transition out of the program.

A potential complication is whether the distribution mechanism itself influences the labor supply decisions of affected participants. If the waitlist participants we use as a control group for Medicaid recipients are themselves constrained by the waitlist because, for example, they believe they need to remain eligible for the program in order to eventually receive it, this would bias against us finding any effects. If true, a better allocation mechanism would perhaps be a lottery since non-recipients would immediately know they would not receive the program and would make their labor supply decisions accordingly. We are unable to answer this question directly. Most of the literature on waiting lists relates to allocation of medical care. Propper (1990, 1995) points out that there are costs to using waiting lists as mechanisms for medical care allocation in the U.K. and estimates these costs using contingent valuation. M. Johannesson et al. (1998) estimate the demand for private insurance that would reduce waiting times in Sweden. Gliberman (1991) discusses the potential for decreases in productivity due to waiting times. None of these studies examine a random allocation mechanism as an alternative choice. Cullis et al. (2000) provide a general treatment of the theoretical and empirical literature on waiting lists for health care services.

### *III. Theory and Related Literature*

A standard static labor supply model would predict that income eligibility thresholds for public health insurance likely reduce the incentive to remain in or return to the workforce and, among workers, likely reduce the incentive to increase work hours. The negative effect on labor supply results from the reduced need for private coverage among recipients as well as the possibility that increased earnings would disqualify them from public coverage (the “Medicaid notch”).

The existing economics literature portrays a mixed picture of the impact of Medicaid eligibility on the labor supply of low-income parents, the most comparable population available that has been studied. Initial work found strong work disincentives of Medicaid: Ellwood and Adams (1990) and Moffitt and Wolfe (1992) find single mothers on AFDC were less likely to exit coverage (and become employed) if Medicaid’s value to them was high. Subsequent work finds effect sizes of smaller magnitude (Yelowitz 1995, Ham and Shore-Sheppard 2001) and of the opposite sign (Ham and Shore-Sheppard 2005). Recent papers either find mixed effects (Hamersma and Kim 2009) or no effect (Hamersma 2010, Strumpf 2011). The inconclusive nature of the existing literature suggests heterogeneous effects across populations and time periods studied, further motivating the need to study childless adults in isolation during recent years.

The literature on other important publicly provided health insurance programs is more conclusive. French and Jones (2011) show Medicare eligibility is an important determinant of retirement decisions. Boyle and Lahey (2010) find decreased labor supply on both the extensive and intensive margins for older veterans eligible for Department of Veteran’s Affairs health programs.

Other types of cash and in-kind transfer programs in the United States have been found to negatively affect labor supply. Moffitt (2002) reviews the extensive empirical literature. More recently, Jacob and Ludwig (2012) find a 6% decline in labor force participation and a 10% decrease in earnings resulting from housing vouchers. Hoynes and Schanzenbach (2012) find reductions in employment and

hours worked among single-headed households resulting from the food stamp program. Meyer (2002) and finds the Earned Income Tax Credit discourages work on the extensive but not on the intensive margin; Eissa and Hoynes (2004) confirm the finding of extensive margin work disincentives at the family level. Social Security Disability Insurance has generally been found to reduce employment among older men (Bound 1989, Parsons 1990, Gruber and Kubit 1997, Chen and Van der Klaauw 2008, Maestas et al. 2011, French and Song 2012).

The effect of public insurance on earnings is ambiguous in our context. If availability of public insurance leads to increased job mobility and increased mobility results in better job matches, we could, all else equal, observe higher wages (and therefore earnings) among the public insurance enrollees. A second possibility is that workers could match with jobs that pay higher wages since the job would no longer need to pay health benefits. Baicker and Chandra (2006) find increases in health insurance premiums result in both a decreased probability of employment and lower wages, supporting a partial wage offset for health insurance. Since we do not observe hours worked, only quarterly earnings, in practice earnings could either increase (because of better matches and/or wage offsets) or decrease (because of fewer hours worked). Again, since workers must remain below the income eligibility threshold the positive effects are likely limited.

Finally, increased availability of public insurance may increase the likelihood a worker would leave the labor force to become self-employed. Consistent with a compensating differential framework, the self-employment wage is effectively increased by the value of public insurance coverage. Results from the empirical literature are mixed (Lombard 2001, Holtz-Eakin et al. 1996, Zissimopoulos and Karoly 2007, Fairlie, Kapur, and Gates 2011); however, we acknowledge the possibility and discuss it further below.

#### *IV. Data*



The data sources for this project are state administrative records on enrolled and waitlisted Core Plan applicants and earnings records from Wisconsin's unemployment insurance (UI) system. In the state's records on Core plan enrollees and waitlisted applicants, we observe exact application date, age in months, monthly income at the time of application, county of residence and sex. The UI data include quarterly earnings for each individual from each covered firm where he or she worked during that quarter; only employers not subject to unemployment insurance laws (for example, the self-employed) are exempt from reporting requirement. We observe these data for each person from the first quarter of 2005 (Q1 2005) through the final quarter of 2011 (Q4 2011). We merge the data on Core Plan applicants and enrollees to the UI data using Social Security numbers.

A particular strength of our analysis is that UI data exhibit superior accuracy over the survey-based data used in the existing literature. Virtually all employers are required to file quarterly wage reports for each employee on their payrolls. The wage reports include the employee's Social Security number and quarterly wages and the employer's federal tax identification number and industry classification code. Using these data, we can track quarterly earnings and employment at all covered firms, job changes, and any periods of non-employment lasting for at least one quarter.

Waitlist members were subject to basic screening, but to ensure comparability we employ several sample filters to ensure those on the waitlist would have actually been eligible for Core had they been invited to enroll (on the basis of all characteristics other than earnings, which may have changed in response to being on the waitlist). First, we drop anyone not in the eligibility age range (ages 19-64) according to date of birth. Second, we observe termination codes (reasons) for waitlist members that are removed from the waitlist, and we drop all waitlist members with codes indicating they either do not meet program requirements or are eligible for other Medicaid programs. We do not observe Core plan applicants who applied before the program cutoff and were found ineligible by the state.

Table 1 reports demographic characteristics. Individuals who enrolled in the Core Plan are aged 43 on average and 49.6 percent were female, while the average age on those on the waitlist was lower –

38 years – and 43.7 percent were female. If we examine only those who applied within about a month of the October 9 cut-off date (i.e., those who enrolled into Core between September 1, 2009 and October 2, 2009 and those who were waitlisted and applied between October 9, 2009 and October 31, 2009), these differences are slightly smaller.

We consider several outcomes to measure labor supply using the quarterly employment records available in the Unemployment Insurance administrative data records. For employment, we consider average quarterly employment over the Q4 2009 to Q4 2011 period, with employment defined as having any earnings in a quarter. Earnings are defined as average earnings over Q4 2009 to Q4 2011. For the difference in differences models, these outcomes are defined analogously for the pre-program period. To consider intensive margin decisions, we select a subsample of applicants who were continuously employed (had positive earnings) throughout 2009 and 2010, and look at their average earnings for Q4 2009 to Q4 2011.

Finally, in order to assess the potential for our results to be explained by transitions to self-employment, which would not be recorded in our administrative data, we use the American Community Survey (ACS) from 2009 to 2011. We chose the ACS for its relatively large state sample sizes. The ACS includes a question asking participants whether they were employed by a government, private company, nonprofit organization, or were self-employed. We classify all respondents who indicated they were self-employed (whether at an incorporated or unincorporated business) as self-employed.

#### *V. Empirical Method*

We identify the effect of the Core plan on the labor supply of childless adults using two complementary sets of analyses, each with its own relative strengths. The first is regression discontinuity (Lee and Lemieux, 2010) and the second is propensity score difference in differences (Heckman et al., 1997). Each empirical strategy relies on a slightly different assumption about the comparability of the waitlist applicants versus the enrolled applicants. If there were no differences between waitlist applicants and

enrolled applicants, both approaches would be equally valid. While the regression discontinuity design likely exhibits superior internal validity relative to matching methods, the latter design is relatively better powered. We think the ability to assess the robustness of the results across these two methods provides more convincing evidence than implementing either approach on its own.

We first use a regression discontinuity (RD) design. Lee and Lemieux (2010) provide an overview and summary of recent applications. In essence, this approach involves comparing the labor supply of those who applied just prior to October 9, 2009 (immediately before the enrollment cap was implemented) with the labor supply of those who applied just after October 9, 2009 (immediately after the enrollment cap was set). As discussed above, eligible applicants who applied prior to October 9 were enrolled into the program while those who applied after October 9 were placed on a waiting list. Because all eligible people who applied before October 9 were allowed to enroll in the Core plan and none who applied after were, we use a ‘sharp’ regression discontinuity design.

Importantly, the date was announced precipitously (on October 5) and would have been unexpected by all potential applicants. However, the data show the announcement resulted in an increase in applications between October 5 and October 9. Our preferred specifications use only the data on enrollees up to the announcement date, but we estimate and report specifications including applications between October 5 and 9 as well.<sup>3</sup>

The RD approach enjoys a distinct advantage over simple comparisons of those enrolled in the Core Plan with those on the waiting list. Since the cutoff date was imposed arbitrarily by the state (and was not an original feature of the program), it is reasonable to assume the individuals applying just before the announced cutoff date were very similar to those applying just after the cutoff date. The standard RD identification assumption applies, and in this context is interpreted as: there is no self-selection into application based on the knowledge the applicant will be on the waitlist rather than gain immediate insurance. We implement our estimates using a local linear regression approach. We include robustness

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<sup>3</sup> This is similar to although not the same as the “donut-RD” estimate studied in Barreca et al. (2011) as a solution to heaping bias.

checks to various bandwidths as part of our analysis. The standard validity checks are included in the Appendix.

The exact specification of our RD estimator is:

$$(1) \quad Y_i = \alpha + \beta(X_i - x_0) + \tau W_i + \gamma(X_i - x_0)W_i + \epsilon_i$$

with kernel weights defined as  $h - |X_i - x_0|$  where  $h$  is the bandwidth and all observations outside the bandwidth (more than  $h$  away from  $x_0$ ) are discarded. Here,  $Y_i$  is the outcome under consideration,  $X_i$  is the date of application,  $x_0$  is the cutoff date,  $W_i$  is an indicator for whether or not the individual was enrolled in Medicaid (equals one if on the waitlist, zero if in Core), and  $\epsilon_i$  is a random error term. The treatment effect of interest is  $\tau$ . The coefficients  $\beta$  and  $\gamma$  allow the slope of the regression to differ on either side of the cutoff  $x_0$ .

A disadvantage of RD is that it does not use the entire samples of those on the Core Plan and on the waitlist, so lack of sample size could lead to power issues (though this concern does not appear to be an issue in our case) and limit our ability to conduct sub-analyses that further stratify by age or sex of the applicant. A second issue is that the announcement prior to the actual application cutoff date makes the identification less straightforward than might be desired. Specifically, we might be concerned the announcement is a form of manipulation and affects waitlisted applicants in the post period in addition to those who enrolled during the few days between the announcement and the suspension of enrollment.

For these reasons we complement our regression discontinuity design by including a second approach, the use of difference-in-differences and propensity score weighted difference-in-differences methods. This design involves making the Core group and waiting list groups as comparable as possible based on observable characteristics, as well as taking advantage of the panel nature of the earnings data. In contrast to the regression discontinuity analysis, propensity score weighting uses the entire samples of waitlisted and enrolled applicants. The most important difference with propensity score weighting relative to the discontinuity approach is the assumption required for identification: we must assume that

conditional on observables included in the propensity score and an individual fixed effect, there was no selection on time-varying characteristics in the date of application (Smith and Todd 2005).

A rich methodological literature establishes the conditions under which the use of propensity scores is appropriate in examining labor market outcomes (examples include Card and Sullivan 1988; Dehejia and Wahba 1999; Dehejia and Wahba 2002; Heckman, Ichimura, Smith and Todd 1996; Heckman, Ichimura and Todd 1997; Heckman and Smith 1999; and Smith and Todd 2005). A key finding from this body of work is the underlying assumptions of propensity score methods are best met by including data on lagged labor market outcomes; indeed, lagged labor market measures have been found to be the single most important set of matching variables. We have access to historical UI data, which we use to construct such measures for the study sample. Moreover, our data meet the other key conditions established in the aforementioned methodological literature: matched treatments and controls are drawn from the same geographical labor market and their respective labor market outcomes are measured in the same way (Heckman, Ichimura and Todd 1997; Heckman, Ichimura, Smith and Todd 1996).<sup>4</sup>

We implement both standard difference in differences with a variety of specifications as well as propensity score matched versions of these models. In particular, we estimate the following models:

$$(2) \quad Y_{it} = \beta_0 + \beta_1 Post_{it} + \beta_2 Core_i + \beta_3 (Post \times Core)_{it} + \delta X_i + \varepsilon_{it},$$

and

$$(3) \quad Y_{it} = \alpha + \sum_{j=2005Q1}^{2011Q4} \gamma_j (Quarter_{it} = j) + \beta Core_{it} + \sum_{j=2005Q1}^{2011Q4} \varphi_j (Quarter_{it} = j) \times Core_{it} + \delta X_i + \varepsilon_{it},$$

where:

$Y_{it}$  is an indicator for positive employment for individual  $i$  in quarter  $t$ ,

$Post_{it}$  is an indicator for the earnings occurred in a quarter between Q3 2009 to Q4 2011,

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<sup>4</sup> Also of note is a recent German study that finds that propensity score models including lagged labor market measures and a set of demographic covariates similar to our own perform just as well as models augmented with additional person-level measures such as personality traits and motivation (Biewen, Fitzenberger, Osikominu, and Paul 2010).

$Core_{it}$  is an indicator the individual enrolled into the Core plan,

$Quarter_{it}$  is an indicator for the quarter the earnings were observed, and

$X_i$  is a set of indicator variables for sex, age in months, and county of residence.

To implement our propensity score adjustments, we estimate the propensity score using a probit with controls for quarterly employment for each quarter from Q1 2005 to Q2 2009, quarterly earnings in each quarter from Q1 2005 to Q2 2009, age in years, sex, and county of residence. We then construct a propensity score weight for each control observation (waitlisted applicants) using an Epanechnikov kernel weight (Leuven and Sianesi 2003). The results of the propensity score models and the balancing tests are reported in the Appendix.

Finally, we also embed our regression discontinuity framework within the propensity score approach and estimate these models restricting the sample to applications within thirty days of the cut-off date.

## VI. Results

In this section, we present the results from the regression discontinuity analysis and those from the propensity score differences in differences analysis. Overall, both sets of analysis yield similar estimates despite being identified from different sets of assumptions.

### *Probability of Employment*

Figure 1 illustrates the results of our local linear RD specifications for the employment outcome. All figures in the left column have the assignment variable, the exact date of application, on the x-axis and the outcome variable, average quarterly employment from Q4 2009 to Q4 2011, on the y-axis. The figure in the first row includes all application days thirty days before and after October 9, 2009. Each observation is the average of the outcome for all applicants on that day. The lines are estimated local linear regression functions.

The figure in the first column of the second row excludes the week prior to and after the cutoff day, starting from the left application date begins on September 4, 2009 and goes through October 4, 2009

and from the right application date begins October 15, 2009 and ends on November 15, 2009. The figure in the first column of the third row excludes just those days between the announcement and the cutoff, with applications from September 4, 2009 through October 4, 2009 and October 10, 2009 through November 10, 2009.

Results of the estimation are summarized in Table 2. Most specifications show a statistically significant and relatively large drop in employment among Core plan enrollees relative to waitlisted applicants, from 6.9 percentage points in the specification including all applications to 11.8 percentage points in the specification excluding one week around the cutoff and 5.9 percentage points in the specification excluding just the surge of applications between the announcement and the cutoff date. The results in Table 2 are all reported at a bandwidth of 15 days. While the 5.9 percentage point result is not statistically significant at the bandwidth in Table 2, it remains stable and becomes statistically significant at slightly higher bandwidths. Table 2 also includes specification checks adding all available covariates to the analysis (age, sex, employment in prior quarter, earnings in prior quarter). Results are not statistically different from the specifications without covariates.

Figure 1 also includes bandwidth robustness illustrations for each set of results in the right column. In these, the x-axis is the bandwidth at which the specification was estimated, while the y-axis is the size of the estimate. The solid dark line represents the estimate itself, and the lighter dashed lines represent the 95% confidence interval for the estimate. After some variability at the smallest bandwidths (as is to be expected), estimates do not vary with the bandwidth used for estimation.

In addition to quarterly measures of employment, Table 2 also includes specifications that aggregate the results to an indicator for ever being employed in 2010. Results and conclusions are very similar.

We include standard validity checks in the Appendix. These include a density test (Appendix Figure 1) placebo tests (Table A3 and A4), and covariate tests (Table A5). All placebo and covariate tests are consistent with the regression discontinuity assumption with one exception: a small but statistically

significant drop in age of applicants at the time of the cut-off of slightly over 3 years. However, including age as a covariate makes no difference in the results.

Appendix Figure 1 makes clear the increase in applications during the last week. In addition, Figure A2 shows applications were allowed on weekends during the post period and not during the pre period, resulting in a Monday bump. Therefore, we also estimate models defined by application week (Saturday-Friday) rather than day. We find no difference in the size or significance of results using these specifications. We also estimated all specifications controlling for the day of week of the application and found no differences in the results. These results are available upon request.

Figure 2 plots quarterly employment rates for those enrolled in the Core Plan and those waitlisted from Q1 2005 to Q4 2011 for our different estimation samples. In the first set of plots, we include all observations, with the plot on the left unweighted and on the right propensity-score reweighted. In the second set of plots, we include only those observations who applied in either September or October 2009.

Three things can be seen in Figure 2. First, Core plan enrollees and waitlisted enrollees both suffered large declines in employment rates around Q3 2009, bottoming out in about Q1 2010, suggesting that employment losses (and perhaps loss of employer-sponsored insurance coverage) led many to apply for the Core Plan. Second, Core Plan enrollees tended to have higher employment rates in the quarters leading up to when enrollment into the plan opened in July 1, 2009 than did waitlisted applicants, suggesting an adjustment based on observables and fixed unobservables needs to be conducted (as in equation (3)). Third, waitlisted applicants had higher employment rates in the quarters following the cut-off date, suggesting a substantial employment disincentive effect of public insurance.

The second two plots also show the Core Plan enrollees and the waitlisted applicants who applied within one month of October 9 look relatively more similar in terms of their employment rates in the “pre” period but in the “post” period, the waitlisted applicants still show a substantially higher rate of employment.



Table 3 reports the results from our difference-in-differences models. The models based on equation (2) can be interpreted as the change in average employment rates over the “post” period (Q4 2009 to Q4 2011) from the average employment rate in the “pre” period (Q1 2005 to Q2 2009) for those enrolled in the Core Plan relative to those waitlisted.

The results indicate a relative decline in average employment rates of 5.9 percentage points for those with public insurance; these results are statistically significant and are robust to including controls for sex, age, and county of residence. When we restrict the sample to those who applied in September and October 2009, the estimated relative reduction in employment rates remains economically large – 5.0 percentage points – and statistically significant.

When we estimate the same models using our propensity score weighted sample, we find smaller estimates when the comparison is relative average employment rates between the “pre” and “post” periods (between 2.4 and 3.3 percentage points) that also are statistically significant.

### *Earnings*

A negative earnings effect across the sample would be expected if wage rates remained the same and Medicaid enrollees were less likely to work. Figure 3 shows local linear regression discontinuity estimates of the effect of public insurance participation on quarterly earnings. The dependent variable is the average total quarterly wage and salary earnings from Q4 2009 to Q4 2011. A summary of these results is included in the second row of Table 2. In these specifications, waitlist participants earn more than Medicaid enrollees; the results suggest a negative earnings effect of Medicaid of between \$200 and \$400 per quarter. Table 2 also includes an annual measure, total annual earnings in 2010. The results for annual earnings are very similar, suggesting an annual difference of \$950 – \$1460 depending on the specification.

Table 4 reports the results from our difference in differences models. The results from those who applied within 30 days indicate a relative decline in quarterly earnings of \$200-210 for those with public insurance; these results are statistically significant and are robust to including controls for sex, age, and

county of residence. When we include the full sample, the estimated relative difference in earnings is essentially zero (a statistically insignificant \$16-20).

When we estimate the same models using our propensity score weighted sample, we find a slightly different pattern. In the full sample, the results suggest a positive earnings effect of around \$70, while in the restricted sample, a negative earnings effect of \$120. These effects are statistically significant in both samples.

### *Subgroups*

Table 5 reports the results of the regression discontinuity estimation for each of the date specifications and four splits of the sample: by sex, by age, by employment status prior to application, and by local unemployment rate. The table includes only the specification that excludes October 5 to October 14 applications and all results are reported at a bandwidth of 20 days.

Results are not particularly different for men and women, although effects are slightly larger for women. For age, however, there are clear and important differences in the employment effects. The effect is approximately twice as large as average for those between 35 and 55 years old, and more than three times as large as average for those over the age of 55. For those under 35, effects are weakly negative (meaning that employment among Core Plan enrollees increased relative to those on the waitlist). This is consistent with an early retirement story for older workers who may have found it more difficult to obtain a new job.

Point estimates for those who were not employed in the second quarter of 2009 are 2.4 percentage points larger than for those who were employed in the second quarter of 2009. The effect also is substantially larger for people living in counties with low rather than high unemployment rates (split at 10 percent, the 75<sup>th</sup> percentile unemployment rate weighted by individual). In counties with unemployment rates of 10 percent or less, we find a reduction of employment of 6.8 percentage points of Core enrollees relative to waitlisted applicants. By contrast, the estimate in counties with unemployment rates greater than 10 percent is very small (0.7 percentage points) and statistically insignificant.

### *Self-Employment*

If some Core Plan participants are leaving wage and salary work for self-employment as a result of receiving public insurance, we would classify them as unemployed in our data. This would bias our results toward finding negative labor supply effects when none exist. As discussed above, results from the literature on the empirical relationship between health insurance portability and self-employment are mixed; however, given that it is a concern for us we wanted to test for the possibility.

We choose a sample of families with no children from the 2009-2011 American Community Survey (ACS) and compare those with incomes up to 200% of the federal poverty level to those with incomes from 200-400% of the federal poverty level in Wisconsin and nationally, before and after the Wisconsin program implementation. While we found the share of low-income self-employed Wisconsin residents eligible for public insurance was higher than in the national sample, we found no evidence of a difference in the shares relative to the national difference over time. We interpret these results as supportive of the hypothesis that changes in self-employment are not an important determinant of changes in labor supply in our context. Full results from the triple difference estimation are available from the authors on request.

### *VII. Discussion and Conclusion*

In this study, we examine the labor supply effects of publicly provided health insurance for low-income adults without dependent children. Our findings suggest public insurance has a disincentive effect on the labor supply of low-income childless adults. The sizes of our estimated effects are large, ranging from 2.4 to 5.9 percentage points in the difference-in-difference models and from 6.1 to 10.6 percentage points in the regression discontinuity models. Among a population in which only approximately half of enrollees had any positive earnings in the quarter prior to application, these are large effects. Our

evidence suggests the net effect on earnings (including those who lost or changed jobs) was a reduction of \$100-300 per quarter.

There are several caveats to our results. First, while we find negative employment effects using two different and complementary methods relying upon different identifying assumptions and across a variety of specifications, our identification strategies are imperfect. For example, even adjusting for observable differences between the Core Plan enrollees and the waitlisted applicants using the rich earnings and employment histories available in the UI data and employing difference in differences (which nets out any fixed unobserved differences), does not preclude the existence of time-varying unobserved differences between the two samples. Moreover, we do find differences at the cut-off discontinuity in the age of the applicants between those waitlisted and those enrolled, which may indicate a violation of the strict RD identifying assumptions. While these age differences are small and the estimated effects change little when we control for age in the RD models, the concern remains.

Second, extrapolating from the Wisconsin Core Plan for childless adults to an expansion of Medicaid to childless adults may not be possible. The two programs differ one important way: Medicaid is an entitlement while the Core Plan is not. Since new enrollment into the Core Plan was ended on October 9, 2009, any Core Plan member who left the plan (perhaps as a result of gaining health insurance through a new employer), would not be able to go back on the plan should he or she subsequently lose private insurance. This would not be the case with Medicaid; individuals would be free to exit and reenter the program as their eligibility changes. The fact that the Core Plan is not an entitlement could have had a “lock-in” effect on enrollees, exacerbating any employment disincentive relative to Medicaid. On the other hand, the waitlist itself may have provided a disincentive and waitlisted applicants had access to the Basic plan. Although only a small percentage of them took up Basic, its existence would provide a work disincentive as well, and minimize the estimated employment disincentive of public insurance.

Finally, as with other studies utilizing unemployment insurance records, we do not observe transitions into and out of self-employment. As we cannot differentiate between self-employment and being out of the labor force, we could be overstating the association between public insurance eligibility and labor market attachment. Using auxiliary data from the ACS, we explore trends in self-employment among the target population of interest over the study period in order to deduce the potential magnitude and direction of any resulting bias from mislabeling. We find no evidence of important bias from our inability to identify self-employed members of our sample.

Our estimates of the labor supply disincentive of public insurance are slightly larger than those found by Baicker et al. (2013) in Oregon and substantially smaller than those found by Garthwaite et al. (2013) in Tennessee. One possible explanation for the variation in estimates is an interaction between the programs and the business cycle. Our findings suggest that almost all of the labor supply response came from individuals living in counties with a relatively low unemployment rates and that the labor supply response was greater among individuals who had been working in Q2 of 2009 (a little more than a year prior to their application to the Core plan). These findings suggest that part of the reason for the larger estimates in Garthwaite et al. (2013) and for the smaller estimates in Baicker et al. (2013) may be differing levels of economic activity across years and states. For example, the statewide unemployment rate was 5.6 percent in Tennessee in 2005, was 11.1 percent in Oregon in 2009, and was only 8.5 percent in Wisconsin in 2010.

In light of these results, policymakers should be prepared for a reduction in labor supply among childless adults affected by the Medicaid expansion under the Affordable Care Act. These labor supply effects may be sufficiently large to be noticeable economy wide. For example, if 21.3 million additional adults gain Medicaid coverage following the ACA expansions, then approximately between 511,000 and 2.2 million fewer individuals will be employed as a result of the labor supply response (corresponding to our labor supply estimates ranging from 2.4 and 10.5 percentage points). These aggregate numbers would be equivalent to roughly a 0.2 to 0.9 percentage point drop in the labor force participation rate in 2014.



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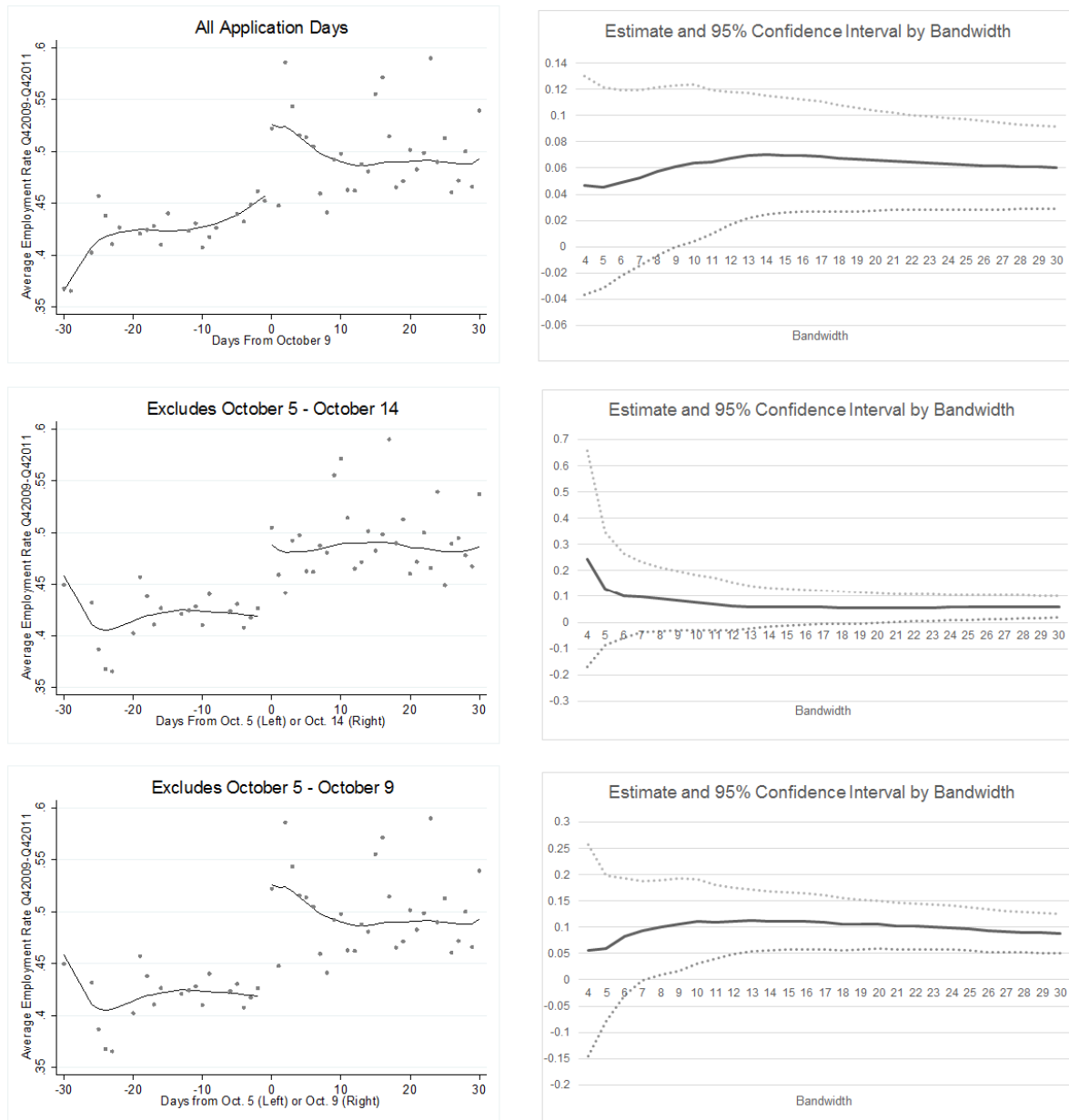
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Figure 1. Employment Rate by Day of Application



Notes: Figures on left show average quarterly employment over the period from the fourth quarter of 2009 to the fourth quarter of 2011 by application day. Each observation is the average for all applicants who applied on that day. The figures also show local linear regression functions estimated at a bandwidth of 15 days. The figures on the right show how the estimate and 95% confidence intervals vary with the estimated bandwidth.

Figure 2. Average Employment by Quarter

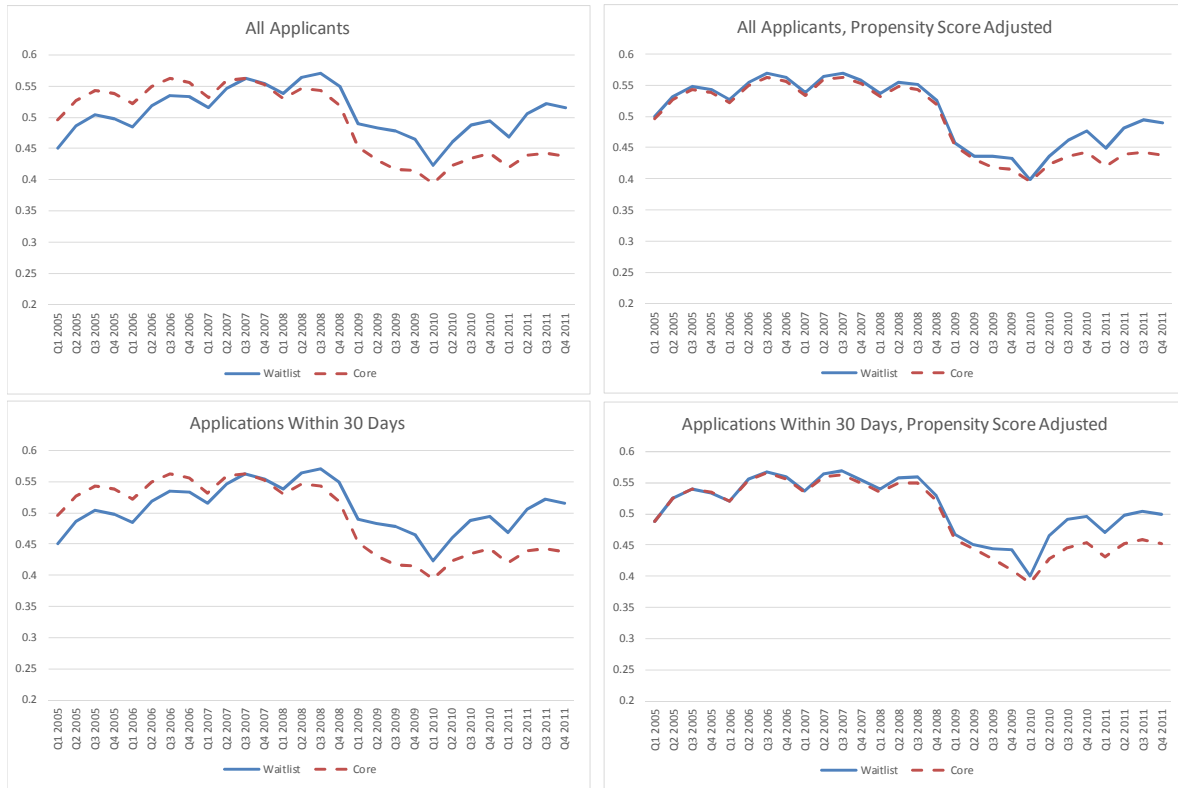
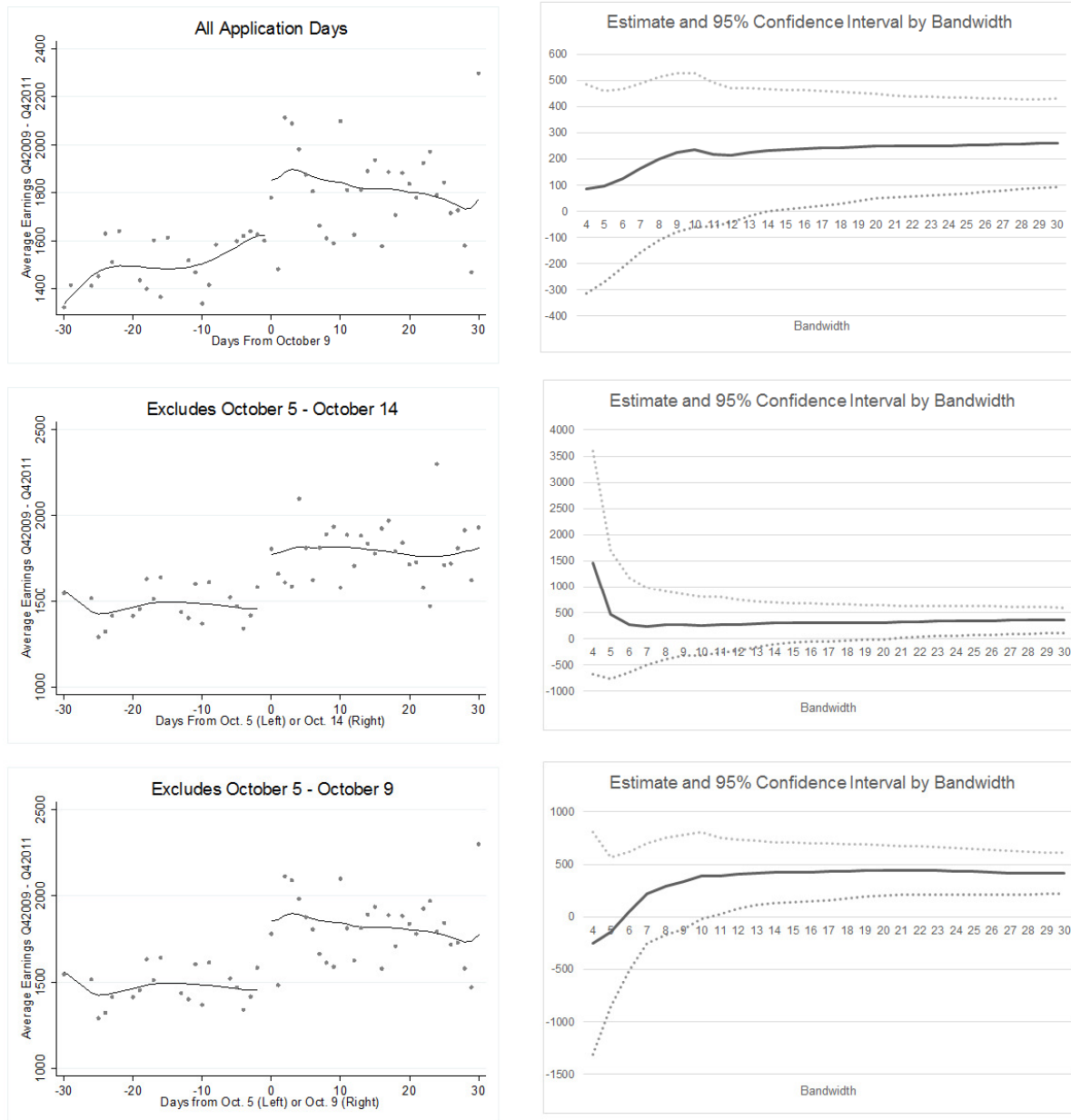


Figure 3. Earnings by Day of Application



Notes: Figures on left show average quarterly total earnings over the period from the fourth quarter of 2009 to the fourth quarter of 2011 by application day. Each observation is the average for all applicants who applied on that day. The figures also show local linear regression functions estimated at a bandwidth of 15 days. The figures on the right show how the estimate and 95% confidence intervals vary with the estimated bandwidth.

**Table 1. Demographic Characteristics, Core Plan Enrollees vs. Waitlisted Applicants**

|  | Core Plan Enrollees | Waitlisted Applicants |
|--|---------------------|-----------------------|
| <i>Ever applied</i>                              |                     |                       |
| Age  | 43.63               | 38.87                 |
| Female   | 0.50                | 0.43                  |
| Average quarterly earnings, Q209                 | 1247.45             | 1827.60               |
| Percent employed, Q209                           | 0.43                | 0.48                  |
| Average employment, Q409-Q411                    | 0.43                | 0.48                  |
| Average earnings, Q409-Q411                      | 1509.49             | 1723.90               |
| Observations                                     | 42401               | 60507                 |
| <i>Applied within 30 days of October 9, 2009</i> |                     |                       |
| Age  | 42.18               | 39.10                 |
| Female   | 0.47                | 0.45                  |
| Average quarterly earnings, Q209                 | 1449.45             | 1624.53               |
| Percent employed, Q209                           | 0.45                | 0.48                  |
| Average employment, Q409-Q411                    | 0.44                | 0.49                  |
| Average earnings, Q409-Q411                      | 1561.60             | 1815.92               |
| Observations                                     | 10528               | 3396                  |

Source: Authors' calculations from WI Administrative Data

Notes: Age, sex, average income and employment at application are from application data.

Average employment and earnings from Q409-Q411 are from unemployment data.

**Table 2. Summary of Regression Discontinuity Results**

| Outcome                                   | All Dates                  |                          | Specification<br>Excludes Oct 5 - Oct 14 |                           | Excludes Oct 5 - Oct 9     |                            |
|---|----------------------------|--------------------------|--|---------------------------|----------------------------|----------------------------|
|   | No Covariates              | Covariates               | No Covariates                            | Covariates                | No Covariates              | Covariates                 |
| Average Employment<br>Rate, Q42009-Q42011 | 0.0659***<br><i>0.0194</i> | 0.037**<br><i>0.0171</i> | 0.055*<br><i>0.0292</i>                  | 0.0524**<br><i>0.0256</i> | 0.105***<br><i>0.0235</i>  | 0.0763***<br><i>0.0201</i> |
| Average Earnings,<br>Q42009-Q42011        | 248.4**<br><i>101.8</i>    | 148<br><i>97.47</i>      | 314.2*<br><i>164</i>                     | 319.3**<br><i>151.6</i>   | 445.8***<br><i>123</i>     | 367.3***<br><i>114.5</i>   |
| Total Annual Earnings,<br>2010            | 977**<br><i>397.9</i>      | 584<br><i>375.2</i>      | 1170*<br><i>629.8</i>                    | 1214**<br><i>588.6</i>    | 1604***<br><i>486</i>      | 1338***<br><i>447.2</i>    |
| Ever Employed, 2010                       | 0.0752***<br><i>0.0221</i> | 0.0397*<br><i>0.0224</i> | 0.0588<br><i>0.0358</i>                  | 0.058*<br><i>0.0332</i>   | 0.0939***<br><i>0.0291</i> | 0.06**<br><i>0.0265</i>    |
| Number of Observations                    | 11278                      | 11278                    | 6064                                     | 6064                      | 6084                       | 6084                       |

Notes: Table displays regression discontinuity estimates of effect of not getting the Core Plan, with robust standard error in italics. All results calculated at a bandwidth of 20 days. Bandwidth robustness is included in Figure 1. Bandwidths defined as distance from October 9 in "All Dates" or distance from excluded interval in other specifications. \* indicates significance at 10% level, \*\* 5%, \*\*\*1%. Covariates include age, sex, day of week of application, and earnings and employment in the second quarter of 2009.

**Table 3. Summary of Difference-in-Differences Results, Employment**

|                                | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       | (7)       | (8)       |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <i>All Application Dates</i>   |           |           |           |           |           |           |           |           |
| Post*Core Plan                 | -0.059*** | -0.059*** | ***-0.059 | -0.059*** | -0.024*** | -0.024*** | -0.024*** | -0.024*** |
|                                | 0.0023    | 0.0023    | 0.0023    | 0.0023    | 0.0025    | 0.0025    | 0.0025    | 0.0025    |
| Demographics                   |           | X         | X         |           |           | X         | X         |           |
| County Fixed Effects           |           |           | X         |           |           |           | X         |           |
| Individual Fixed Effects       |           |           |           | X         |           |           |           | X         |
| PS Weighted                    |           |           |           |           | X         | X         | X         | X         |
| Number of Observations         |           | 2932804   |           |           |           | 2908556   |           |           |
| Number of Individuals          |           | 104743    |           |           |           | 103877    |           |           |
| <i>Within 30 days of Oct 9</i> |           |           |           |           |           |           |           |           |
| Post*Core Plan                 | -0.050*** | -0.050*** | -0.051*** | -0.050*** | -0.033*** | -0.032*** | -0.033*** | -0.033*** |
|                                | 0.0073    | 0.0073    | 0.0073    | 0.0073    | 0.0076    | 0.0076    | 0.0076    | 0.0076    |
| Demographics                   |           | X         | X         |           |           | X         | X         |           |
| County Fixed Effects           |           |           | X         |           |           |           | X         |           |
| Individual Fixed Effects       |           |           |           | X         |           |           |           | X         |
| PS Weighted                    |           |           |           |           | X         | X         | X         | X         |
| Number of Observations         |           | 406364    |           |           |           | 406028    |           |           |
| Number of Individuals          |           | 14513     |           |           |           | 14501     |           |           |

Notes: The "pre" period includes Q1 2005 to Q2 2009 and the "post" period includes Q4 2009 to Q4 2011. Standard errors are clustered at the individual level. Demographic variables include sex, age, and county of residence. \* indicates significance at 10% level, \*\* 5%, \*\*\*1%.

**Table 4. Summary of Difference-in-Differences Results, Earnings**

| <i>All Application Dates</i>   | (1)        | (2)        | (3)        | (4)        | (5)       | (6)       | (7)       | (8)       |
|--------------------------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|
| Post*Core Plan                 | 19.80      | 16.43      | 17.47      | 19.80      | 71.62***  | 70.92***  | 71.62***  | 71.62***  |
|                                | 15.75      | 15.85      | 15.83      | 15.75      | 15.54     | 15.56     | 15.54     | 15.54     |
| Demographics                   |            | X          | X          |            |           | X         | X         |           |
| County Fixed Effects           |            |            | X          |            |           |           | X         |           |
| Individual Fixed Effects       |            |            |            | X          |           |           |           | X         |
| PS Weighted                    |            |            |            |            | X         | X         | X         | X         |
| Number of Observations         |            | 2932804    |            |            |           | 2908556   |           |           |
| Number of Individuals          |            | 104743     |            |            |           | 103877    |           |           |
| <i>Within 30 days of Oct 9</i> |            |            |            |            |           |           |           |           |
| Post*Core Plan                 | -209.94*** | -210.21*** | -211.95*** | -209.94*** | -125.91** | -122.95** | -125.91** | -125.91** |
|                                | 50.44      | 50.84      | 50.72      | 50.44      | 50.85     | 51.07     | 50.86     | -125.91   |
| Demographics                   |            | X          | X          |            |           | X         | X         |           |
| County Fixed Effects           |            |            | X          |            |           |           | X         |           |
| Individual Fixed Effects       |            |            |            | X          |           |           |           | X         |
| PS Weighted                    |            |            |            |            | X         | X         | X         | X         |
| Number of Observations         |            | 406364     |            |            |           | 406028    |           |           |
| Number of Individuals          |            | 14513      |            |            |           | 14501     |           |           |

Notes: The "pre" period includes Q1 2005 to Q2 2009 and the "post" period includes Q4 2009 to Q4 2011. Standard errors are clustered at the individual level. Demographic variables include sex, age, and county of residence. \* indicates significance at 10% level, \*\* 5%, \*\*\*1%.

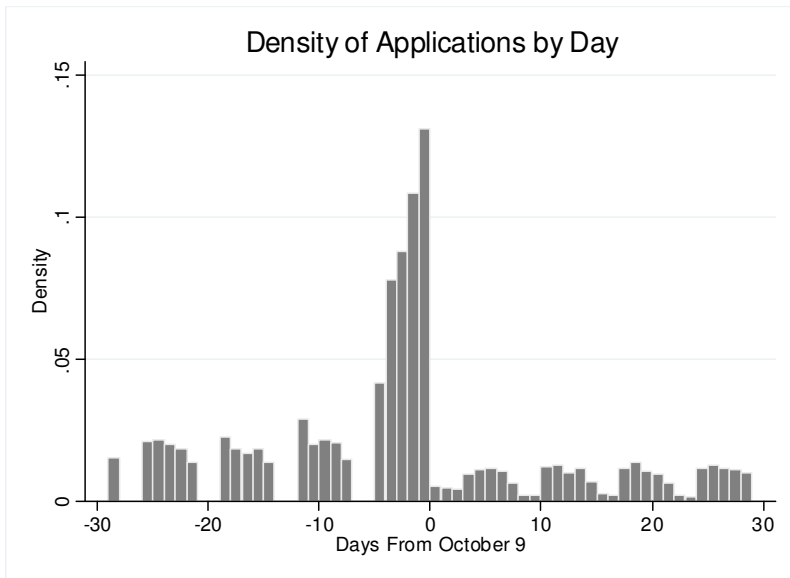


Table 5. Regression Discontinuity Results, by Subsample

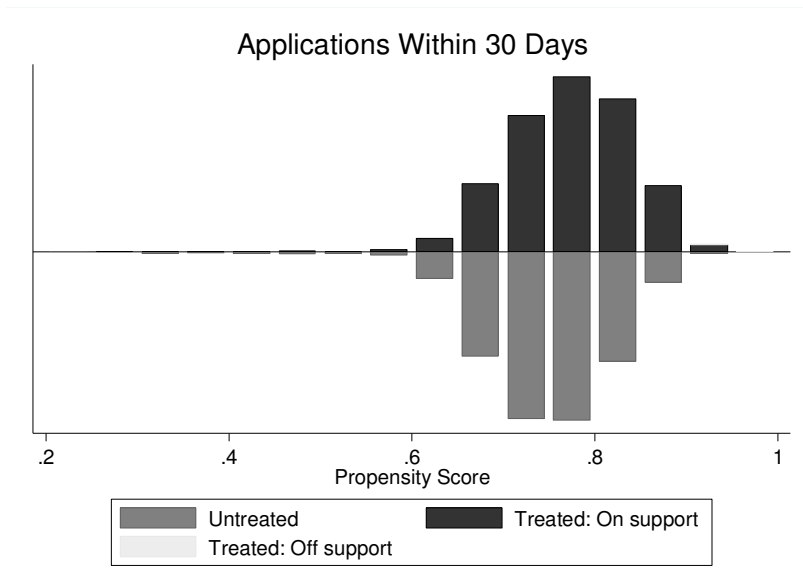
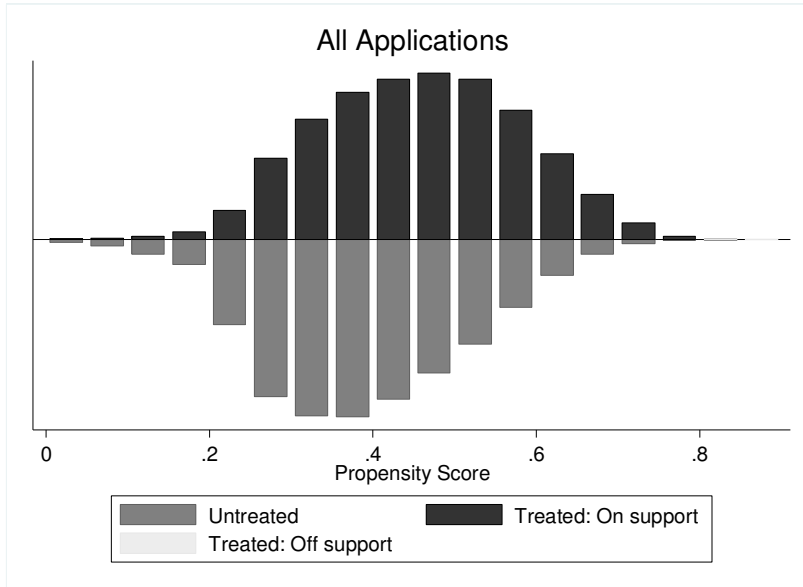
|                                    | Outcome                                 |                                       | Observations |
|------------------------------------|---|---------------------------------------|--------------|
|                                    | Average<br>Employment,<br>Q42009-Q42011 | Average<br>Earnings,<br>Q42009-Q42011 |              |
| All (Benchmark)                    | 0.055*<br><i>0.0292</i>                 | 314.2*<br><i>164</i>                  | 6064         |
| Women                              | 0.0689<br><i>0.0449</i>                 | 419.7*<br><i>254.8</i>                | 2806         |
| Men                                | 0.0519<br><i>0.0374</i>                 | 248.8<br><i>213.2</i>                 | 3258         |
| Age < 35                           | -0.0732*<br><i>0.042</i>                | -268.3<br><i>226.6</i>                | 2541         |
| Age 35-55                          | 0.119**<br><i>0.048</i>                 | 666.3**<br><i>265.6</i>               | 2367         |
| Age > 55                           | 0.173**<br><i>0.0733</i>                | 815.7*<br><i>471.2</i>                | 1156         |
| Employed in Q2 2009                | 0.0468<br><i>0.0387</i>                 | 433.3<br><i>269.5</i>                 | 2725         |
| Unemployed in Q2 2009              | 0.0717**<br><i>0.0345</i>               | 262.7<br><i>172.6</i>                 | 3339         |
| High Unemployment<br>County (>10%) | 0.00675<br><i>0.0623</i>                | 11.37<br><i>343.4</i>                 | 1445         |
| Low Unemployment<br>County (<=10%) | 0.0684**<br><i>0.0333</i>               | 399**<br><i>189.4</i>                 | 4567         |

Notes: Table displays regression discontinuity estimates of effect of not getting the Core Plan, with robust standard error in italics. All results calculated at bandwidth of 20 days, for specification excluding Oct. 5 - Oct. 14. \* indicates significance at 10% level, \*\* 5%, \*\*\*1%

Appendix Figure 1. Density of Applications by Day



Appendix Figure 2. Common Support Graphs for Propensity Score Analysis



Appendix Table 1. Covariate Tests

|                                  | Bandwidth (Days)          |                           |                           |                           |                            |                           |
|----------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|
|                                  | 5                         | 10                        | 15                        | 20                        | 25                         | 30                        |
| <u>All dates</u>                 |                           |                           |                           |                           |                            |                           |
| Age (Months)                     | -41.57***<br><i>15.59</i> | -54.84***<br><i>11.98</i> | -59.33***<br><i>8.777</i> | -54.48***<br><i>7.65</i>  | -51.83***<br><i>6.942</i>  | -49.55***<br><i>6.309</i> |
| Female                           | -0.00883<br><i>0.049</i>  | -0.026<br><i>0.0383</i>   | -0.0443<br><i>0.0282</i>  | -0.0465*<br><i>0.0245</i> | -0.0492**<br><i>0.0221</i> | -0.0469**<br><i>0.02</i>  |
| Employment Q2 2009               | 0.0606<br><i>0.0493</i>   | 0.0514<br><i>0.0386</i>   | 0.0376<br><i>0.0284</i>   | 0.0287<br><i>0.0247</i>   | 0.0229<br><i>0.0223</i>    | 0.0211<br><i>0.0202</i>   |
| Earnings Q2 2009                 | 161.5<br><i>220.7</i>     | 107<br><i>175.7</i>       | 42.9<br><i>135.8</i>      | 30.28<br><i>120.5</i>     | 0.447<br><i>111.1</i>      | -2.446<br><i>101.7</i>    |
| <u>Excludes Oct. 5 - Oct. 14</u> |                           |                           |                           |                           |                            |                           |
| Age (Months)                     | -23.85<br><i>43.16</i>    | -34.32<br><i>21.54</i>    | -24.46*<br><i>14.22</i>   | -23.05**<br><i>11.64</i>  | -22.82**<br><i>9.78</i>    | -24.11***<br><i>8.55</i>  |
| Female                           | -0.0574<br><i>0.137</i>   | -0.0365<br><i>0.0679</i>  | -0.0355<br><i>0.0448</i>  | -0.0378<br><i>0.0366</i>  | -0.0286<br><i>0.0306</i>   | -0.0209<br><i>0.0267</i>  |
| Employment Q2 2009               | -0.0611<br><i>0.136</i>   | -0.0448<br><i>0.0678</i>  | -0.0278<br><i>0.0448</i>  | -0.0154<br><i>0.0366</i>  | -0.0021<br><i>0.0306</i>   | 0.00845<br><i>0.0268</i>  |
| Earnings Q2 2009                 | 561.5<br><i>749.3</i>     | 185.3<br><i>361.5</i>     | 82.67<br><i>241.4</i>     | 49.87<br><i>201.1</i>     | 75.51<br><i>168</i>        | 106<br><i>145.9</i>       |
| <u>Excludes Oct. 5 - Oct. 9</u>  |                           |                           |                           |                           |                            |                           |
| Age (Months)                     | -40.34<br><i>28.3</i>     | -55.01***<br><i>16.31</i> | -49.48***<br><i>10.93</i> | -48.18***<br><i>9.336</i> | -46.33***<br><i>8.366</i>  | -43.06***<br><i>7.56</i>  |
| Female                           | 0.017<br><i>0.0884</i>    | -0.0183<br><i>0.0517</i>  | -0.0353<br><i>0.0348</i>  | -0.0383<br><i>0.0297</i>  | -0.044*<br><i>0.0266</i>   | -0.043*<br><i>0.0239</i>  |
| Employment Q2 2009               | 0.0667<br><i>0.0883</i>   | 0.0591<br><i>0.0518</i>   | 0.0457<br><i>0.035</i>    | 0.0412<br><i>0.0298</i>   | 0.039<br><i>0.0267</i>     | 0.0364<br><i>0.024</i>    |
| Earnings Q2 2009                 | -173.1<br><i>457.3</i>    | 17.32<br><i>266.5</i>     | 74.76<br><i>176.1</i>     | 43.3<br><i>148.2</i>      | 19.82<br><i>134.2</i>      | 26.31<br><i>122.8</i>     |

Notes: Table displays regression discontinuity estimates of effect of not getting the Core Plan on pre-treatment covariates, with robust standard error in italics. \* indicates significance at 10% level, \*\* 5%, \*\*\*1%

Appendix Table 2. Placebo Tests for Alternate Cutoff Days

| <i>All dates</i>                  | Cutoff                    |                          |                           |                            |                          |                           |                           |                            |                            |                           |                          |                           |
|-----------------------------------|---------------------------|--------------------------|---------------------------|----------------------------|--------------------------|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|--------------------------|---------------------------|
|                                   | t-14                      | t-12                     | t-10                      | t-8                        | t-6                      | t-4                       | t+4                       | t+6                        | t+8                        | t+10                      | t+12                     | t+14                      |
| Average Employment, Q42009-Q42011 | -0.0189<br><i>0.0161</i>  | -0.0248<br><i>0.0173</i> | -0.0267*<br><i>0.0151</i> | -0.017<br><i>0.0138</i>    | -0.0144<br><i>0.0136</i> | -0.00974<br><i>0.0123</i> | 0.0535***<br><i>0.017</i> | -0.0157<br><i>0.0199</i>   | -0.037*<br><i>0.0217</i>   | -0.0382*<br><i>0.0227</i> | -0.0328<br><i>0.0214</i> | -0.0142<br><i>0.0208</i>  |
| Average Earnings, Q42009-Q42011   | -72.88<br><i>93.09</i>    | -79.71<br><i>100.7</i>   | -102.9<br><i>86.08</i>    | 17.28<br><i>80.51</i>      | -18.95<br><i>79.97</i>   | -49.18<br><i>71.9</i>     | 298.9***<br><i>99.44</i>  | -0.414<br><i>119</i>       | -43.4<br><i>140.8</i>      | -27.95<br><i>141</i>      | -265.5*<br><i>143.5</i>  | -119<br><i>134.3</i>      |
| Observations                      | 12146                     | 11968                    | 11493                     | 11621                      | 11635                    | 11187                     | 10501                     | 10649                      | 10566                      | 10118                     | 9832                     | 10129                     |
| <i>Excludes Oct. 5 - Oct. 14</i>  |                           |                          |                           |                            |                          |                           |                           |                            |                            |                           |                          |                           |
| Average Employment, Q42009-Q42011 | -0.00377<br><i>0.0172</i> | 0.00617<br><i>0.0172</i> | -0.0106<br><i>0.0165</i>  | -0.0306*<br><i>0.0165</i>  | -0.0221<br><i>0.0175</i> | -0.00978<br><i>0.016</i>  | 0.0254<br><i>0.0227</i>   | -0.00629<br><i>0.0218</i>  | -0.00358<br><i>0.0216</i>  | -0.0148<br><i>0.0216</i>  | -0.0344<br><i>0.0209</i> | 0.0127<br><i>0.0214</i>   |
| Average Earnings, Q42009-Q42011   | -157.4<br><i>109.4</i>    | -60.61<br><i>101.8</i>   | -117.5<br><i>96.5</i>     | -163.9*<br><i>96.17</i>    | -83.88<br><i>101.3</i>   | -41.94<br><i>90.84</i>    | 272.7*<br><i>140.9</i>    | -152.1<br><i>147.7</i>     | -71.55<br><i>139.5</i>     | -159.9<br><i>136.2</i>    | -162.3<br><i>128.9</i>   | -86.99<br><i>130.4</i>    |
| Observations                      | 6971                      | 6698                     | 6362                      | 6564                       | 6484                     | 6170                      | 5492                      | 5698                       | 5422                       | 5199                      | 5078                     | 5007                      |
| <i>Excludes Oct. 5 - Oct. 9</i>   |                           |                          |                           |                            |                          |                           |                           |                            |                            |                           |                          |                           |
| Average Employment, Q42009-Q42011 | -0.00606<br><i>0.0172</i> | 0.00221<br><i>0.0172</i> | -0.0163<br><i>0.0166</i>  | -0.0373**<br><i>0.0165</i> | -0.0235<br><i>0.0175</i> | -0.00827<br><i>0.0161</i> | 0.0157<br><i>0.0216</i>   | -0.0467**<br><i>0.0218</i> | -0.0524**<br><i>0.0227</i> | -0.047**<br><i>0.0232</i> | -0.0293<br><i>0.0216</i> | -0.00349<br><i>0.0213</i> |
| Average Earnings, Q42009-Q42011   | -158.4<br><i>109.1</i>    | -66.05<br><i>101.5</i>   | -125.5<br><i>96.45</i>    | -188.5**<br><i>95.68</i>   | -96.56<br><i>101.5</i>   | -57.83<br><i>91.24</i>    | 95.18<br><i>128.7</i>     | -173.7<br><i>130.1</i>     | -147.5<br><i>144.4</i>     | -111<br><i>142.5</i>      | -271.3*<br><i>145.5</i>  | -74.27<br><i>137.5</i>    |
| Observations                      | 6972                      | 6631                     | 6226                      | 6570                       | 6460                     | 6054                      | 5340                      | 5683                       | 5431                       | 5078                      | 5089                     | 4982                      |

Notes: Table displays regression discontinuity estimates of effect of not getting the Core Plan on pre-treatment covariates, with robust standard error in italics. \* indicates significance at 10% level, \*\* 5%, \*\*\*1%. All estimates at bandwidth of 20 days.

Appendix Table 3. Propensity Score Estimation Results

| Variable        | All Applicants |                | Applied Within 30 Days of Oct 9 |                |
|-----------------|----------------|----------------|---------------------------------|----------------|
|                 | Estimate       | Standard Error | Estimate                        | Standard Error |
| Employed Q12005 | 0.045          | 0.015          | -0.054                          | 0.042          |
| Employed Q22005 | 0.013          | 0.017          | 0.080                           | 0.048          |
| Employed Q32005 | 0.046          | 0.016          | -0.084                          | 0.047          |
| Employed Q42005 | 0.031          | 0.016          | 0.023                           | 0.047          |
| Employed Q12006 | 0.032          | 0.016          | 0.089                           | 0.047          |
| Employed Q22006 | 0.019          | 0.016          | -0.014                          | 0.048          |
| Employed Q32006 | 0.071          | 0.016          | 0.086                           | 0.047          |
| Employed Q42006 | 0.025          | 0.016          | -0.011                          | 0.046          |
| Employed Q12007 | 0.000          | 0.016          | 0.045                           | 0.046          |
| Employed Q22007 | 0.046          | 0.016          | 0.024                           | 0.046          |
| Employed Q32007 | 0.013          | 0.016          | 0.046                           | 0.046          |
| Employed Q42007 | 0.000          | 0.016          | -0.053                          | 0.045          |
| Employed Q12008 | 0.024          | 0.016          | -0.030                          | 0.045          |
| Employed Q22008 | 0.012          | 0.016          | -0.018                          | 0.045          |
| Employed Q32008 | 0.031          | 0.015          | -0.001                          | 0.045          |
| Employed Q42008 | 0.010          | 0.015          | 0.044                           | 0.044          |
| Employed Q12009 | 0.066          | 0.015          | -0.010                          | 0.044          |
| Employed Q22009 | 0.024          | 0.014          | -0.042                          | 0.039          |
| Earnings Q12005 | 0.005          | 0.003          | 0.011                           | 0.009          |
| Earnings Q22005 | -0.006         | 0.003          | 0.000                           | 0.010          |
| Earnings Q32005 | 0.000          | 0.003          | 0.000                           | 0.009          |
| Earnings Q42005 | -0.007         | 0.003          | -0.010                          | 0.008          |
| Earnings Q12006 | 0.004          | 0.003          | 0.008                           | 0.010          |
| Earnings Q22006 | -0.004         | 0.003          | 0.001                           | 0.010          |
| Earnings Q32006 | -0.004         | 0.003          | -0.010                          | 0.009          |
| Earnings Q42006 | -0.005         | 0.003          | -0.001                          | 0.008          |
| Earnings Q12007 | 0.001          | 0.003          | -0.004                          | 0.008          |
| Earnings Q22007 | -0.005         | 0.003          | -0.013                          | 0.008          |
| Earnings Q32007 | -0.001         | 0.003          | 0.007                           | 0.008          |
| Earnings Q42007 | -0.003         | 0.003          | 0.000                           | 0.008          |
| Earnings Q12008 | -0.004         | 0.003          | -0.002                          | 0.008          |
| Earnings Q22008 | 0.002          | 0.003          | 0.010                           | 0.008          |
| Earnings Q32008 | -0.013         | 0.003          | -0.014                          | 0.008          |
| Earnings Q42008 | -0.008         | 0.003          | -0.006                          | 0.007          |
| Earnings Q12009 | -0.015         | 0.003          | -0.006                          | 0.009          |
| Earnings Q22009 | -0.059         | 0.003          | 0.000                           | 0.007          |
| Age             | 0.001          | 0.000          | 0.001                           | 0.000          |
| Female          | 0.090          | 0.008          | 0.025                           | 0.024          |
| Constant        | -1.159         | 0.052          | -0.121                          | 0.142          |

Notes: Regression also includes dummy variables for county of residence. Earnings in thousands of dollars.

Appendix Table 4. Propensity Score Balancing Test

| Variable        | All Applicants |        |       |       | Applied Within 30 Days of Oct 9 |        |       |       |
|-----------------|----------------|--------|-------|-------|---------------------------------|--------|-------|-------|
|                 | Waitlist       | Core   | %bias | t     | Waitlist                        | Core   | %bias | t     |
| Employed Q12005 | 0.50           | 0.50   | -0.60 | -0.88 | 0.49                            | 0.49   | 0.00  | 0.02  |
| Employed Q22005 | 0.53           | 0.53   | -0.90 | -1.28 | 0.53                            | 0.53   | 0.10  | 0.06  |
| Employed Q32005 | 0.54           | 0.55   | -0.90 | -1.32 | 0.54                            | 0.54   | -0.20 | -0.18 |
| Employed Q42005 | 0.54           | 0.54   | -0.90 | -1.31 | 0.54                            | 0.53   | 0.30  | 0.21  |
| Employed Q12006 | 0.52           | 0.53   | -1.00 | -1.44 | 0.52                            | 0.52   | 0.10  | 0.08  |
| Employed Q22006 | 0.55           | 0.56   | -1.10 | -1.62 | 0.55                            | 0.56   | -0.30 | -0.22 |
| Employed Q32006 | 0.56           | 0.57   | -1.20 | -1.83 | 0.57                            | 0.57   | -0.50 | -0.35 |
| Employed Q42006 | 0.56           | 0.56   | -1.20 | -1.82 | 0.56                            | 0.56   | -0.50 | -0.40 |
| Employed Q12007 | 0.53           | 0.54   | -1.00 | -1.42 | 0.53                            | 0.54   | -0.50 | -0.38 |
| Employed Q22007 | 0.56           | 0.56   | -1.10 | -1.57 | 0.56                            | 0.56   | -0.90 | -0.67 |
| Employed Q32007 | 0.56           | 0.57   | -1.20 | -1.73 | 0.56                            | 0.57   | -1.00 | -0.77 |
| Employed Q42007 | 0.55           | 0.56   | -1.00 | -1.40 | 0.55                            | 0.56   | -1.10 | -0.80 |
| Employed Q12008 | 0.53           | 0.54   | -1.10 | -1.67 | 0.53                            | 0.54   | -1.20 | -0.93 |
| Employed Q22008 | 0.55           | 0.55   | -1.40 | -2.01 | 0.55                            | 0.56   | -1.50 | -1.13 |
| Employed Q32008 | 0.54           | 0.55   | -1.40 | -2.05 | 0.55                            | 0.56   | -1.70 | -1.29 |
| Employed Q42008 | 0.52           | 0.52   | -1.20 | -1.77 | 0.52                            | 0.53   | -1.60 | -1.18 |
| Employed Q12009 | 0.45           | 0.46   | -1.00 | -1.54 | 0.46                            | 0.47   | -1.50 | -1.10 |
| Employed Q22009 | 0.43           | 0.44   | -1.10 | -1.62 | 0.44                            | 0.45   | -1.30 | -0.95 |
| Earnings Q12005 | 1.92           | 1.97   | -1.60 | -2.43 | 1.97                            | 1.96   | 0.30  | 0.24  |
| Earnings Q22005 | 2.13           | 2.18   | -1.60 | -2.44 | 2.18                            | 2.18   | 0.00  | 0.03  |
| Earnings Q32005 | 2.29           | 2.35   | -1.60 | -2.46 | 2.36                            | 2.36   | 0.00  | 0.00  |
| Earnings Q42005 | 2.22           | 2.28   | -1.70 | -2.57 | 2.30                            | 2.28   | 0.40  | 0.30  |
| Earnings Q12006 | 2.07           | 2.14   | -1.90 | -2.98 | 2.16                            | 2.16   | 0.00  | 0.01  |
| Earnings Q22006 | 2.21           | 2.27   | -2.00 | -3.11 | 2.32                            | 2.33   | -0.20 | -0.15 |
| Earnings Q32006 | 2.27           | 2.34   | -2.10 | -3.26 | 2.38                            | 2.40   | -0.60 | -0.46 |
| Earnings Q42006 | 2.26           | 2.33   | -2.00 | -3.16 | 2.37                            | 2.39   | -0.50 | -0.41 |
| Earnings Q12007 | 2.08           | 2.15   | -2.10 | -3.32 | 2.18                            | 2.21   | -0.80 | -0.61 |
| Earnings Q22007 | 2.20           | 2.28   | -2.20 | -3.47 | 2.32                            | 2.36   | -1.20 | -0.89 |
| Earnings Q32007 | 2.23           | 2.31   | -2.20 | -3.51 | 2.37                            | 2.41   | -1.10 | -0.84 |
| Earnings Q42007 | 2.21           | 2.29   | -2.40 | -3.72 | 2.33                            | 2.37   | -1.30 | -0.98 |
| Earnings Q12008 | 1.99           | 2.07   | -2.50 | -4.07 | 2.12                            | 2.17   | -1.30 | -0.99 |
| Earnings Q22008 | 2.06           | 2.15   | -2.70 | -4.28 | 2.23                            | 2.27   | -1.10 | -0.87 |
| Earnings Q32008 | 2.02           | 2.11   | -2.60 | -4.32 | 2.19                            | 2.25   | -1.90 | -1.44 |
| Earnings Q42008 | 1.85           | 1.94   | -2.80 | -4.57 | 1.99                            | 2.05   | -1.80 | -1.45 |
| Earnings Q12009 | 1.37           | 1.44   | -2.50 | -4.23 | 1.52                            | 1.55   | -1.30 | -1.04 |
| Earnings Q22009 | 1.24           | 1.32   | -2.80 | -4.95 | 1.44                            | 1.48   | -1.50 | -1.12 |
| Age             | 521.72         | 521.31 | 0.30  | 0.38  | 505.17                          | 499.11 | 3.80  | 2.80  |
| Female          | 0.49           | 0.49   | -0.20 | -0.25 | 0.47                            | 0.46   | 0.80  | 0.61  |

Notes: Regressions also include 70 county of residence indicators; none has a statistically significant difference between waitlist and core or standardized bias greater than 10. Earnings in thousands of dollars.