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ABSTRACT

The Effects of the Affordable Care Act Medicaid Expansion on Subjective Well-being*

This study analyzes the effects of the 2014 Affordable Care Act (ACA) Medicaid expansion on the subjective well-being of individuals in the United States. Using data from the Panel Study of Income Dynamics, we find that the expansion has significantly improved the overall life satisfaction of low-income non-elderly adults. Various sensitivity checks and falsification tests confirm the internal validity. Our findings imply that, without considering psychological benefits, the actual benefits of the ACA Medicaid expansion may be underemphasized.

JEL Classification: I13, I18, I31

Keywords: Affordable Care Act Medicaid Expansion, health insurance, subjective well-being, life satisfaction, happiness

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1. Introduction

Health insurance plays a pivotal role in managing financial and health risks. However, significant inequality still exists in health and access to healthcare in the U.S. (Hero et al. 2017). To address this disparity, the Patient Protection and Affordable Care Act (ACA) was legislated in 2010 and has significantly expanded health insurance coverage (Obama 2016). One of the ACA's major provisions is the expansion of Medicaid coverage, which is a public means-tested health insurance program for low-income individuals. Medicaid, as the single largest source of health insurance coverage in the U.S., covered 72.3 million individuals (including about 35 million children) as of May 2019. In addition, its spending totaled over $581.9 billion in 2017 (CMS 2019). The ACA expanded Medicaid eligibility to individuals earning up to 138 percent of the federal poverty level (FPL), making it the largest expansion of Medicaid coverage to non-elderly adults since the 1960s (Miller and Wherry 2017).[1] However, the U.S. Supreme Court decision in June 2012 made the Medicaid expansion optional for individual states, and only 32 states opted to expand Medicaid coverage by 2017. The court's ruling creates a quasi-experimental setting to study the impacts of the ACA Medicaid expansion by comparing the differences in the outcomes between expansion states and non-expansion states.

The primary goal of the Medicaid expansion was to increase health insurance coverage among low-income individuals. Figure 1 reveals the Medicaid coverage trends for individuals aged 18 to 64, between expansion states and non-expansion states, from 2009 to 2017. Panel A indicates the substantial increase in Medicaid coverage in expansion states after 2014, which is the year the federal government began to fully fund the Medicaid expansion (Leung and Mas 2018). Panel B indicates a sharp increase in Medicaid coverage among individuals with incomes at or below 138 percent of the FPL (hereafter referred to as the eligible group). However, panel C shows a minimal increase in Medicaid coverage in the ineligible group.

The Medicaid expansion has been financed by state and federal governments, and the ACA still remains politically controversial (Sommers and McDonough 2018). Hence, it is important to examine whether the reform has improved individuals' welfare. To provide scientific evidence on this issue, many studies have investigated its impacts on behavioral and health outcomes, such as medical care utilization, labor supply, household finances, physical and mental health, and mortality (Wherry and Miller 2016; Allen et al. 2017; Ghosh et al. 2017; Kaestner et al. 2017;

[1] The federal poverty level is the official income threshold used to determine eligibility for means-tested welfare programs for each family size. The U.S. Department of Health and Human Services updates the values (officially called the federal poverty guidelines) each January.

Simon et al. 2017; Sommers et al. 2017; Hu et al. 2018; Leung and Mas 2018; Miller et al. 2019; Borgschulte and Vogler, 2019).

In this paper, we aim to provide new evidence on the ACA Medicaid expansion's welfare impacts using an under-explored measure for individual's subjective well-being (SWB). SWB is measured through a self-reported evaluation addressing life satisfaction, happiness, and life meaning, which provides information on individuals' experienced utility (Kahneman and Sugden 2005). This can be used as an alternative measure for the welfare consequences of public policy, and an increasing number of governments are adopting SWB as their policy objective (Layard 2005; Stiglitz et al. 2009; Layard et al. 2015; Diener and Biswas-Diener 2019; Durand and Exton 2019).

The ACA Medicaid expansion can improve individuals' SWB through several channels.[2] First, it can improve SWB via better health and financial conditions. Several previous studies have demonstrated that the ACA Medicaid expansion leads to improved financial conditions (Hu et al. 2016; Allen et al. 2017), while there remains mixed evidence on health outcomes (Gruber and Sommers 2019). This mechanism could take time to affect SWB, as chronic health conditions and household finances are unlikely to adjust immediately (e.g., Brown et al. 2019.)

Second, the ACA Medicaid expansion can improve SWB by providing "peace of mind," even without immediate improvements in health or household finances. The core function of health insurance is to protect individuals from catastrophic medical expenditures and negative health shocks (Arrow 1963; Nyman 1999; Haushofer et al. 2019). As such, this ex-ante risk reduction might induce individuals to be more satisfied with their life in general by decreasing anxiety or stress. Thus, this mechanism may have improved SWB as soon as the ACA was expected to be legislated.

Finally, a secondary mechanism through which the ACA Medicaid expansion may improve individuals' SWB is via a reduction in labor supply without losing healthcare coverage. Since Medicaid is a means-tested social insurance program, it can discourage individual labor supply; thus, by working less and having more leisure time, individuals could be more satisfied with their lives. However, existing studies show little evidence that the ACA Medicaid expansion decreased labor supply (Kaestner et al. 2017).

Currently, there is scant evidence of the ACA's impacts on SWB despite a growing interest in the effect of public policies on SWB. In fact, Gruber and Sommers (2019) emphasize the

[2] The discussion of the potential mechanisms is adapted from our earlier work (Kim and Koh 2018).

importance of understanding the ACA's effects on individuals' overall well-being.[3] To fill this gap in the literature, we examine the effects of the ACA Medicaid expansion on individuals' SWB measured by self-reported overall life satisfaction using the Panel Study of Income Dynamics, 2009-2017.

We have found evidence that the ACA Medicaid expansion significantly improved the overall life satisfaction of low-income non-elderly adults in the U.S. Our difference-in-differences and triple-differences estimates indicate that the ACA Medicaid expansion improved low-income individuals' life satisfaction score by 0.19 to 0.24 points, and increased the probability of being very satisfied or completely satisfied with overall life by 13-14 percentage points. A variety of robustness and falsification checks corroborate the baseline findings.

The results of this study imply that the ACA Medicaid expansion has improved low-income adults' SWB. Our findings are consistent with existing evidence that the state-wide expansion of Medicaid in Oregon (known as the Oregon Health Insurance Experiment) improved self-reported happiness (Finkelstein et al, 2012). Kim and Koh (2018) also reveal that a near-universal state-level healthcare reform in Massachusetts improved the overall life satisfaction of its residents. Hence, without considering its impacts on individuals' SWB, we may underemphasize the beneficial impacts of health insurance.

The remainder of the paper is structured as follows. Sections 2 and 3 describe the data and discusses the empirical strategy. We present and discuss the results in Section 4. Section 5 concludes.

2. Data

We use the PSID to examine the effects of the ACA Medicaid expansion on SWB. The PSID is a bi-annual longitudinal survey of nationally representative households and individuals in the United States that provides detailed information on demographics, income, health status, etc. Since 2009, it has surveyed respondents' overall life satisfaction; thus, we use the data from 2009 through 2017. Specifically, it asks: "Please think about your life as a whole. How satisfied are you with it?" Respondents rate their satisfaction levels from 1, "not at all satisfied," to 5, "completely

[3] Kobayashi et al. (2019) do not find evidence that the ACA Medicaid expansion was associated with SWB using the Gallup-Healthways data. However, it is noteworthy that the Gallup data only has a response rate of about 5–10 percent (Sommers et al. 2015), while the PSID data have a response rate of about 98 percent. Although they did not study outcomes on SWB, McMorrow et al. (2017) and Winkelman et al. (2018) document the positive impacts of the ACA Medicaid expansion on mental health outcomes among low-income parents and low-income childless adults with chronic conditions, using the first two-years' post-reform data from the National Health Interview Survey (2010-2015) and the Behavioral Risk Factor Surveillance System (2011–2015), respectively.

satisfied." The baseline analysis uses this variable by assuming its values as cardinal values.[4] One issue is that researchers cannot observe true cardinal values of respondents' life satisfaction. Because of this limitation, Schroeder and Yitzhaki (2017) and Bond and Lang (2019) argue that researchers cannot identify life satisfaction impacts. However, Kaiser and Vendrik (2019) provide evidence that this identification failure happens only under extreme cases. To further examine the robustness of the empirical analysis, we construct an alternative outcome variable such as the probability of being "very satisfied" or "completely satisfied" with overall life. We also employ an alternative regression method following Chen et al. (2019) as a robustness check.

Table 1 reports the sample respondents' baseline characteristics in expansion states and non-expansion states before 2014.[5] Panel A indicates that the average life satisfaction levels and distributions of life satisfaction are similar between expansion states and non-expansion states. Panel B summarizes individuals' characteristics that may be related to life satisfaction and will be used as control variables in regression analyses. These characteristics are generally similar between expansion states and non-expansion states.

3. Empirical Strategy

To identify the effects of the 2014 ACA Medicaid expansion, we compare changes in life satisfaction between expansion and non-expansion states before and after the ACA Medicaid expansion. To estimate the effects, we consider the following difference-in-differences (DID) specification:

$$(1) \qquad LS_{ist} = \beta_0 + \beta_1 Exp_s * Post_t + \delta_s + \theta_t + X_{ist}'\beta_2 + \varepsilon_{ist}$$

in which LS_{ist} is individual *i*'s self-reported overall life satisfaction level in state *s* and year *t*; Exp_s denotes a binary indicator of whether a respondent lives in the ACA Medicaid expansion states; $Post_t$ indicates whether the calendar year is 2014 or after; X_{ist} is a vector of individual characteristics related to the dependent variable such as age, age squared, years of education, marital status, race, and ethnicity. We include state fixed effects, δ_s, to control for this time-

[4] We reverse-coded the assigned values in the original PSID data so that a higher value represents a higher level of life satisfaction.

[5] The expansion states include states that expanded Medicaid by 2017, and the non-expansion states include states that did not expand Medicaid or expanded later than 2017 (https://www.kff.org/medicaid/issue-brief/status-of-state-medicaid-expansion-decisions-interactive-map/). The list of 32 expansion states is AK, AZ, AR, CA, CO, CT, DE, DC, HI, IL, IN, KY, LA, MD, MA, MI, MN, MT, NV, NH, NJ, NM, NY, ND, OH, OR, PA, RI, VT, WA, WV, WI.

invariant, state-specific heterogeneity. As a robustness check, we replace state fixed effects with individual fixed effects to examine the sensitivity of baseline results to individual specific heterogeneity. We include year fixed effects, θ_t, to control for any time-varying shocks, which are common across states, to life satisfaction.

ε_{ist} is an error term. We calculate standard errors corrected for heteroscedasticity and clustered at the state level by allowing for serial correlation within a state. Statistical significance of the results is robust to clustering standard errors at the individual level. The parameter of interest is β_1, which represents the effects of the ACA Medicaid expansion on overall life satisfaction.

The key identification assumption in the DID approach is that any differential changes in life satisfaction between expansion states and non-expansion states over time are only due to the ACA Medicaid expansion. That is, there are no other time-varying confounding factors between states. The implication of this assumption is that the trends in life satisfaction of expansion and non-expansion states should be parallel in the absence of the ACA Medicaid expansion. However, it is impossible to examine this counterfactual scenario.

To circumvent this limitation, we examine whether trends of overall life satisfaction are parallel during pre-reform periods. As a supplementary test, we estimate the difference in slopes of life satisfaction between expansion and non-expansion states during the pre-reform periods using the following specification:

$$(2) \qquad LS_{ist} = \alpha_0 + \alpha_1 Exp_s * Year_t + \delta_s + \theta_t + X_{ist}'\alpha_2 + \varepsilon_{ist}$$

in which we follow the same notations as in equation (1). The only difference is that we replace $Post_t$ with a linear time variable for year, $Year_t$. The parameter of interest is α_1. It captures the difference in the slopes of pre-reform life satisfaction trends between expansion and non-expansion states.

To strengthen the identification, we exploit the fact that Medicaid coverage is available to individuals whose incomes are equal to or less than 138 percent of the FPL. If the ACA Medicaid expansion improved their overall life satisfaction, its impacts should be larger for the eligible group and minimal for the ineligible group. Hence, we compare changes in life satisfaction between the eligible group and the ineligible group within the expansion states against those changes within non-expansion states. To implement this approach, we consider the following triple differences (TD) specification:

$$(3) \quad LS_{ist} = \gamma_0 + \gamma_1 Exp_s * Post_t * Elig_i + \gamma_2 Exp_s * Post_t + \gamma_3 Exp_s * Elig_i + \gamma_4 Post_t * Elig_i + \gamma_5 Elig_i + \delta_s + \theta_t + X_{ist}'\gamma_6 + \varepsilon_{ist}$$

in which $Elig_i$ is a binary indicator of whether individual *i* has an income at or below 138 percent of the FPL. Other notations are the same as in equation (1). The parameter of interest is γ_1, which represents the effects of the ACA Medicaid expansion on overall life satisfaction under the TD specification.

4. Empirical Results

Main Results

Figure 2 reveals the trends of overall life satisfaction among non-elderly adults between expansion states and non-expansion states from 2009 to 2017. Panel A indicates that, before the expansion, the average level of life satisfaction in expansion states was slightly lower than in non-expansion states. The pattern subsequently reversed only after the expansion. The magnitude of the reversal in overall life satisfaction is larger in Panel B when restricting the sample to the eligible group. Low-income individuals in expansion states have a lower level of overall life satisfaction than that of low-income individuals in non-expansion states. However, after 2014, low-income individuals in expansion states have much higher overall life satisfaction than do low-income individuals in non-expansion states. If the observed pattern in Panel B is driven by the Medicaid expansion, we would observe minimal changes in overall life satisfaction over time in the ineligible group, unless spill-over effects exist from expansion states to non-expansion states. Panel C reveals trends of life satisfaction consistent with this conjecture. The patterns are similar when using the binary indicator of being very satisfied and completely satisfied with general life as an alternative dependent variable in Figure A1.

Figure 2 shows arguably parallel trends of life satisfaction during pre-period by expansion status. To formally test this, we estimate α_1 in the specification (2). Table A1 reveals the estimated differences in these slopes of life satisfaction. In panel A, we use a cardinal value of overall life satisfaction as a dependent variable. Columns (1) and (2) indicate that the difference is small in magnitude and statistically insignificant when using the whole sample. Columns (3) and (4) and (5) and (6) indicate that similar results hold when using the eligible and ineligible groups, respectively. The results are also similar when using the binary indicator of life satisfaction in panel B. The results provide supportive evidence of the parallel trend assumption.

Table 2 reports the estimated effects of the ACA Medicaid expansion on overall life satisfaction using equation (1). First, we use the whole sample of non-elderly adults in columns (1) and (2). Column (1) of panel A indicates that the ACA Medicaid expansion increased the overall life satisfaction score by 0.05 points. The estimated effect when controlling for individual-specific heterogeneity in column (2) is 0.04 points. Both of the coefficient estimates are statistically significant at the 5 percent level. Columns (1) and (2) of panel B show that the ACA Medicaid expansion increased the probability of being very satisfied or completely satisfied with overall life by 3 percentage points, and the coefficient estimates are statistically significant at the 1 percent and 5 percent levels, respectively. In columns (3) and (4), we restrict the sample to the eligible group. Consistent with panel B of Figure 2, we find that the ACA Medicaid expansion improved the overall life satisfaction score in the eligible group by 0.19 to 0.24 points in panel A, and increased the probability of being very satisfied or completely satisfied with overall life by 13 to 14 percentage points in panel B. All coefficient estimates are statistically significant at the 1 percent level and their magnitudes are over 4 times larger than those in columns (1) and (2). In columns (5) and (6), we conduct a falsification test by restricting the sample to the ineligible group. If the results shown in columns (1) to (4) are due to the ACA Medicaid expansion, no or little impacts would be observed. As expected, panels A and B show that the expansion did not increase overall life satisfaction in the ineligible group.

The baseline analysis uses 2014 as the reference year, as this was when the ACA Medicaid expansion was fully funded by the federal government. Since the U.S. Supreme Court ruling regarding the ACA Medicaid expansion was announced in June 2012, health insurance can reduce *ex-ante* health and financial risks. Hence, anticipation of the reform might have improved individuals' overall life satisfaction even before the expansion was fully implemented (transition period). We test the reform's differential effects between the transition period (captured by the *During* dummy variable) and the period after its full implementation (captured by the *Post* dummy variable). Since the bi-annual PSID data exist only in odd-numbered years, *During* represents the year 2013. Panel A of Table A2 shows that the improvements in overall life satisfaction mostly arise after the ACA Medicaid expansion's full implementation, and not during the transition period. Using the whole sample in columns (1) and (2) and the Medicaid-eligible sample in columns (3) and (4), respectively, we find that none of the coefficient estimates of the *Expansion*During* interaction term are statistically significant, while those of the *Expansion*Post* interaction term are larger and statistically significant at the 1 to 5 percent levels. However, columns (5) and (6) show that the coefficient estimates of both *Expansion*During* and *Expansion*Post* are small in magnitude and statistically insignificant because the sample

individuals are not eligible for Medicaid coverage. We use a binary indicator of overall life satisfaction in panel B, and the results are qualitatively similar. The results indicate little impact of the anticipation for the ACA Medicaid expansion on individuals' overall life satisfaction. This finding is consistent with the lack of life satisfaction improvements during the Massachusetts healthcare reform's transition period (Kim and Koh 2018).

Table 3 reports TD estimates of the ACA Medicaid expansion's impacts using the regression specification (3).[6] In panel A, column (1) shows that the ACA Medicaid expansion improved the overall life satisfaction score of the eligible group by 0.22 points. The estimated effect becomes 0.17 points when including the individual fixed effects in column (2). Both estimates are statistically significant at the 1 percent level. The results are qualitatively similar when using a binary indicator of overall life satisfaction in panel B, and the estimates are also statistically significant at the 1 percent level. These results provide consistent evidence that the ACA Medicaid expansion improved life satisfaction for low-income individuals.

In the baseline analysis, we arbitrarily choose all non-expansion states as the control group. To minimize the arbitrariness of choice of a control group, we use a data-driven procedure to construct suitable comparison groups following Abadie et al. (2010). The main goal of this approach is to construct a synthetic expansion state, which is a weighted average of non-expansion states, as an alternative control group. The key objective of calculating the weights is to ensure that the life satisfaction trend of the synthetic control is as close as possible to the life satisfaction trend of expansion states during the pre-treatment periods. Since the unit of observation in this approach is a state, we first aggregate the PSID into state-year cells. There are 32 treated units in the case of the ACA Medicaid expansion; thus, we aggregate the expansion states into a single treatment unit following Abadie et al. (2010). Consequently, we have balanced panel data of 19 states (one representative expansion state and 18 control states) from 2009 to 2017, which contain the averages of life satisfaction and the control variables. Then, we calculate weights by minimizing the difference in each pre-period average of overall life satisfaction and the averages of control variables between treated and untreated units. Finally, we use states with positive weights to construct the synthetic expansion state. It is noteworthy that all non-expansion states are assigned positive weights, similar to Kaestner et al. (2017). Under this framework, any difference in life-satisfaction levels between expansion states and their synthetic control during post-treatment periods is due to the ACA Medicaid expansion.

[6] Corresponding figures are available upon request.

Figure 3 shows trends in overall life satisfaction of expansion states and its synthetic control. We use the whole sample of non-elderly adults when constructing the synthetic control state in panel A. Then, we restrict the sample to those with incomes at or below 138 percent of the FPL in panel B, and to the rest of the non-elderly adults in panel C. All figures exhibit similar patterns to those of Figure 2. Panel A indicates that there was an improvement in overall life satisfaction in expansion states compared to its synthetic control after the ACA Medicaid expansion among the non-elderly. Panel B shows that this improvement is driven by an improvement in life satisfaction in the eligible group in expansion states, while panel C indicates that there was little improvement in expansion states in the ineligible group.

Robustness Checks

We also examine the robustness of the baseline results under different specifications by using an alternative i) construction of the dependent variable, ii) definition of the Medicaid-eligible group (100% percent of the FPL instead of 138% percent), iii) regression specification, iv) sample restrictions and v) regression method. The results are robust to these robustness checks

Alternative dependent variable

We use a binary indicator of being completely satisfied with overall life as an alternative dependent variable in Table A3, instead of a binary indicator of being completely satisfied or very satisfied with overall life. The results are robust when using the alternative dependent variable. Columns (1) and (2) reveal that the ACA Medicaid expansion slightly improved this probability among non-elderly adults, whereas the estimates are statistically insignificant. However, columns (3) and (4) reveal that the reform increased the share of individuals in the eligible group who are completely satisfied with their overall life by 7 to 9 percentage points. The estimates are statistically significant at the 5 and 1 percent levels, respectively. Columns (5) and (6) indicate that the expansion did not change the probability of being completely satisfied with overall life.

Alternative definition of Medicaid eligibility

Simon et al. (2017) use 100 percent of the FPL instead of 138 percent as an income cutoff for Medicaid eligibility because people between 100 and 138 percent of the FPL in non-expansion states are eligible for a subsidy to purchase health insurance coverage from state-level health insurance exchanges. To examine whether our baseline analysis is sensitive to a different definition of the Medicaid-eligible group, we use income at or below 100 percent of FPL as an alternative definition.

Table A4 reveals the estimated effects of the ACA Medicaid expansion in the newly defined Medicaid-eligible group. In panel A, column (1) reveals that the ACA Medicaid expansion improved overall life satisfaction score by 0.23 points, which is statistically significant at the 5 percent level. Column (2) shows that the estimate is 0.09, which is statistically insignificant when using individual fixed effects. In panel B, columns (1) and (2) show that the ACA Medicaid expansion increased the probability of being very satisfied or completely satisfied with overall life by 9 to 12 percentage points, which are statistically significant at the 5 percent level.

Alternative regression specifications

If the ACA Medicaid expansion improved overall life satisfaction, the estimation results should be robust to the choice of control variables. To examine this prediction indirectly, we re-estimate the effects of the ACA Medicaid expansion on overall life satisfaction without control variables in Table A5.

The results are robust when excluding all control variables in the regression analysis. In panel A, columns (1) and (2) reveal that the ACA Medicaid expansion improved non-elderly adults' overall life satisfaction score by 0.03 to 0.04 points in expansion states, which is similar to the baseline estimates. Columns (3) to (6) also reveal that the baseline results of estimating the ACA Medicaid impacts by eligibility status are robust when excluding the control variables. The results are qualitatively similar when using a binary indicator of life satisfaction in panel B.

It is possible that time-varying state-specific unobserved heterogeneity might bias the baseline estimates. To alleviate this issue, we re-estimate life satisfaction impact of the ACA Medicaid expansion by including state-specific linear time trends. Table A6 reveals that the estimation results remain robust.

Alternative definition of the eligible and ineligible groups

The ineligible group used in the empirical analysis includes all individuals with incomes above 138 percent of the FPL. We check the robustness of our results by making the eligible group and the ineligible group more comparable by narrowing ranges of incomes relative to the FPL. Since we aim to compare the eligible and ineligible groups with similar relative incomes, we use the TD specification to estimate the effects of the ACA Medicaid expansion in Table A7. We restrict the sample to those whose incomes are between 0 and 276 percent of the FPL in columns (1) and (2) and 139 and 276 percent of the FPL in columns (3) and (4). The estimation results show that TD estimates of life satisfaction impacts of the ACA Medicaid expansion are generally similar to those of the baseline estimates in Table 3 when using the alternative sample restrictions.

Estimation using the heteroskedastic ordered probit model

Although Kaiser and Vendrik (2019) show that unobserved true cardinal valuations of life satisfaction might not cause a significant bias in estimation, we use an alternative regression method to account for the ordinal nature of the overall life satisfaction variable. We estimate the regression specification (1) using the ordered probit model that allows heteroskedasticity, following Chen et al. (2019).

Table A8 reveals that the estimation results are qualitatively similar to those of the baseline results in Table 2. Columns (1) and (2) reveal that the estimates are positive and statistically significant at the 1 percent level when using the whole sample and restricting to the eligible group. However, column (3) reveals that the estimates are small in magnitude and statistically insignificant. The estimated marginal effects indicate that the ACA Medicaid expansion decreased the probabilities of not at all satisfied, not very satisfied, and somewhat satisfied, while it increased the probabilities of very satisfied and completely satisfied in columns (1) and (2). However, the marginal effects do not indicate a substantial impact of the reform on those probabilities in column (3).

Falsification Checks

We conduct two additional falsification tests.

Effects of the ACA Medicaid expansion in Massachusetts

We investigate the effects of the ACA Medicaid expansion on life satisfaction for Massachusetts residents. Although Massachusetts expanded Medicaid coverage under the ACA, the state had already achieved near-universal health coverage before the ACA. If the baseline results capture the impacts of the ACA Medicaid expansion, we conjecture that it has had little impact on the life satisfaction of Massachusetts residents.

Table 4 presents the estimated effects of the ACA Medicaid expansion on overall life satisfaction in Massachusetts. In panel A, columns (1) and (2) indicate that the ACA Medicaid expansion did not improve Massachusetts residents' overall life satisfaction. The results are similar when estimating its impacts separately by eligibility status in columns (3) to (6). The results are

qualitatively similar when using the binary indicator of being very satisfied or completely satisfied with general lives as an alternative dependent variable in panel B. [7]

Effects of the ACA Medicaid expansion among the Elderly

We examine the effects of the ACA Medicaid expansion on life satisfaction for individuals aged 65 and above because they are already covered by Medicare, a federal health insurance program for the elderly and the disabled. If the baseline results are due to the ACA Medicaid expansion, it should have little impact on overall life satisfaction of individuals aged 65 and above.

Table 5 shows the estimated effects of the ACA Medicaid expansion on overall life satisfaction among those aged 65 and above. In panel A, columns (1) and (2) show that the ACA Medicaid expansion did not improve the elderly's life satisfaction. The results are similar when splitting the sample by the eligibility status in columns (3) to (6). The results are also qualitatively similar when using the binary indicator of being very satisfied or completely satisfied with general lives as an alternative dependent variable in panel B.

5. Concluding Remarks

This study provides novel evidence that the ACA Medicaid expansion improved overall life satisfaction for low-income adults in the United States. To quantify the SWB impacts of obtaining Medicaid coverage via the expansion, we calculate that the average improvements in life satisfaction per Medicaid coverage obtained for a low-income non-elderly adult in the U.S. is 1.3 standard deviation (SD).[8] This magnitude is larger than those of the Oregon Health Insurance Experiment and the Massachusetts healthcare reform. Finkelstein et al. (2012) and Kim and Koh (2018) find that the life satisfaction improvement per obtaining health insurance coverage via these reforms is 0.39 SD and 0.83 SD, respectively. To further benchmark the life satisfaction impact per Medicaid coverage, we also compare our magnitude with those from several studies examining the impacts of public policies in the United States on life satisfaction. A 10 percentage point reduction in tract poverty via the Moving to Opportunity program increases life satisfaction by 0.11 SD (Ludwig et al. 2012). Stimulus tax rebates averaging $950 increase life satisfaction by

[7] We re-estimate the effects of the ACA Medicaid expansion on life satisfaction after excluding Massachusetts from the expansion states and find robust estimates. The results are available upon request.

[8] Miller and Wherry (2019) estimate that the ACA Medicaid expansion has increased the Medicaid coverage of low-income adults by 17 percent. Hence, the coefficient estimate of 0.19 in column (3) of Table 2 is divided by 0.17, and then divided by the standard deviation of overall life satisfaction (0.83).

0.32 SD (Lachowska 2016). This comparison indicates that access to health insurance via the ACA Medicaid expansion has had a large, positive impact on an individual's overall life satisfaction.

The ACA was legislated almost a decade ago, but its future remains uncertain (Sommers and McDonough 2018). The Trump administration has recently taken several actions to nullify the ACA legislation (e.g., repeal of the individual mandate). Given this circumstance, it is ever more important to understand the comprehensive consequences of the ACA for the optimal design of the U.S. healthcare system. Our findings imply that, unless its impacts on individuals' SWB are taken into consideration, the actual benefits of the ACA Medicaid expansion can be underemphasized.[9]

[9] We acknowledge that our analysis of the SWB data does not provide information regarding the cost implications of the ACA Medicaid expansion, as in Finkelstein *et al*. (2019).

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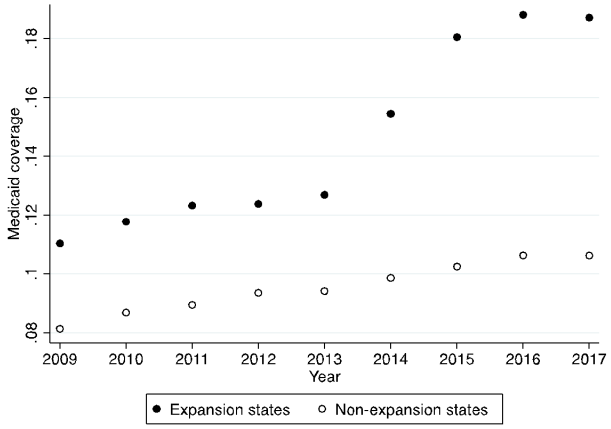
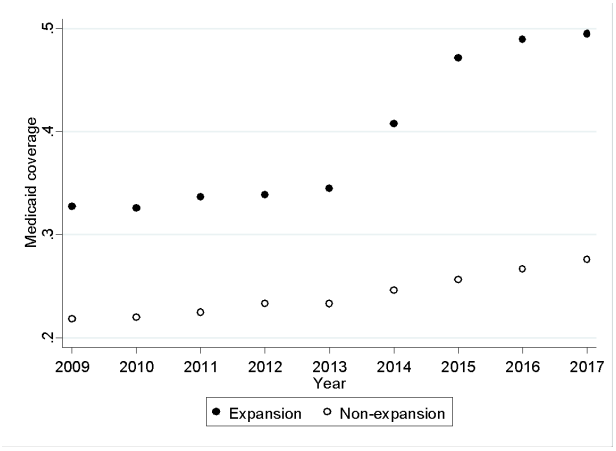
Figures and Tables

Figure 1: Trends of Medicaid Coverage

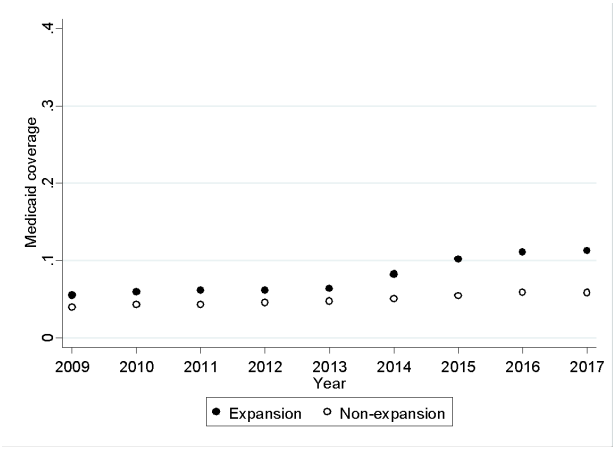
A. Whole sample



B. Income ≤ 138 percent of FPL



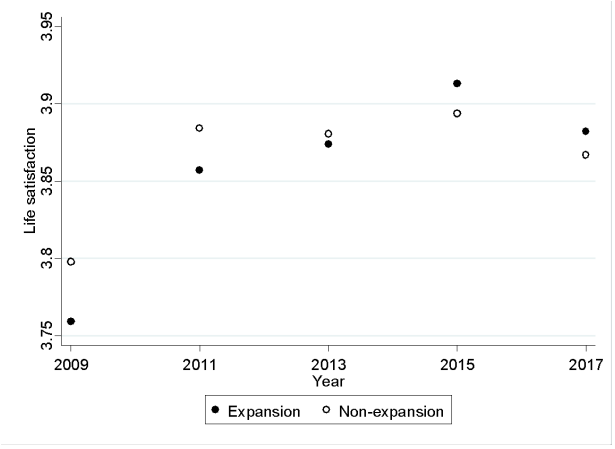
C. Income > 138 percent of FPL



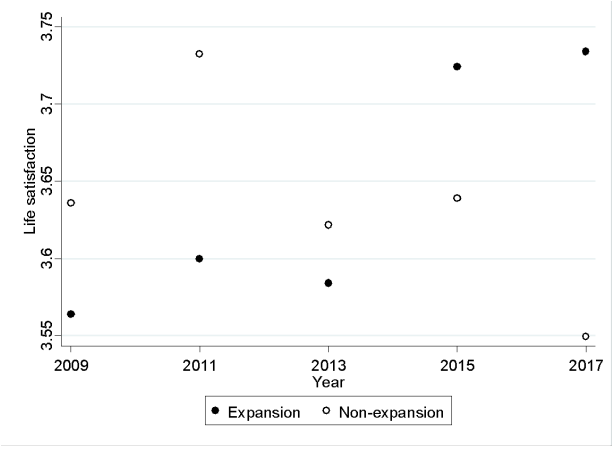
Source: The American Community Survey data, 2009–2017.
Notes: In panel A, the sample is restricted to individuals aged 18 to 64. In panels B and C, the sample is split by Medicaid-eligibility status. Black and blank dots represent the average Medicaid coverage in expansion states and non-expansion states, respectively.

Figure 2: Trends of Overall Life Satisfaction

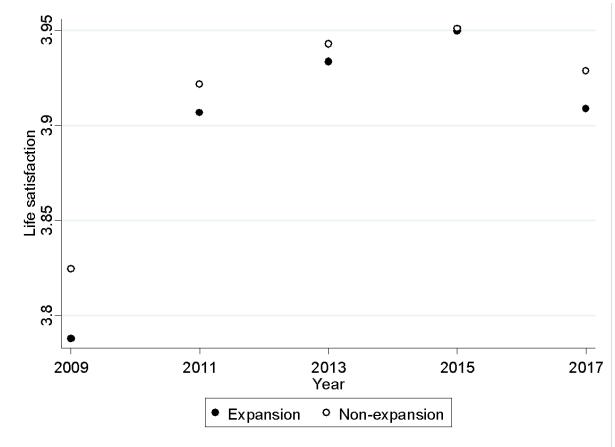
A. Whole sample



B. Family income ≤ 138 percent of FPL



C. Family income > 138 percent of FPL

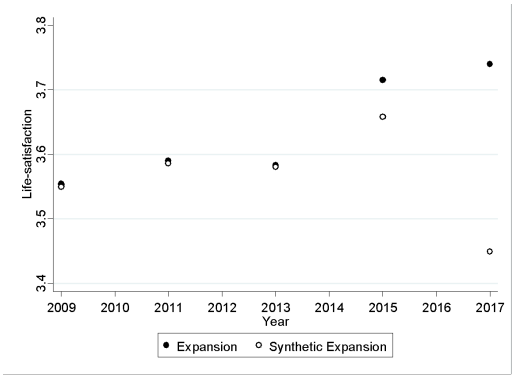


Source: The PSID data, 2009–2017.
Notes: In panel A, the sample is restricted to individuals aged 18 to 64. In panels B and C, the sample is split by Medicaid-eligibility status. Black and blank dots represent the average coverage of Medicaid in expansion states and non-expansion states, respectively.

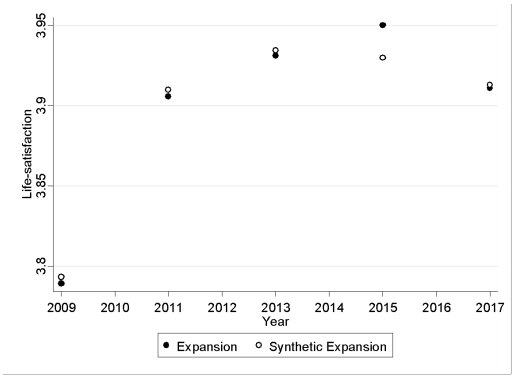
Figure 3: Trends of overall life satisfaction in expansion states and its synthetic control state

A. Whole sample

B. Family income ≤ 138 percent of FPL



C. Family income > 138 percent of FPL



Source: the PSID data, 2009–2017.
Notes: We restrict the sample to individuals aged 18 to 64 in panel A. Then we split the sample by Medicaid-eligibility status in panels B and C.

Table 1: Baseline Characteristics of Individuals aged 18 to 64 by Medicaid-expansion Status

	Expansion states Mean (standard deviation) (1)	Non-expansion states Mean (standard deviation) (2)
A. Overall Life satisfaction		
Overall life satisfaction	3.83	3.85
	(0.86)	(0.88)
Pr(Not at all satisfied)	0.01	0.01
	(0.11)	(0.12)
Pr(Not very satisfied)	0.04	0.03
	(0.20)	(0.19)
Pr(Somewhat satisfied)	0.27	0.27
	(0.46)	(0.47)
Pr(Very satisfied)	0.48	0.46
	(0.50)	(0.49)
Pr(Completely satisfied)	0.20	0.22
	(0.41)	(0.42)
B. Individual characteristics		
Age	43.5	42.4
	(11.7)	(11.4)
Pr(Married)	0.71	0.68
	(0.48)	(0.49)
Pr(White)	0.79	0.76
	(0.48)	(0.49)
Pr(Hispanic)	0.14	0.11
	(0.32)	(0.23)
Years of education	13.5	13.6
	(2.63)	(2.32)
Pr(Male)	0.81	0.79
	(0.44)	(0.46)
Family Income (in $1,000)	105,970	91,186
	(135,411)	(104,638)

Source: The PSID data, 2009–2013.
Notes: We use the individual sampling weight as a probabilistic weight. Monetary units are in 2017 USD.

Table 2: The Effects of the ACA Medicaid Expansion on Overall Life Satisfaction

Samples:	Whole sample		Family income ≤ 138 percent of FPL		Family income > 138 percent of FPL	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Dependent variable: Overall life satisfaction						
Expansion×Post	0.05**	0.04**	0.24***	0.19***	0.01	0.01
	(0.02)	(0.02)	(0.05)	(0.06)	(0.03)	(0.02)
Sample size	107,887	76,373	25,185	19,296	82,702	57,077
R-Squared	0.09	0.58	0.11	0.66	0.08	0.61
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)						
Expansion×Post	0.03**	0.03***	0.14***	0.13***	0.01	0.02
	(0.01)	(0.01)	(0.03)	(0.03)	(0.02)	(0.01)
Sample size	107,887	76,373	25,185	19,296	82,702	57,077
R-Squared	0.10	0.57	0.10	0.66	0.09	0.59
Controls	Y	Y	Y	Y	Y	Y
State FE	Y		Y		Y	
Year FE	Y	Y	Y	Y	Y	Y
Individual FE		Y		Y		Y

Source: The PSID data, 2009–2017.

Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in columns (1), (3), and (5) and at the individual level in columns (2), (4), and (6). *** p<0.01, ** p<0.05, * p<0.1.

Table 3: TD Estimation of the Effects of the ACA Medicaid Expansion on Overall Life Satisfaction

	(1)	(2)
A. Dependent variable: Overall Life satisfaction		
Expansion×Post×Eligible	0.22***	0.17***
	(0.06)	(0.05)
Sample size	107,887	76,373
R-Squared	0.09	0.58
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)		
Expansion×Post×Eligible	0.12***	0.09***
	(0.04)	(0.03)
Sample size	107,887	76,373
R-Squared	0.10	0.57
Controls	Y	Y
State FE	Y	
Year FE	Y	Y
Individual FE		Y

Source: The PSID data, 2009–2017.

Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in column (1) and at the individual level in column (2). *** p<0.01, ** p<0.05, * p<0.1.

Table 4: The Effects of the ACA Medicaid Expansion on Overall Life Satisfaction of Massachusetts Residents

Sample:	Whole sample		Family income ≤ 138 percent of FPL		Family income > 138 percent of FPL	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Dependent variable: Overall Life satisfaction						
Expansion×Post	-0.04	-0.00	-0.06	-0.13	-0.06	-0.01
	(0.02)	(0.05)	(0.04)	(0.19)	(0.02)	(0.06)
Sample size	48,720	34,525	12,129	9,366	36,591	25,159
R-Squared	0.08	0.60	0.11	0.67	0.08	0.63
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)						
Expansion×Post	-0.06	-0.04	-0.24	-0.10	-0.08	-0.05
	(0.01)	(0.03)	(0.03)	(0.07)	(0.01)	(0.03)
Sample size	48,720	34,525	12,129	9,366	36,591	25,159
R-Squared	0.09	0.58	0.11	0.67	0.08	0.61
Controls	Y	Y	Y	Y	Y	Y
State FE	Y		Y		Y	
Year FE	Y	Y	Y	Y	Y	Y
Individual FE		Y		Y		Y

Source: The PSID data, 2009–2017.

Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in odd-numbered columns and at the individual level in even-numbered columns. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: The Effects of the ACA Medicaid Expansion on Overall Life Satisfaction of Individuals Aged 65 and Above

Samples:	Whole sample		Family income ≤138 percent of FPL		Family income > 138 percent of FPL	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Dependent variable: Overall Life satisfaction						
Expansion×Post	-0.07	-0.04	-0.14	0.06	-0.06	-0.05
	(0.04)	(0.05)	(0.13)	(0.16)	(0.05)	(0.05)
Sample size	10,790	8,210	1,787	1,537	9,003	6,673
R-Squared	0.09	0.64	0.17	0.77	0.09	0.66
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)						
Expansion×Post	-0.03	-0.01	-0.04	0.02	-0.03	-0.01
	(0.02)	(0.03)	(0.06)	(0.09)	(0.02)	(0.03)
Sample size	10,790	8,210	1,787	1,537	9,003	6,673
R-Squared	0.09	0.66	0.18	0.78	0.10	0.67
Controls	Y	Y	Y	Y	Y	Y
State FE	Y		Y		Y	
Year FE	Y	Y	Y	Y	Y	Y
Individual FE		Y		Y		Y

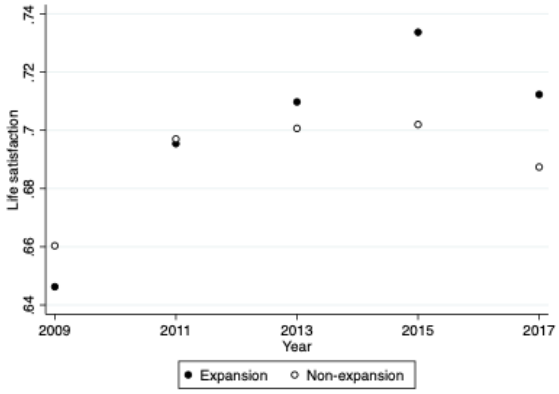
Source: The PSID data, 2009–2017.

Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in odd-numbered columns and at the individual level in even-numbered columns. *** p<0.01, ** p<0.05, * p<0.1.

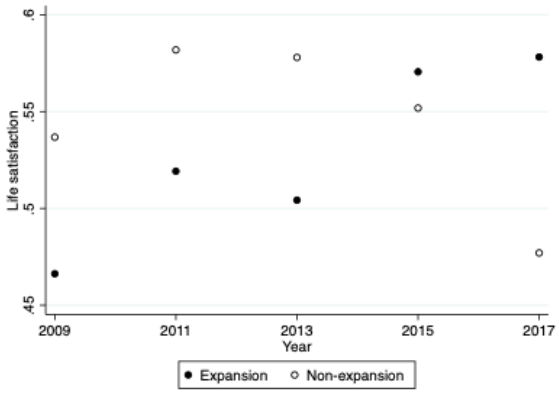
Appendix

Figure A1. Trends of the Probability of Being Very Satisfied or Completely Satisfied

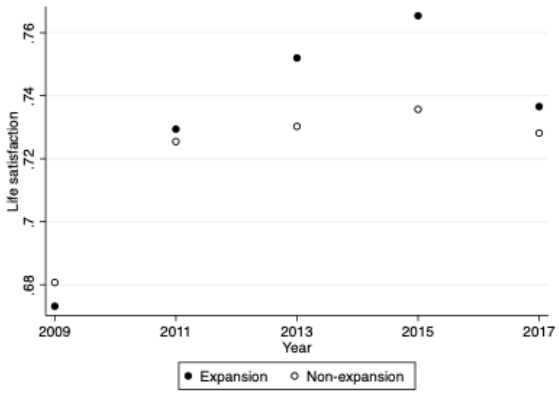
A. Whole sample



B. Family income ≤ 138 percent of FPL



C. Family income > 138 percent of FPL



Source: the PSID data, 2009–2017.

Notes: We restrict the sample to individuals aged 18 to 64 in panel A. Then we split the sample by Medicaid-eligibility status in panels B and C.

Table A1: Testing Pre-reform Parallel Trend Assumption

Samples:	Whole sample		Family income ≤ 138 percent of FPL		Family income > 138 percent of FPL	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Dependent variable: Life satisfaction						
Expansion×Year	0.01	-0.00	0.01	-0.00	0.01	-0.00
	(0.01)	(0.00)	(0.02)	(0.00)	(0.01)	(0.00)
Sample size	65,118	46,040	15,340	11,771	49,778	34,269
R-Squared	0.08	0.66	0.11	0.74	0.08	0.69
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)						
Expansion×Year	0.01	0.00	-0.00	-0.00	0.01	0.00
	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)
Sample size	65,118	46,040	15,340	11,771	49,778	34,269
R-Squared	0.09	0.65	0.11	0.74	0.08	0.67
Controls	Y	Y	Y	Y	Y	Y
State FE	Y		Y		Y	
Year FE	Y	Y	Y	Y	Y	Y
Individual FE		Y		Y		Y

Source: The PSID data, 2009–2013.

Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in columns (1), (3), and (5) and at the individual level in columns (2), (4), and (6). *** p<0.01, ** p<0.05, * p<0.1.

Table A2: Dynamic Effects of the ACA Medicaid Expansion on Overall Life Satisfaction

Samples:	Whole sample		Family income ≤ 138 percent of FPL		Family income > 138 percent of FPL	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Dependent variable: Overall Life satisfaction						
Expansion×During	0.03	0.01	0.06	-0.01	0.02	0.00
	(0.03)	(0.02)	(0.06)	(0.07)	(0.03)	(0.02)
Expansion×Post	0.06**	0.04**	0.26***	0.18***	0.02	0.01
	(0.03)	(0.02)	(0.07)	(0.07)	(0.03)	(0.02)
Sample size	107,887	76,373	25,185	19,296	82,702	57,077
R-Squared	0.09	0.58	0.11	0.66	0.08	0.61
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)						
Expansion×During	0.02	0.02	-0.01	-0.05	0.03	0.02*
	(0.02)	(0.01)	(0.04)	(0.03)	(0.02)	(0.01)
Expansion×Post	0.04**	0.03***	0.14***	0.11***	0.02	0.02**
	(0.02)	(0.01)	(0.04)	(0.03)	(0.02)	(0.01)
Sample size	107,887	76,373	25,185	19,296	82,702	57,077
R-Squared	0.10	0.57	0.10	0.66	0.09	0.59
Controls	Y	Y	Y	Y	Y	Y
State FE	Y		Y		Y	
Year FE	Y	Y	Y	Y	Y	Y
Individual FE		Y		Y		Y

Source: The PSID data, 2009–2017.

Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in columns (1), (3), and (5) and at the individual level in columns (2), (4), and (6). *** p<0.01, ** p<0.05, * p<0.1.

Table A3: The Effects of the ACA Medicaid Expansion on
the Probability of Being Completely Satisfied with Overall Life

Samples:	Whole sample		Family income ≤ 138 percent of FPL		Family income > 138 percent of FPL	
	(1)	(2)	(3)	(4)	(5)	(6)
Expansion×Post	0.02	0.01	0.09***	0.07**	-0.00	0.00
	(0.01)	(0.01)	(0.03)	(0.03)	(0.01)	(0.01)
Sample size	107,887	76,373	25,185	19,296	82,702	57,077
R-Squared	0.03	0.48	0.06	0.55	0.03	0.51
Controls	Y	Y	Y	Y	Y	Y
State FE	Y		Y		Y	
Year FE	Y	Y	Y	Y	Y	Y
Individual FE		Y		Y		Y

Source: The PSID data, 2009–2017.

Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in columns (1), (3), and (5) and at the individual level in columns (2), (4), and (6). *** p<0.01, ** p<0.05, * p<0.1.

Table A4: The Effects of the ACA Medicaid Expansion on Overall Life Satisfaction
Restricting to Non-elderly Individuals Whose Income ≤ 100 percent of the FPL

	(1)	(2)
A. Dependent variable: Overall Life satisfaction		
Expansion×Post	0.23**	0.09
	(0.10)	(0.08)
Sample size	17,030	13,345
R-Squared	0.10	0.69
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)		
Expansion×Post	0.12**	0.09**
	(0.05)	(0.04)
Sample size	17,030	13,345
R-Squared	0.10	0.69
Controls	Y	Y
State FE	Y	
Year FE	Y	Y
Individual FE		Y

Source: The PSID data, 2009–2017.
Notes: We restrict the sample to individuals aged 18 to 64 years and whose family income is 100% of the FPL. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in column (1) and at the individual level in column (2). *** p<0.01, ** p<0.05, * p<0.1.

Table A5: The Effects of the ACA Medicaid Expansion on Overall Life Satisfaction
Excluding Control Variables

Samples:	Whole sample		Family income ≤ 138 percent of FPL		Family income > 138 percent of FPL	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Dependent variable: Overall Life satisfaction						
Expansion×Post	0.04*	0.03*	0.20***	0.16***	0.01	0.01
	(0.02)	(0.02)	(0.05)	(0.06)	(0.03)	(0.02)
Sample size	109,560	77,461	25,758	19,692	83,802	57,769
R-Squared	0.01	0.57	0.04	0.65	0.01	0.60
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)						
Expansion×Post	0.03**	0.02***	0.12***	0.12***	0.01	0.01
	(0.01)	(0.01)	(0.03)	(0.03)	(0.01)	(0.01)
Sample size	109,560	77,461	25,758	19,692	83,802	57,769
R-Squared	0.01	0.56	0.04	0.65	0.01	0.58
Controls						
State FE	Y		Y		Y	
Year FE	Y	Y	Y	Y	Y	Y
Individual FE		Y		Y		Y

Source: The PSID data, 2009–2017.
Notes: We exclude the control variables used in the baseline regression analysis. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in odd-numbered columns and at the individual level in even-numbered columns. *** p<0.01, ** p<0.05, * p<0.1.

Table A6: The Effects of the ACA Medicaid Expansion on Overall Life Satisfaction
Including State-specific Time Trend

Samples:	Whole sample		Family income ≤ 138 percent of FPL		Family income > 138 percent of FPL	
	(1)	(2)	(3)	(4)	(5)	(6)
A. Dependent variable: Overall Life satisfaction						
Expansion×Post	0.01	0.04***	0.18***	0.21***	-0.02	0.02
	(0.03)	(0.02)	(0.06)	(0.06)	(0.03)	(0.02)
Sample size	107,887	76,373	25,185	19,296	82,702	57,077
R-Squared	0.09	0.58	0.12	0.66	0.08	0.61
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)						
Expansion×Post	0.01	0.03***	0.11**	0.14***	-0.01	0.02*
	(0.02)	(0.01)	(0.05)	(0.03)	(0.02)	(0.01)
Sample size	107,887	76,373	25,185	19,296	82,702	57,077
R-Squared	0.10	0.57	0.11	0.66	0.09	0.59
Controls	Y	Y	Y	Y	Y	Y
State FE	Y		Y		Y	
Year FE	Y	Y	Y	Y	Y	Y
Individual FE		Y		Y		Y

Source: The PSID data, 2009–2017.
Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in odd-numbered columns and at the individual level in even-numbered columns. *** p<0.01, ** p<0.05, * p<0.1.

Table A7. TD Estimates of the Effects of the ACA Medicaid Expansion on Overall Life Satisfaction
Alternative Ranges of Family Income

Family Income is between:	0 percent and 276 percent of FPL		50 percent and 226 percent of FPL	
	(1)	(2)	(3)	(4)
A. Dependent variable: Overall Life satisfaction				
Expansion×Post×Eligible	0.14	0.18***	0.24**	0.39***
	(0.09)	(0.06)	(0.11)	(0.09)
Sample size	52,588	39,013	36,369	26,819
R-Squared	0.10	0.60	0.10	0.64
B. Dependent variable: Pr(Very satisfied or completely satisfied with overall life)				
Expansion×Post×Eligible	0.12*	0.14***	0.03	0.11**
	(0.07)	(0.03)	(0.04)	(0.04)
Sample size	52,588	39,013	36,369	26,819
R-Squared	0.10	0.61	0.05	0.54
Controls	Y	Y	Y	Y
State FE	Y		Y	
Year FE	Y	Y	Y	Y
Individual FE		Y		Y

Source: The PSID data, 2009–2017.
Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level in odd-numbered columns and at the individual level in even-numbered columns. *** p<0.01, ** p<0.05, * p<0.1.

Table A8: The Effects of the ACA Medicaid Expansion on Overall Life Satisfaction
Using the Heteroskedastic Ordered Probit Model

Samples:	Whole sample	Family income ≤ 138 percent of FPL	Family income > 138 percent of FPL
	(1)	(2)	(3)
A. Dependent variable: Overall Life satisfaction			
Expansion×Post	0.068**	0.286***	0.019
	(0.031)	(0.067)	(0.037)
B. Average Marginal Effects			
Pr(Not at all satisfied)	-0.0014**	-0.0003	-0.0003
	(0.0006)	(0.0005)	(0.0005)
Pr(Not very satisfied)	-0.0043**	-0.0278***	-0.0010
	(0.0018)	(0.0065)	(0.0020)
Pr(Somewhat satisfied)	-0.0179**	-0.0649***	-0.0050
	(0.0081)	(0.0147)	(0.0097)
Pr(Very satisfied)	0.0039**	0.0291***	0.0008
	(0.0018)	(0.0069)	(0.0015)
Pr(Completely satisfied)	0.0197**	0.0787***	0.0055
	(0.0088)	(0.0174)	(0.0108)
Sample size	107,887	25,185	82,702
Pseudo R-squared	0.037	0.043	0.036
Controls	Y	Y	Y
State FE	Y	Y	Y
Year FE	Y	Y	Y

Source: The PSID data, 2009–2017.
Notes: We include age, age squared, marital status, race, ethnicity, years of education, gender, and the number of children as control variables. We allow heteroskedasticity by expansion status and post-expansion periods. We use the individual sampling weight as a probabilistic weight. Standard errors in parentheses are corrected for heteroscedasticity and clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1.