

Minimum Wages and the Uptake of Supplemental Security Income

Krishna Regmi*

December 2021

Abstract

This study provides the first investigation of whether the minimum wage affects the uptake of Supplemental Security Income (SSI). To disentangle the effect of the minimum wage from the underlying macroeconomic condition, I use a triple differences model, exploiting cross-state and temporal differences in the minimum wage and its differential effects on those individuals with and without a high school diploma. The results show that a one percent increase in the minimum wage leads to a 0.33 percent decline in SSI uptake. To substantiate the findings, this study employs an alternative approach, leveraging the discontinuity in minimum wage legislation at state borders by comparing SSI uptake within the contiguous state-border counties. Using this approach yields qualitatively similar findings, corroborating the baseline estimates.

Keywords: Minimum wage, Supplemental Security Income, border discontinuity, means-tested programs

*Department of Economics, Finance and Quantitative Analysis, Kennesaw State University and IZA

1 Introduction

Many states and localities are raising the minimum wage to \$15 per hour as contentious policy debates over the possible adoption of a 15-dollar federal minimum wage continue. These unfolding events and debates have reignited interest in the effects of the minimum wage on a broad range of potential outcomes, including employment and participation in public assistance programs. Meanwhile, total expenditures on Supplemental Security Income (SSI), a leading means-tested U.S. program to provide income support to individuals with a disability, has accelerated over time. Nominal spending on SSI reached approximately \$54 billion in 2015 compared to \$27 billion in 1995. Nearly 9.2 million people (approximately 2.9 percent of the total population) received SSI benefits in 2015. Researchers have extensively studied both the minimum wage and SSI, producing the voluminous literature on how these programs affect individuals' labor market choices and outcomes.¹ However, the literature does not provide evidence regarding if, and to what extent, the minimum wage affects the uptake of SSI.

The impetus for individuals to enter and exit the SSI program, one of the two federally run disability insurance programs, could stem from how the minimum wage alters their labor market prospects and outcomes. The previous literature shows that increasing DI benefits incentivizes for workers to exit the labor force and deteriorating labor market conditions motivate individuals to enroll in DI programs (Charles, Li, and Stephens 2018 and Black, Daniel, and Sanders 2002). Similarly, high potential earnings in the labor market dissuade individuals from collecting DI benefits (Milligan and Schirle 2019). Thus, an increase in the minimum wage provides a higher income for individuals, which should increase the opportunity cost of collecting SSI benefits, reducing its attractiveness. In addition to proving that disability prevents them

¹To name a few, Meer and West (2016), Neumark, Salas, and Wascher (2014a), Cengiz et al. (2019), Liu, Hyclak, and Regmi (2016), and Dube, Lester, and Reich (2010) provide evidence on employment. Likewise, there is an emerging literature on participation in various means-tested programs (Sabia and Nguyen 2017, Reich and West 2015, and Page, Spetz, and Millar 2005). Related to it, Dube (2019) investigate its effects on poverty. Another body of the literature documents the rising trend in SSI uptake, exploring possible explanations behind it (e.g., Charles, Li, and Stephens 2018, Black, Daniel, and Sanders 2002, French and Song 2014 and Autor and Duggan 2003).

from engaging in meaningful work, individuals should have limited income and assets to meet SSI eligibility requirements. Moreover, a higher income accompanying a rise in the minimum wage may push individuals beyond the eligibility threshold. Despite the minimum wage literature providing mixed effects on employment, overwhelming evidence demonstrates positive effects on low-skilled workers' earnings. As a result, one would expect lower participation in SSI. Similarly, as documented in several studies, a minimum wage increase could leave some workers with fewer skills unemployed, potentially encouraging them to claim SSI benefits. Given the mix of potentially relevant channels, the effect of changes in the minimum wage on SSI uptake is *a priori* theoretically ambiguous.

In this paper, I provide the first investigation of whether changes in the minimum wage affect the SSI disability insurance program.² Uncovering the link between minimum wage changes and SSI receipt is crucial to enhancing the collective understanding of the potential disincentive effects of disability insurance programs and of the way minimum wage changes affect government spending on public assistance programs. One argument that proponents of the minimum wage have put forth is that a minimum-wage-induced reduction in participation in welfare programs lowers the need for higher taxes and helps firms offset the overall financial burden that stems from higher labor costs.

The main challenge confronted in decoupling the effect of the minimum wage on the SSI uptake in the U.S. context is that minimum wage increases should be correlated with state-level macroeconomic conditions which are also related to changes in SSI participation. To overcome this challenge, I use cross-state variation in the minimum wage over time and individuals less likely to be affected by the minimum wage as a basis for comparison. Specifically, using the

²Social Security Disability Benefits Insurance (SSDI) is the other most extensive disability insurance program but is not means-tested and has a different eligibility requirement than SSI. To receive SSDI benefit payment, individuals must have sufficient work and earnings history. However, individuals' qualification for SSI assistance rests solely on two factors: Meeting the Social Security Administration's (SSA) definition of disability and limited income and assets. Consistent with its objective to limit its analysis to the domain of the relationship of the minimum wage with means-tested programs, this paper does not extend its analysis to SSDI. Another notable limitation is that, unlike SSI, the Current Population Survey (CPS) lacks clear, unambiguous information on SSDI.

individual-level data from the Current Population Survey (CPS) from 1992 to 2015, I define those individuals without a high school degree as the treatment group, and other individuals with a high school degree or beyond as the comparison group. This classification of the treatment group is based on the fact that minimum wage laws are considered to be more applicable to less-educated workers.

To preview the results, I find that minimum wage increases significantly decrease SSI rolls. A one percent increase in the minimum wage leads to a 0.33 percent decline in an individual's likelihood of receiving an SSI benefit. The results are robust to several checks, including the inclusion of state-by-year fixed effects and other alternative controls for unobserved confounders specific to states and vary over time. I show evidence that the minimum wage is negatively associated with the SSI uptake among the group of high school dropouts, but such an association does not exist among those with a high school degree or beyond. This evidence corroborates that minimum wage laws are not systematically correlated with the SSI uptake, further bolstering the baseline estimates.

To further substantiate micro evidence and connect my empirical approach to emerging literature, I leverage the discontinuity in minimum wage legislation at state borders and compare outcomes in counties within cross-state pairs. Adjacent counties at state borders are more likely to have similar labor markets and economic environments. Hence, this approach serves as an alternative way of addressing identification threats because states with a high-minimum wage have more generous welfare programs and different underlying macroeconomic conditions. Consistent with the previous influential work ([Charles, Li, and Stephens 2018](#) and [Black, Daniel, and Sanders 2002](#)), I use the per capita county-level benefit payment as a measure of SSI uptake. My baseline estimate shows that the elasticity of SSI benefit payment with respect to the minimum wage is around -0.17. Additionally, I assemble information on the number of SSI recipients from reports titled "SSI Recipients by State and County" from the Social Security Administration, which are publicly available only since 1998. The reports breakdown the recipients by age (under 18 years of age, ages 18 to 64, and 65 and older). Analyzing the effect on the recipients by

age yields two important messages. First, a rise in the minimum wage significantly reduces the number of recipients in the age group of 18-64. Second, estimates for those under 18 years and 65 or older are imprecise. Those individuals under 18 years of age or 65 and older have a lower attachment (or no attachment at all depending on the exact age profile) to the labor market and are not consequently expected to be responsive to minimum wage changes. Finding no evidence of the connection between the minimum wage and receipts of SSI by these two latter groups serves a falsification test and help to provide further validity to the research design of this study.

The paper proceeds as follows. Section 2 reviews related literature and illustrates potential channels through which the minimum wage operates to affect SSI uptake. Section 3 provides the institutional background on SSI, while Section 4 describes the sources of data and summary statistics. I present the estimation procedure and the results based on individual-level data in Section 5 and provide macro evidence in Section 6. Section 7 offers concluding remarks.

2 Literature and Framework

2.1 Literature Review

In being the first paper I am aware of to study how the minimum wage affects the participation in Supplemental Security Income (SSI), a prominent welfare program and a crucial component of disability insurance, this paper contributes to three strands of the literature.

First, this study broadens our understanding of the link between the minimum wage and welfare programs by providing timely evidence on SSI uptake. Despite the prevalence of the voluminous literature on the employment effects of the minimum wage, evidence on social safety nets is limited. Furthermore, the available evidence is as mixed and contentious as the evidence on employment. Using the state-level panel data and controlling for the state- and year-fixed effects, [Page, Spetz, and Millar \(2005\)](#) analyze the association between the AFDC caseload and the minimum wage. In terms of magnitude, they find the elasticity of 1-2 between the

minimum wage and the AFDC caseload. However, as they note, their study’s suggestion of the minimum wage leading to an increased welfare dependency does not hold across different samples and does not withstand the inclusion of state-specific trends. In contrarily suggestive findings, [Reich and West \(2015\)](#) show that the minimum wage leads to a substantial decline in the participation in the Supplemental Nutrition Assistance Program (SNAP), previously known as food stamps, with the elasticity of up to -0.32. Revisiting the scope of the minimum wage in reducing public assistance programs, [Sabia and Nguyen \(2017\)](#) evaluate whether the minimum wage decrease participation in major welfare programs—the Supplemental Nutrition Assistance Program (SNAP), Medicaid, Housing Assistance programs, Temporary Assistance for Needy Families (TANF/AFDC), and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). They conclude that the minimum wage does not affect the participation in means-tested programs. One common thread or point of contention that these previous studies bring to light is the need to tackle unobserved state-level confounders. Not only does this study add to our understanding of the role of the minimum wage in public assistance programs, but does so by adopting more credible, sophisticated econometrics procedures.

Second, this study relates directly to the literature examining the disincentive effects of labor market conditions on receiving federal disability insurance programs. The rise in disability insurance programs has coincided with deteriorating job opportunities for low-skilled workers, leading economists to seek proximate explanations in the labor market. [Black, Daniel, and Sanders \(2002\)](#) examine how earnings prospects, driven by exogenous changes in the price of coal in coal-producing states, including Kentucky, Ohio, Pennsylvania, and West Virginia, affect individuals’ propensity to enroll in disability insurance programs. [Charles, Li, and Stephens \(2018\)](#) extend [Black, Daniel, and Sanders \(2002\)](#) by examining the connection between predicted employment growths and the uptakes of SSI and Social Security Disability Insurance (SSDI). Several other studies seek explanations for rising enrollment into the rolls of disability insurance (DI) and examine labor supply responses to DI, including SSI.³

³For example, [Autor and Duggan \(2003\)](#), [Goodman-Bacon and Schmidt \(2020\)](#), [Bound \(1989\)](#), and [Milligan](#)

Third, this analysis is connected with an emerging body of literature that examines the effect of the minimum wage beyond labor market outcomes. [Dube \(2019\)](#) notes that the minimum wage can effectively lift people out of poverty. [Aaronson, Agarwal, and French \(2012\)](#) find that a rise in the minimum wage leads to an increase in consumption. [Dettling and Hsu \(2020\)](#) show how the minimum wage improves the financial well-being of individuals, such as by decreasing delinquency and increasing credit scores and access to credit card loans. Similarly, [Regmi \(2020\)](#) studies the effects of the minimum wage on children’s cognitive achievement, and [Renkin, Montialoux, and Siegenthaler \(2020\)](#) and [Leung \(2021\)](#) examine how the minimum wage affects retail prices.

2.2 Conceptual Framework

Before proceeding to empirical estimation, I present a conceptual framework to explain how a minimum wage increase operates to influence the prime-age working population’s participation in Supplementary Security Insurance (SSI), guiding the empirical procedure. Indeed, there are several competing potential channels affecting individual decision to enter and exit the SSI program.

When the government raises the minimum wage, it affects (i) the employment prospects arising from firms’ labor demand and (ii) the opportunity cost of being unemployed or a non-participant in the labor market for less-skilled workers. If individuals become jobless from an increase in the minimum wage, they may turn to SSI for income support. The neoclassical model posits that a higher minimum wage leads to a decline in employment. Contrarily, the monopsony model predicts that a higher minimum wage leads to higher employment and earnings levels. The voluminous minimum wage literature is mixed and contentious in line with the prediction of these theoretical models.

In a classical model how the minimum wage affects participation in SSI is ambiguous.

and [Schirle \(2019\)](#).

It depends on (i) whether firms reduce their employment through reduced hiring or increased layoff and (ii) whether a higher minimum wage increases search efforts or attachment to the labor market for the unemployed. When firms do not lay off individuals because of minimum wage increases, one potential channel involving the transition of individuals from employment to SSI may be absent. In providing the evidence of adverse effects on employment, [Gopalan et al. \(2021\)](#) note that a decline in low-skilled workers in firms because of a minimum wage rise primary results from the decline in hiring. Likewise, when the unemployed or non-employed individuals sense that minimum wage rises increase the potential earnings, they may be attached to the labor market, reducing their interest in SSI. [Adams, Meer, and Sloan \(2018\)](#) provide evidence of the unemployed increasing job search time immediately after a rise in the minimum wage. Conversely, monopsony model predictions—higher employment and higher wages—suggest that the minimum wage should lead to a decline in SSI enrollments.

Notwithstanding the contentiousness of empirical findings on employment, the minimum wage literature points to a rise in wages of low-skilled workers. When a higher minimum wage increases earnings and subsequently assets of those low-skilled workers, they may be pushed out of the eligibility threshold for SSI benefit based on income and assets. Further, as the previous literature attributes the rise in the potential replacement rate (SSI benefits divided by (previous) earnings in the labor market) to the rise in disability rolls ([Autor and Duggan 2003](#)), an enhanced minimum wage can lead to a decline in the relative benefits of SSI payment and an increase in attachment to the labor market. The relative benefits could be especially important when separation from a job is endogenous or voluntary.

In summary, how changes in minimum wages affect enrollment in SSI encompass two channels: income and incentives. The resulting changes in income can affect individuals' eligibility for SSI and the potential replacement rate, which alters the intensity of their labor market attachment, thus inducing or dissuading their participation in SSI.

3 SSI Background

In this section, I provide a brief overview of Supplemental Security Income (SSI).⁴ SSI, a nationwide means-tested program, came into operation in 1974 with an objective of helping people to meet their immediate basic needs such as food, shelter, and clothing. Particularly, it provides cash assistance to aged, blind, and disabled people with limited or no income and fewer resources. The program comprises three types of recipients: (i) blind or disabled children, (ii) blind or disabled adults, and (iii) 65 or older. Administered by the federal government, (more precisely, the Social Security Administration) SSI operates through the funding from general tax revenues. The program's parameters such as income, assets and medical eligibility and the level of benefits are uniform across states. Some states provide a supplemental payment in addition to the federal benefit amount. However, the share of states' payment is extremely low, just six percent of total SSI benefits (Duggan, Kearney, and Rennane 2015). Another important feature of this program is that it does not require its applicants or their family members to have prior work history, contrary to the Social Security Disability Insurance (SSDI) program. Therefore, it can be only source of income for "disabled" individuals lacking sufficient work history to qualify for SSDI. SSI is also distinct from other means-tested programs like Temporary Assistance for Needy Families (TANF), the Supplemental Assistance Program (SNAP), and the Earned Income Tax Credit. Two distinctions between SSI and other means-tested programs worthy of note are: (i) it is more generous and (ii) it provides benefits for a long period of time, contrary to a temporary feature of the other programs.

To qualify for benefits, individuals, except those 65 and older, must meet the disability definition of the Social Security Administration. Further, they must have little or no income and limited resources (\$2,000 for an individual or a child, and \$3,000 for a couple.) Approximately 9.21 million people received SSI benefits in 2015. The average monthly payment was \$733. Total spending in 2015 stood at approximately \$55 billion. The amount has steadily been rising over

⁴Interested readers may want to refer to Duggan, Kearney, and Rennane (2015) for an expansive review.

years (Figure A1).

4 Data and Summary Statistics

4.1 Data

I assemble data from a variety of sources. I below explain such sources and how I construct and restrict the sample.

Current Population Survey. I use individual-level data from the Annual Social and Economic Supplement (ASES) of the Current Population Survey (CPS), which is conducted every March and includes detailed information on socioeconomic and demographic characteristics. The data are extracted from the Integrated Public Use Microdata Series ([Sarah Flood and Warren 2020](#)). Given the richness of the information it contains, it has been widely used in the literature to analyze various policy effects and create official statistics, including the annual estimate of poverty.

The sample covers the period from 1992 to 2015. Before 1992, the educational attainment variable was defined differently, creating measurement errors in classifying high school dropouts.⁵ As noted below, to isolate the causal effects of SSI, this paper relies on a variation of comparing between those without a high school degree and those with at least a high school degree.

I limit the sample to individuals in the prime-age working group (ages 25 to 54), a standard practice in the literature. I also drop those individuals who are in the armed forces.

One of the many advantages of the CPS data is that the survey explicitly asks individuals to report the amount of Supplemental Security Income (SSI) they received during the previous calendar year. This makes it possible to observe the sample of SSI recipients more precisely.

⁵For example, the proportions of individuals in the sample who report their educational attainment as “12th grade, no diploma” and “high school diploma or equivalent” were 1.25 and 23.76 percent, respectively, in the period between 1992 and 2015, while the corresponding proportions were 26.02 and 2.74 percent in the years 1990 and 1991.

Nonetheless, having a few attractive features, the CPS like any other household survey has one disadvantage that is worthy of note. Particularly, respondents in the survey tend to underreport their participation in welfare programs (see [Meyer, Mok, and Sullivan 2009](#) for detail review).

Aggregate SSI. To complement the micro-level analysis based on the CPS, I use the aggregate data. I use SSI benefit payment at the county level from the Bureau of Economic Analysis's (BEA) Regional Economic Information System (REIS),⁶ covering 1992-2015. The REIS provides annual estimates of personal income by source created at the county level. The measure of SSI uptake in this study is similar to that of [Charles, Li, and Stephens \(2018\)](#). One advantage of the BEA data over household surveys such as the CPS is that the BEA data are available at a more granular level, particularly at the county level.

Other Data. I collect the state-level minimum wage data from David Neumark.⁷ I use the minimum wage available in the first month every year. Panel A of Figure [A2](#) displays the variation in the minimum wage across states in 2015 and Panel B the growths of the minimum wage between 1992 and 2015. Both the level and growths of the minimum wage reflect different underlying economic, demographic, and political characteristics. Generous minimum-wage states tend to lie on the northeast, on the west, and on the mid-west. Further, I collect the county-level unemployment rate data from the Bureau of Labor Statistics.⁸ I retrieve county population estimates from the Surveillance, Epidemiology, and End Results (SEER) Program.⁹

4.2 Summary Statistics

Analytical CPS Sample. Table [1](#) provides summary statistics for the analytical CPS sample. Columns 1-2 present the results for the sample of high school dropouts and the last two for those with a higher school degree or beyond. I apply the ASES survey weight to calculate those statistics. The uptake of SSI appears to be much higher for high school dropouts. In terms

⁶The link is <https://www.bea.gov/data/economic-accounts/regional>.

⁷I extract the data from <https://www.socsci.uci.edu/~dneumark/datasets.html>.

⁸The link is www.bls.gov/lau.

⁹The link is <https://seer.cancer.gov/popdata/>.

of demographics, the high school dropout sample tends to show a disproportionately higher representation of Hispanics and an under-representation of the white.

Who are SSI recipients? To provide general demographic and educational information on SSI recipients, Table A1 presents their characteristics. About 12 percent of them report having been employed. Regarding racial composition, 55 percent are white, 27 percent black, 14 percent Hispanic, and 5 percent are other races. The mean age is about 41 years. Females are slightly over-represented, accounting for about 57 percent of the total recipients. Likewise, the recipients are overwhelmingly unmarried (67 percent). In terms of educational attainment, 36 percent of them do not have a high school degree, and 40 percent of them have a high school degree.

Analytical Aggregate Sample. Next, I present summary statistics for the alternative analytical sample based on the aggregate-level data in Table A7. Panel A presents summary statistics for all counties and Panel B for border-pair counties. As noted below, counties in the border-pair sample appear as many times as many counties they border. The variable $\ln(SSI)$ represents the natural log of the county-level benefit payment.

5 Micro Evidence from the CPS Data

I base the micro-level analysis on the Current Population Survey (CPS) data. The main advantage of individual-level data is that it permits the use of a comparison group, which is an additional variation source.

5.1 Main Empirical Estimation

A critical challenge in identifying the effects of minimum wage changes on the uptake of Supplemental Security Income (SSI) benefits is that legislation governing such changes should correlate with underlying macroeconomic conditions and the generosity of other welfare programs. [Allegretto et al. \(2017\)](#) document the non-randomness nature of minimum wage policies, with

high- and low-minimum-wage states differing across several dimensions such as labor market conditions and political leaning—Democrat versus Republican.

In order to isolate the causal effects of the minimum wage on participating in SSI, I use a triple differences approach, which exploits cross-state and temporal differences in minimum wages and comparisons in the outcome of the potential treatment group (those without a high school degree) to that of the potential control group (those with a high school degree or beyond). The rationale behind the construction of the treatment group is rooted in the fact that minimum wage policy is expected to affect less-educated individuals, but not more-educated ones. This empirical strategy is, in spirit, similar to [Dettling and Hsu \(2020\)](#). I estimate, in particular, the following model:

$$SSI_{i,s,t-1} = \beta_1 \ln(MW_{s,t-2}) + \beta_2 * \mathbf{1}[LHS_{i,t}] + \beta_3 \mathbf{1}[LHS_{i,t}] * \ln(MW_{s,t-2}) + \delta X_{i,t} + \gamma_t + \varsigma_s + \epsilon_{it}, \quad (1)$$

where i represents individual, s state, and t survey year. In this model, $SSI_{i,s,t-1}$ is an indicator variable that takes the value of one if the individual received any amount of SSI benefit in the previous calendar year. Note that the CPS reports income from the previous calendar year, while it reports demographic information from the survey year. $\ln(MW_{s,t-2})$ is the log of state-level minimum wage in year $t - 2$. Given that the SSI application process is lengthy, running into several months, there should be a lag between a minimum wage rise and the receipt of SSI benefits. $\mathbf{1}[LHS_{i,t}]$ is a dummy variable that equals to one if the individual has less than a high school degree, i.e., high school dropouts. The interaction between $\ln(MW_{s,t-2})$ and $\mathbf{1}[LHS_{i,t}]$ is the variable of interest, and its parameter β_3 measures the effect of the minimum wage on the treatment group relative to the control group. γ_t is a vector of year fixed effects intended to capture the secular trend in SSI uptake. ς_s contains state fixed effects that capture state-level unobserved, time-invariant heterogeneities. $X_{i,t}$ includes individual demographics such as the race (dummies for non-Hispanic white, non-Hispanic black, Hispanic, and non-Hispanic other races), a dummy variable for marital status, age, and age squared. The objective behind the

inclusion of these individual-level variables is to improve the precision of estimates.

I use the survey weight in all my analyses to make the sample representative of the population. Additionally, I cluster standard errors at the state level to account for unobserved factors within a state, the unit of policy, are probably correlated. The unit of analysis is an individual.

The maintained assumption necessary to identify the parameter of interest in this econometric procedure is that any remaining confounders affect both high school dropouts and those with a high school degree or beyond similarly. For example, even if economic conditions or the business cycle influence the choices of state lawmakers to revise the minimum wage and individuals to collect SSI, this model can purge unobserved confounders under the maintained assumption.

Before presenting my baseline results, I show how the state-level minimum wage is associated with SSI participation by high school dropouts (the treatment group) versus high school or higher degree holders (the comparison group). I average the minimum wage and participation in SSI by state over the period 1992-2015. As graphically visualized in Figure 1, there is a clear, steady association between the decline in participation and a higher minimum wage for high school dropouts. However, for those with a high school degree or beyond, there is no association between the minimum wage and participation. Despite displaying a revealing relationship, it is important to note that such a relationship does not guarantee the causal relationship between SSI uptake and the minimum wage.

5.2 Main Results

After providing visual evidence on the effects of the minimum wage, I then present baseline estimates based on Equation (1). I begin estimating my model without any individual controls. Column 1 of Table 2 contains the results. Next, I control for individual level characteristics, such as dummies for the race, age, age squared, and marital status. Column 2 contains the results, which are both qualitatively and quantitatively similar. In terms of magnitude, the coefficient

on the interaction term $\ln(MW_{s,t-2}) * \mathbf{1}[LHS_{i,t}]$ is -0.0196. That means a one-percent increase the minimum wage leads to approximately a 0.0196 percentage points decline in the likelihood that a high school dropout would collect SSI benefits as compared to an average individual in the control group. Given the mean value of SSI uptake of 6 percent among the treatment group, this represents approximately $\frac{0.0196}{6} = 0.33$ percent (the elasticity of 0.33).

Other coefficients provide an essential and meaningful context to interpret the main coefficient of interest. The coefficient on the minimum wage variable is imprecise, demonstrating that the minimum wage does not correlate with underlying unobservable confounders determining the participation in SSI. This coefficient would measure the effect of the minimum wage if all individuals received at least a high school degree, that is, $\mathbf{1}[LHS_{i,t}] = 0$. The variable $\mathbf{1}[LHS_{i,t}]$ is positive and precise, illustrating the differences in the uptake of SSI between high school dropouts and those with a high school degree or beyond.

Potential Threats. The major contentiousness in the minimum wage literature about identifying its effects revolves around sufficiently capturing unobserved factors, including the business cycle. The inability to control for those factors, which can drive changes in the minimum wage and participation in social welfare programs, may bias estimates.

To analyze the sensitivity of the results, I first control for the seasonally adjusted state-level unemployment rates. The results are nearly identical (Column 1 of Table 3). A more credible, comprehensive approach that I take to safeguard the estimates from potential biases is to non-parametrically control for time-varying state-level confounders by including state-by-year fixed effects. This approach makes it possible to control for year-over-year state-level changes in unobserved confounders, such as the underlying macroeconomic environment. Note that in this specification, the effect of the minimum wage is not separately identified as state-by-year fixed effects subsume it. Column 2 of Table 3 contains the results.

Additional Analysis. After providing robust, credible evidence against other state-level unobserved factors explaining these findings, I further explore alternative approaches used in the

literature for completeness, connecting the current approach to those described in the literature. In particular, I use state-specific linear trends and division-by-year fixed effects to account for spatial heterogeneities. Table [A2](#) contains the results. Expectedly and reassuringly, the results are similar. Additionally, to examine the sensitivity of the results, I use the minimum wage in real terms. In the absence of official cost-of-living measures across states during the sample period, I use the widely used national measure of cost-of-living, the Consumer Price Index for All Urban Consumers published by the Bureau of Labor Statistics. Column 1 of Table [A3](#) contains the results. Likewise, I also use minimum wages in levels and present the results in Column 2 of Table [A3](#). The results are both qualitatively and quantitatively similar.

Overall, the results withstand various types of specifications and controls for unobserved confounders. The slew of checks validates the claim that the minimum wage causes a decline in SSI participation.

Pre-Great Recession Period. My sample period includes the Great Recession and its aftermath, leading to some concern over my main results being biased by its heterogeneous impacts across states. To the extent that minimum wage laws were correlated with the severity of the recession and associated expansions in social safety nets, especially unemployment insurance,¹⁰ it is possible that confounding factors may drive the results. Severe economic downturns can accelerate the destruction of low-skilled jobs, which are typically minimum wage jobs. Studying the role of minimum wage changes in the recent Great Recession in the U.S., [Addison, Blackburn, and Cotti \(2013\)](#) provide some support that states facing the deepest recessions are more likely to bear negative employment effects. [Clemens and Wither's \(2019\)](#) findings of larger and deeper effects of the minimum wage during the period surrounding the Great Recession provide an additional piece of corroborating evidence on this topic. Therefore, I exclude the years after 2007 and re-estimate my preferred specification. Table [A4](#) presents the results. Column 1 presents the results based on Equation 1 and Column 2 the results estimated

¹⁰During and aftermath of the Great Recession, unemployment insurance was extended up to as many as 99 weeks, up from the regular 26 weeks.

by adding state-by-year fixed effects.

5.3 Heterogeneous Analysis

By Gender. It is well-documented that men and women face different labor market experiences and tradeoffs between home and market production. Therefore, I estimate the effect separately. Table 4 presents the results by gender: Column 1 for women and column 2 for men. The response of both groups to SSI is similar.

By Marital Status. There are contrasting channels through which the minimum wage can generate heterogeneous effects for the married and unmarried. With one couple partaking in the labor market, the other can find SSI benefits effectively complement family earnings and focus on home production, becoming more responsive to it. Conversely, given the income and asset thresholds for SSI eligibility, it is reasonable that the married are more likely to cross the thresholds, becoming ineligible. Table 5 reports the results by marital status. The effects are concentrated in unmarried individuals.

6 Macro Evidence

6.1 Empirical Estimation

Thus far, I have provided robust estimates on how the minimum wage affects SSI participation using the individual-level data. To complement the micro findings, I use aggregate data that provide two advantages in the empirical specification. First, the aggregate participation in SSI is not prone to measurement error stemming from respondents' under-reporting. Second, the availability of data at a more refined geographical level (county), allows me to leverage policy discontinuity in minimum wage legislation at state borders in my empirical estimation. Moreover, this estimation serves as an alternative, credible approach to overcome the identification challenges and disentangle the effect of minimum wages on SSI payment. In this research design,

I compare the per capita SSI benefit payments within contiguous counties at state borders, which happen to be in different states and subsequently subject to different minimum wage laws. As noted in [Dube, Lester, and Reich \(2010\)](#), adjacent counties in neighboring states should resemble similar labor market trends and other economic conditions. The maintained assumption of this approach is that absent a minimum wage increase, the trend in the uptake of SSI benefits in a county would evolve similarly to that in an adjacent county. I use the following empirical specification:

$$\ln(SSI_{cpt}) = \beta_1 \ln(MW_{c,t-1}) + \gamma_c + \varphi_{pt} + \ln(Pop_{ct}) + \epsilon_{cpt}. \quad (2)$$

In this model, $\log(SSI_{cpt})$ is total SSI payment in county c and year t , $\ln(MW_{c,t-1})$ the natural logarithm of the effective minimum wage which is the higher of the federal and state minimum wages in county c and year $t - 1$, and γ_c a vector of county fixed effects. Likewise, φ_{pt} is a vector of county-pair-by-year fixed effects which nonparametrically control for time-varying, common confounding factors in a cross-border pair. The parameter of interest β_1 measures the elasticity of SSI payment with respect to the minimum wage. I use the log of the population as a control variable so that the outcome variable can be interpreted as the log of per capita SSI payment. Since identifying the parameter of interest in this model relies on comparing the outcome in a cross-border counties pair, creating a border-pair for each county is necessary. Therefore, a county appears in the data as many times as many other counties it borders. I cluster standard errors at the state-level.

6.2 Results

This section presents the results derived from the approach based on discontinuities in minimum wage policies at state borders, as specified in Equation (2). [Table 6](#) presents the results. The results show that higher minimum wages significantly reduce the uptake of SSI benefits. The elasticity of SSI benefit payment with respect to the minimum wage is around -0.17 (Column 1).

Putting this estimate in the context of the literature regarding SSI, [Charles, Li, and Stephens \(2018\)](#), using similar data to this study, has estimated the elasticity with respect to earnings of -0.16.

The previous literature shows the role of business cycle fluctuations in participation in means-tested and disability insurance programs. To examine whether the business cycle is driving the results, I re-estimate the model controlling for the county-level, seasonally adjusted unemployment rate. Expectedly and reassuringly, the results are almost identical (Column 2 of Table 6).¹¹ These results bolster the validity of the research design. Note that the model identifies the causal effect of the minimum wage under the assumption that the underlying business cycles are not different in a cross-border pair. Having virtually no impact on the main estimate while controlling for the unemployment rate provides strong evidence that the business cycles evolve smoothly across borders (or are not different among counties in a cross-border pair).

Further, as noted above, a county can appear multiple times. To account for multiple appearances, I re-estimate the model by weighting by the inverse of the number of times it is observed in county pairs. The results are almost identical (Table B1).

Pre-Trend Analysis. To further support the plausibility of my identifying assumption, I estimate a distributed lead-lag model including three years of leads and three years of lags. As in [Dube, Lester, and Reich \(2010\)](#), I use changes in the minimum wage rather than its level. The regression has the following form:

$$\ln(SSI_{cpt}) = \sum_{j=-3}^3 \beta_j \Delta \ln(MW_{c,t+j}) + \beta_4 \ln(MW_{c,t-4}) + \gamma_c + \varphi_{pt} + \ln(Pop_{ct}) + \epsilon_{cpt}. \quad (3)$$

If the baselines results reveal pre-existing differences between counties, not the actual effect of the minimum wage, we expect to find statistically significant effects of future minimum wage

¹¹For completeness, I estimate my model using the minimum wage in levels. As presented in Table A6, the results are similar.

changes. As presented in Table 7, all the coefficients on the leads are not statistically different from zero. Another feature of this model is that it illustrates the dynamic responses of the minimum wage on the SSI benefit payment.

Alternative Measure. Thus far, I use the well-regarded works in the literature to define the uptake of SSI benefits. Though the calculated per capita SSI benefit payment sheds light on the overall trend in SSI expenditure and its uptake, it does not allow me to provide nuanced estimates about the characteristics of recipients. I next go on to construct data on SSI recipients' characteristics. I assemble information on the number of SSI recipients from 1998 to 2015 using publicly available "SSI Recipients by State and County" reports from the Social Security Administration.¹² Note that such reports are publicly available only since 1998. These reports divide recipients into three groups: under 18 years of age, ages 18 to 64, and 65 and older. I re-estimate the main results using my preferred specification based on minimum wage legislation discontinuity at state borders. Table 8 provides the results; Panel A for the period 1998 to 2015 and Panel B for the period 1998 to 2007. Two main messages stand out. First, I find statistically significant effects for the age group of 18-64. Second, estimates for under 18 years and 65 or older are not statistically different from zero. Those individuals under 18 years of age or 65 and older have a lower attachment (or no attachment at all depending on the exact age profile) to the labor market and are not consequently responsive to minimum wage changes. Statistically insignificant effects for those age groups help to provide further validity to the research design of this study.

Robustness Check. As noted above, it is possible that the Great Recession can bias the results. Therefore, I exclude the years after 2007 and re-estimate my preferred specification. Table A7 presents the results. Column 1 provides the estimate derived without any control variable and Column 2 controls for the unemployment rate. The effects are slightly stronger as compared to baseline estimates, mirroring the pattern found in the individual-level data above. The findings could also be viewed in the context of Charles, Li, and Stephens's (2018) "puzzling"

¹²https://www.ssa.gov/policy/docs/statcomps/ssi_sc/1998/index.html

discovery of SSI being non-responsive to labor market conditions in recent years, which in turn implies the weaker effect of the minimum wage.

6.3 Low- and High-Income Counties Comparison

Although the above-presented identification strategy that focuses on counties in a cross-border pair is plausibly appealing, it has certain disadvantages. Particularly, one argument against the above-illustrated border discontinuity approach is that limiting the analysis to contiguous state-bordering counties may throw away important variation needed to identify the effect of minimum wages (Neumark, Salas, and Wascher 2014b). Adding further credibility to the findings, I examine the extent to which the level of the minimum wage affects the uptake of SSI disability insurance in low-income counties differently compared to higher-income counties. The minimum wage is considered to be more binding in low-income counties. As a result, we expect it to have a disproportionately larger effect on those counties. Using county-level per capita income data from the Bureau of Economic Analysis’s (BEA) Regional Economic Information System (REIS),¹³ I classify counties as high- and low-income. I adopt the following empirical strategy.

$$\ln(SSI_{ct}) = \beta_1 \mathbf{1}[LowIncome_{ct}] + \beta_2 \ln(MW_{c,t-1}) + \beta_3 \ln(MW_{c,t-1}) * \mathbf{1}[LowIncome_{ct}] + \gamma_c + \tau_t + \ln(Pop_{ct}) + \epsilon_{ct}, \quad (4)$$

where $\mathbf{1}[LowIncome_{ct}]$ is an indicator variable for county c in year t for having per capita income below the median. β_3 , the parameter of interest, measures the differential effects of the minimum wage between low-income and high-income counties. Other variables are defined as above. This specification purges any confounding factors common to both type of counties. β_3 identifies the causal effect of the minimum wage under the maintained assumption that changes in the minimum wage are not correlated with other confounders affecting both types of counties differently.

I start by providing the results estimated using the specification identical to Equation (4).

¹³The link is <https://www.bea.gov/data/economic-accounts/regional>.

Column 1 of Panel A of Table A8 contains the results, which are similar to baseline estimates. A one percent rise in the minimum wage reduces the SSI benefit payment by around 0.13 percent, that is, the elasticity of -0.13. Next, I control for time-varying non-linear, unobserved heterogeneities common within a division via the inclusion of division \times year fixed effects (Column 2), for unobserved factors that affect both the minimum wage and the SSI benefit uptake linearly via state-specific linear trends (Column 3) and for the business cycle via county-level unemployment rates (Column 4). The results are robust across these specifications, providing reassurance that the main results are not driven by omitted variables bias.

Finally, I divide counties into quartiles based on their per-capita income and compare the outcome in counties in the first-, second-, and third-income quartiles relative to those in the top-income quartile.¹⁴ Panel B of Table A8 presents the results. I run four specifications parallel to those above. I find that the effects are concentrated in the counties in the lowest-income quartile. In addition, the specifications that add division \times year fixed effects, state-specific linear trends, or the unemployment rate yield statistically significant effects in the counties in the second-lowest income quartile.

For the reasons explained above, I drop the sample after 2007, and re-run all these specifications. Table A9 in Appendix contains the results, which are qualitatively similar.

7 Conclusion

To the extent that the minimum wage influences individuals' income, incentive to enter and exit the labor market, and employment opportunities, it can alter their participation in Supplemental Security Income (SSI), a leading means-tested program in the U.S. This paper empirically examines how the minimum wage affects the uptake of SSI. Using different datasets and empirical approaches, I show that minimum wage changes significantly affect individuals' participation in

¹⁴I use the regression model of the form $\ln(SSI_{ct}) = \beta_1 \ln(MW_{c,t-1}) + \sum_{q=2}^4 \phi_q \mathbf{1}[Income_q] + \sum_{q=2}^4 \alpha_q \mathbf{1}[Income_q] * \ln(MW_{c,t-1}) + \gamma_c + \tau_t + \ln(Pop_{ct}) + \epsilon_{ct}$.

SSI. My analysis based on the individual-level data finds elasticity of -0.33 between the minimum wage and the SSI uptake. Alternatively, I use the per capita county-level SSI benefits payment as a measure of SSI uptake, consistent with the previous works, and estimate the macro effect of the minimum wage.

To provide a rough estimate of cost-saving in SSI benefits payments from a rise of the minimum wage, I consider the following estimates. First, in my analytical CPS sample, I extrapolate the elasticity based on 25- to 54-year-olds in order to estimate the elasticity for the entire population of SSI recipients. I note that the share of SSI recipients aged 25-54 years in the analytical CPS sample is about 46 percent. Thus, a back-of-the-envelope calculation suggests that the elasticity for the entire population of SSI recipients is -0.15, which is the multiplication of the elasticity estimate for individuals aged 25-54 years by their share in the sample. And, in my analytical CPS sample, a one percent increase in the minimum wage represents around \$0.058 from its average value of \$5.8. If the minimum wage were to increase by one dollar (nearly 17.2 percent), this would result in a decline of around 2.58 percent ($=-0.15 \times 17.2$) in SSI enrollees. Given the number of SSI recipients totaling 9.2 million in 2015, a dollar increase in the minimum wage leads to a reduction in the number of SSI recipients by approximately 240,000. With each recipient collecting SSI benefits of \$8,796 per year ($=12 \times \773) in 2015, this translates into a total saving of \$1.97 billion per year.

Being the first study I am aware of to examine the link between the minimum wage and the uptake of SSI, this paper highlights the role of the minimum wage on participation in welfare programs, a topic that is inconclusive in the literature. This study carries a critical policy implication that a higher minimum wage can help reduce welfare dependency. When rich data are available, one possible extension for future research is to consider the combined effect of the minimum wage on participation in all welfare programs.

References

- Aaronson, D., S. Agarwal, and E. French. 2012. “The Spending and Debt Response to Minimum Wage Hikes.” *American Economic Review* 102:3111–39.
- Adams, C., J. Meer, and C. Sloan. 2018. “The Minimum Wage and Search Effort.” Working Paper No. 25128, National Bureau of Economic Research.
- Addison, J.T., M.L. Blackburn, and C.D. Cotti. 2013. “Minimum Wage Increases in a Recessionary Environment.” *Labour Economics* 23:30–39.
- Allegretto, S., A. Dube, M. Reich, and B. Zipperer. 2017. “Credible Research Designs for Minimum Wage Studies: A Response to Neumark, Salas, and Wascher.” *ILR Review* 70:559–592.
- Autor, D.H., and M.G. Duggan. 2003. “The Rise in the Disability Rolls and the Decline in Unemployment.” *Quarterly Journal of Economics* 118:157–206.
- Black, D., K. Daniel, and S. Sanders. 2002. “The Impact of Economic Conditions on Participation in Disability Programs: Evidence from the Coal Boom and Bust.” *American Economic Review* 92:27–50.
- Bound, J. 1989. “The Health and Earnings of Rejected Disability Insurance Applicants.” *American Economic Review* 79:482–503.
- Cengiz, D., A. Dube, A. Lindner, and B. Zipperer. 2019. “The Effect of Minimum Wages on Low-Wage Jobs.” *Quarterly Journal of Economics* 134:1405–1454.
- Charles, K.K., Y. Li, and M. Stephens. 2018. “Disability Benefit Take-Up and Local Labor Market Conditions.” *Review of Economics and Statistics* 100:416–423.
- Clemens, J., and M. Wither. 2019. “The Minimum Wage and the Great Recession: Evidence of Effects on the Employment and Income Trajectories of Low-skilled Workers.” *Journal of Public Economics* 170:53–67.

- Dettling, L.J., and J.W. Hsu. 2020. "Minimum Wages and Consumer Credit: Effects on Access and Borrowing." *Review of Financial Studies* 34:2549–2579.
- Dube, A. 2019. "Minimum Wages and the Distribution of Family Incomes." *American Economic Journal: Applied Economics* 11:268–304.
- Dube, A., T.W. Lester, and M. Reich. 2010. "Minimum Wage Effects across State Borders: Estimates Using Contiguous Counties." *Review of Economics and Statistics* 92:945–964.
- Duggan, M., M.S. Kearney, and S. Rennane. 2015. "The Supplemental Security Income (SSI) Program." NBER Working Papers No. 21209.
- French, E., and J. Song. 2014. "The Effect of Disability Insurance Receipt on Labor Supply." *American Economic Journal: Economic Policy* 6:291–337.
- Goodman-Bacon, A., and L. Schmidt. 2020. "Federalizing Benefits: The Introduction of Supplemental Security Income and the Size of the Safety Net." *Journal of Public Economics* 185:104174.
- Gopalan, R., B.H. Hamilton, A. Kalda, and D. Sovich. 2021. "State Minimum Wages, Employment, and Wage Spillovers: Evidence from Administrative Payroll Data." *Journal of Labor Economics* 39:673–707.
- Leung, J.H. 2021. "Minimum Wage and Real Wage Inequality: Evidence from Pass-Through to Retail Prices." *Review of Economics and Statistics*, pp. 1–16.
- Liu, S., T.J. Hyclak, and K. Regmi. 2016. "Impact of the Minimum Wage on Youth Labor Markets." *Labour* 30:1–37.
- Meer, J., and J. West. 2016. "Effects of the Minimum Wage on Employment Dynamics." *Journal of Human Resources* 51:500–522.

- Meyer, B.D., W.K.C. Mok, and J.X. Sullivan. 2009. "The Under-Reporting of Transfers in Household Surveys: Its Nature and Consequences." Working paper No. 15181, National Bureau of Economic Research.
- Milligan, K., and T. Schirle. 2019. "Push and Pull: Disability Insurance, Regional Labor Markets, and Benefit Generosity in Canada and the United States." *Journal of Labor Economics* 37:S289–S323.
- Neumark, D., J.I. Salas, and W. Wascher. 2014a. "More on Recent Evidence on the Effects of Minimum Wages in the United States." Working Paper No. 20619, National Bureau of Economic Research.
- Neumark, D., J.M.I. Salas, and W. Wascher. 2014b. "Revisiting the Minimum Wage—Employment Debate: Throwing Out the Baby with the Bathwater?" *ILR Review* 67:608–648.
- Page, M.E., J. Spetz, and J. Millar. 2005. "Does the Minimum Wage Affect Welfare Caseloads?" *Journal of Policy Analysis and Management* 24:273–295.
- Regmi, K. 2020. "The effect of the minimum wage on children's cognitive achievement." *Labour Economics* 65:101844.
- Reich, M., and R. West. 2015. "The Effects of Minimum Wages on Food Stamp Enrollment and Expenditures." *Industrial Relations: A Journal of Economy and Society* 54:668–694.
- Renkin, T., C. Montialoux, and M. Siegenthaler. 2020. "The Pass-Through of Minimum Wages into US Retail Prices: Evidence from Supermarket Scanner Data." *Review of Economics and Statistics*, 10, pp. 1–99.
- Sabia, J.J., and T.T. Nguyen. 2017. "Do Minimum Wages Really Reduce Public Assistance Receipt?" Working paper.

Sarah Flood, R.R.S.R., Miriam King, and J.R. Warren. 2020. Working paper, Integrated Public Use Microdata Series, Current Population Survey: Version 7.0 [dataset]. Minneapolis, MN: IPUMS. <https://doi.org/10.18128/D030.V7.0>.

Table 1: **Summary Statistics: CPS Sample**

	LHS		HS or Beyond	
	Mean	SD	Mean	SD
SSI Uptake	6.22%	24.16%	1.50%	12.15%
White	37.77%	48.48%	71.32%	45.23%
Black	13.60%	34.28%	11.68%	32.12%
Hispanic	43.60%	49.59%	10.46%	30.61%
Other	5.03%	21.86%	6.54%	24.73%
Age	39.18	8.57	39.36	8.49
Female	46.65%	49.89%	51.44%	49.98%
Married	55.96%	49.64%	62.83%	48.33%
MW	\$5.94	\$1.36	\$6.02	\$1.36
Unemp Rate	6.25%	1.92%	6.11%	1.93%
N	219,928		1,625,763	

Notes: This table presents summary statistics separately for individuals with less than a high school (LHS) diploma and those with at least a high school (HS) diploma (Panel B). The statistics are calculated using the Annual Social and Economic Supplement (ASES) of the Current Population Survey (CPS) for the period 1992-2015.

Table 2: **Effects of the Minimum Wage on the Uptake of SSI: CPS Sample**

	(1)	(2)
LHS×ln(MW)	-0.0238*** (0.0074)	-0.0196*** (0.0064)
LHS	0.0885*** (0.0107)	0.0923*** (0.0100)
ln(MW)	0.0024 (0.0031)	0.0024 (0.0032)
N	1,845,691	1,845,691
Year FEs	Y	Y
State FEs	Y	Y
Indiv. Controls	N	Y

Notes: The table presents the results based on Equation (1). The interaction term between an indicator for individuals without a high school degree and the log of state-level minimum wage $LHS \times \ln(MW)$ is the variable of interest. I begin presenting the results without any individual controls (Column 1). Column 2 adds individual controls such as dummies for race (white, black, and Hispanic), a dummy for marital status, age, and age squared. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table 3: **Controlling for Time-Varying State-Level Unobservables: CPS Sample**

	(1)	(2)
LHS×ln(MW)	-0.0196*** (0.0064)	-0.0194*** (0.0064)
LHS	0.0924*** (0.0100)	0.0921*** (0.0100)
ln(MW)	0.0020 (0.0028)	
N	1,845,691	1,845,691
Year FEs	Y	Y
State FEs	Y	Y
State-by-year FEs	N	Y
Indiv. Controls	Y	Y

Notes: The table presents the results derived by adding time-varying state-specific confounders to the model based on Equation (1). In particular, Column 1 adds the the state unemployment rate. Column 2 uses state-by-year fixed effects. The interaction term between an indicator for individuals without a high school degree and the log of state-level minimum wage $LHS \times \ln(MW)$ is the variable of interest. Individual controls include dummies for race (white, black, and Hispanic), a dummy for marital status, age, and age squared. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table 4: **Heterogeneity by Gender: CPS Sample**

	Women	Men
LHS×ln(MW)	-0.0183** (0.0089)	-0.0198*** (0.0061)
LHS	0.1008*** (0.0136)	0.0831*** (0.0103)
ln(MW)	0.0058 (0.0048)	-0.0012 (0.0035)
N	966,037	879,654
Year FEs	Y	Y
State FEs	Y	Y
Controls	N	Y

Notes: The table presents the results by gender. Column 1 presents for men and Column 2 for women. The interaction term between an indicator for individuals without a high school degree and the log of state-level minimum wage $LHS \times \ln(MW)$ is the variable of interest. Individual controls include dummies for race (white, black, and Hispanic), a dummy for marital status, age, and age squared. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table 5: **Effects by Marital Status: CPS Sample**

	Married	Unmarried
LHS×ln(MW)	-0.0075 (0.0045)	-0.0461*** (0.0087)
LHS	0.0380*** (0.0084)	0.1838*** (0.0138)
ln(MW)	0.0002 (0.0021)	0.0102 (0.0080)
N	1,214,924	630,767
Year FEs	Y	Y
State FEs	Y	Y
Indiv. Controls	N	Y

Notes: The table presents the results by marital status. Column 1 presents for the married and Column 2 for unmarried. The interaction term between an indicator for individuals without a high school degree and the log of state-level minimum wage $LHS \times \ln(MW)$ is the variable of interest. Individual controls include dummies for race (white, black, and Hispanic), a dummy for marital status, age, and age squared. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table 6: **Effects on SSI Benefit Payment: Aggregate Sample**

	(1)	(2)
ln(MW)	-0.1660*** (0.0485)	-0.1686*** (0.0484)
N	61,750	61,750
County FEs	Y	Y
Cross-border pair FEs	Y	Y
Unemp. rate	N	Y

Notes: The results are estimated using Equation (2). Both the minimum wage and the unemployment rate are measured in year $t - 1$. Column 2 adds the county-level unemployment rate as a control variable. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table 7: **Pre-trend Analysis: Aggregate Sample**

	(1)	(2)
$\Delta \ln(\text{MW}_{t+3})$	-0.0013 (0.0593)	-0.0006 (0.0590)
$\Delta \ln(\text{MW}_{t+2})$	-0.0587 (0.0599)	-0.0574 (0.0595)
$\Delta \ln(\text{MW}_{t+1})$	-0.0318 (0.0779)	-0.0311 (0.0777)
$\Delta \ln(\text{MW}_t)$	-0.1095 (0.0981)	-0.1090 (0.0978)
$\Delta \ln(\text{MW}_{t-1})$	-0.1697* (0.0968)	-0.1710* (0.0968)
$\Delta \ln(\text{MW}_{t-2})$	-0.2290** (0.1074)	-0.2281** (0.1064)
$\Delta \ln(\text{MW}_{t-3})$	-0.1918* (0.1113)	-0.1933* (0.1116)
$\ln(\text{MW}_{t-4})$	-0.3871*** (0.1200)	-0.3918*** (0.1207)
N	61,856	
County FEs	Y	Y
Cross-border pair FEs	Y	Y
Unemp. rate	N	Y

Notes: The results are estimated using Equation (3). The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

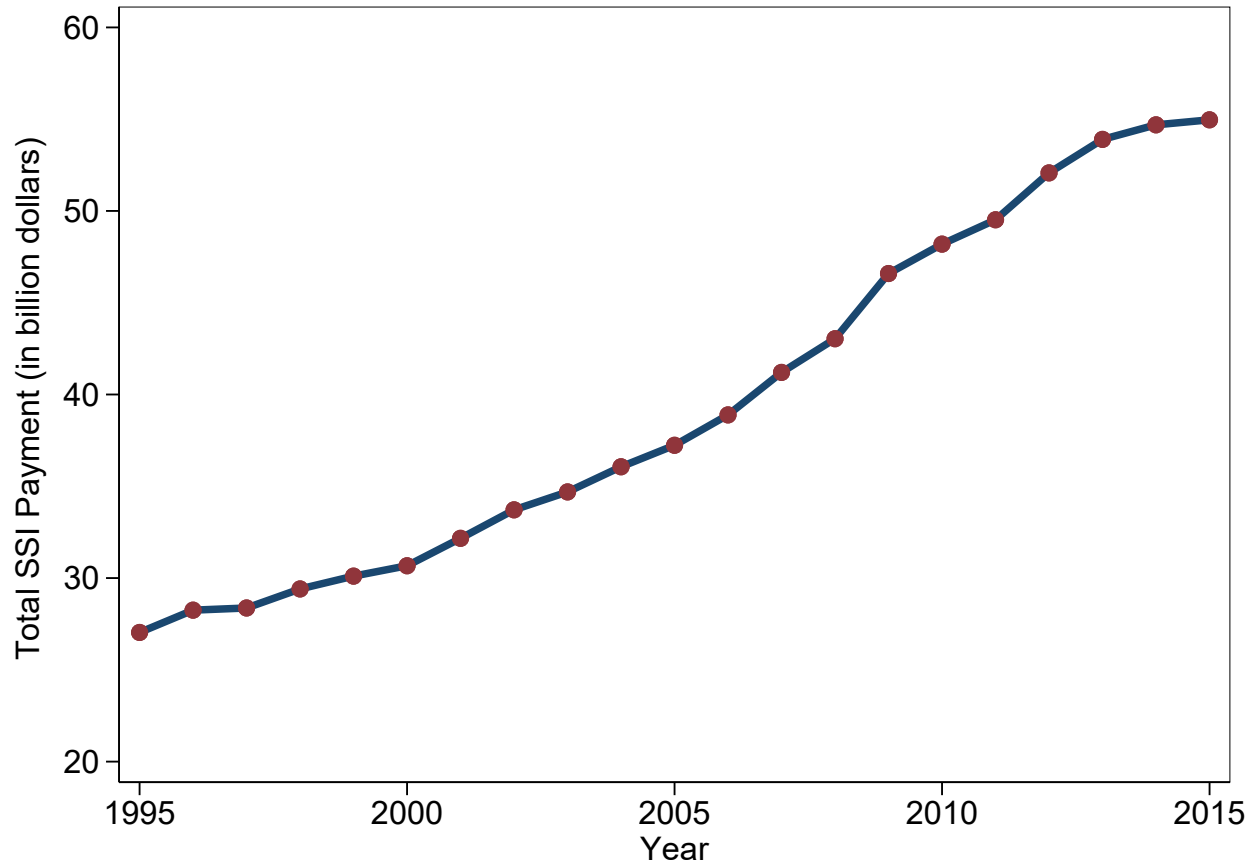
Table 8: **Effects on the Number of SSI Recipients**

	Ages 18-64	Under 18 years	65 years or older
<i>Panel A</i>			
ln(MW)	-0.1206*** (0.0363)	0.0418 (0.0569)	0.0289 (0.0554)
N	41,879	40,206	40,321
<i>Panel B</i>			
ln(MW)	-0.1720*** (0.0575)	0.0353 (0.1209)	0.0052 (0.0765)
N	24,693	24,466	24,543
County FEs	Y	Y	Y
Cross-border pair FEs	Y	Y	Y

Notes: The table presents the results that are estimated based on Equation (2). The minimum wage is measured in the year $t - 1$. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Appendix A

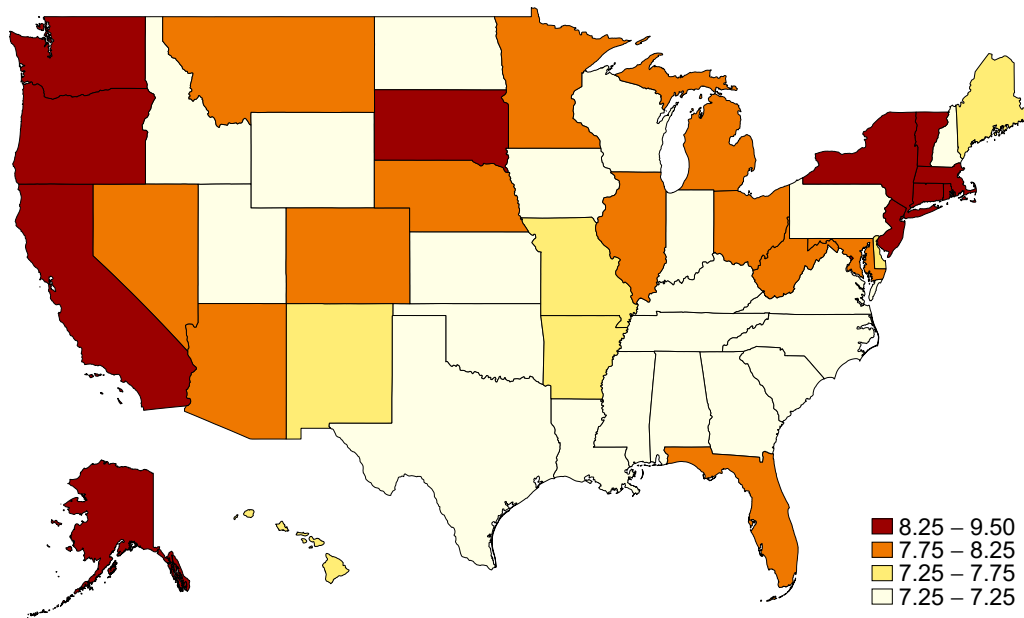
Figure A1: Growth in the Total SSI Payment



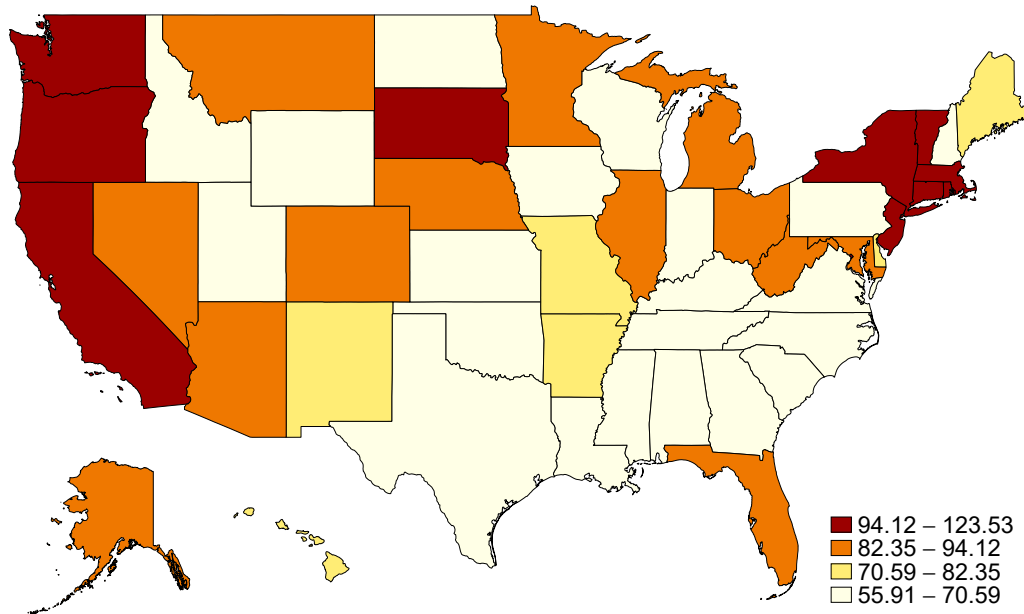
Notes: The figure displays trend in the total Supplemental Security Income (SSI) payment from 1995 to 2015.

Source: SSI Annual Statistical Report, 2015, Social Security Administration.

Figure A2: Variation in Minimum Wages



(a) Cross-State Variation in Minimum Wages in Dollars in 2015



(b) Minimum Wage Growth Rates from 1992 to 2015 by State

Notes: Panel A displays the variation in the minimum wage across states in 2015. Panel B presents the growth rates of the minimum wage by state between 1992 and 2015. The minimum wage represents the higher of the federal or state minimum wage.

Table A1: **Characteristics of SSI Recipients:
CPS Sample**

	Mean	SD
Employment	12.17%	32.70%
White	54.96%	49.75%
Black	26.59%	44.18%
Hispanic	13.77%	34.46%
Other	4.68%	21.12%
Female	57.01%	49.51%
Married	22.52%	41.77%
Less than High School	35.76%	47.93%
High School	39.57%	48.90%
Some College	19.27%	39.45%
College	5.39%	22.58%
Age	40.90	8.62

Notes: The table presents characteristics of SSI recipients using the Current Population Survey from 1992-2015.

Table A2: **Alternative Controls for State and Division Specific Confounders: CPS Sample**

	(1)	(2)	(3)
LHS×ln(MW)	-0.0194*** (0.0064)	-0.0196*** (0.0064)	-0.0194*** (0.0064)
LHS	0.0920*** (0.0100)	0.0923*** (0.0100)	0.0920*** (0.0100)
ln(MW)	0.0054* (0.0031)	0.0024 (0.0032)	0.0054* (0.0031)
N	1,845,691	1,845,691	1,845,691
Year FEs	Y	Y	Y
State FEs	Y	Y	Y
State Trends	Y	N	Y
Division-by-year FEs	N	Y	Y
Indiv. Controls	Y	Y	Y

Notes: The table presents the results derived by adding time-varying state-specific confounders to the model based on Equation (1). In particular, Column 1 adds state-specific linear trends. Column 2 adds division-by-year fixed effects. Column 3 adds both the linear trends and division-by-year fixed effects simultaneously. The interaction term between an indicator for individuals without a high school degree and the log of state-level minimum wage $LHS \times \ln(MW)$ is the variable of interest. Individual controls include dummies for race (white, black, and Hispanic), a dummy for marital status, age, and age squared. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table A3: Using MW in Levels and Real Term:
CPS Sample

	(1)	(2)
LHS×MW	-0.0036*** (0.0012)	
LHS	0.0792*** (0.0067)	0.0705*** (0.0048)
MW		
LHS×RealMW		-0.0013*** (0.0003)
RealMW		-0.0000 (0.0003)
N	1,845,691	1,845,691
Year FEs	Y	Y
State FEs	Y	Y
Indiv. Controls	Y	Y

Notes: Column 1 presents the results derived using the minimum wage in levels and Column 2 using the minimum wage in 1990 dollars. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table A4: Dropping after 2007: CPS Sample

	(1)	(2)
LHS×ln(MW)	-0.0256** (0.0110)	-0.0255** (0.0114)
LHS	0.0988*** (0.0162)	0.0988*** (0.0169)
ln(MW)	0.0084** (0.0036)	
N	1,178,421	1,178,421
Year FEs	Y	Y
State FEs	Y	Y
State-by-year FEs	N	Y
Indiv. Controls	Y	Y

Notes: Column 1 of the table presents the results based on Equation (1). Column 2 further adds state-by-year fixed effects. The sample is restricted to the pre-Great Recession period, 1992-2007. The interaction term between an indicator for having less than high school degree and the log of state-level minimum wage $LHS \times \ln(MW)$ is the variable of interest. Column 2 adds state-by-year fixed effects. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table A5: **Summary Statistics: Aggregate Sample**

	Mean	SD
<i>Panel A: All Counties</i>		
ln(SSI)	7.92	1.66
MW	5.72	1.24
Unemp. Rate	6.29	2.92
ln(Pop)	10.24	1.43
N	73,820	
<i>Panel B: Border-Pair Counties</i>		
ln(SSI)	8.02	1.68
MW	5.73	1.24
Unemp Rate	6.28	2.85
ln(Pop)	10.32	1.44
N	61,856	

Notes: The table presents summary statistics. Panel A includes all counties while Panel B presents the summary statistics for the border-pair counties. Note that a county appears in the border-pair sample as many times as many other counties it borders.

Table A6: Using MW in Levels: Aggregate Sample

	(1)	(2)
MW	-0.0282*** (0.0090)	-0.0288*** (0.0090)
N	61,750	61,750
County FEs	Y	Y
Cross-border pair FEs	Y	Y
Unemp. rate	N	Y

Notes: The results are estimated using Equation (2). Both the minimum wage and the unemployment rate are measured in year $t - 1$. I use the minimum wage in levels. Column 2 adds the county-level unemployment rate as a control variable. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table A7: **Dropping after 2007: Aggregate Sample**

	(1)	(2)
ln(MW)	-0.2217** (0.0954)	-0.2208** (0.0935)
N	41,164	41,164
County FEs	Y	Y
Cross-border pair FEs	Y	Y
Unemp. rate	N	Y

Notes: I use the sample period over 1992-2007. Both the minimum wage and the unemployment rate are measured in year $t - 1$. The results are estimated using Equation (2). Column 2 adds the county-level unemployment rate as a control variable. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table A8: Low versus High Income Countries: Aggregate Sample

	(1)	(2)	(3)	(4)
<i>Panel A</i>				
1[Low Income]*ln(MW)	-0.1322*** (0.0370)	-0.0768*** (0.0257)	-0.1075*** (0.0228)	-0.1011*** (0.0225)
1[Low Income]	0.2547*** (0.0639)	0.1641*** (0.0454)	0.2077*** (0.0425)	0.1934*** (0.0417)
ln(MW)	0.2517*** (0.0785)	-0.0862 (0.1090)	-0.0245 (0.0617)	-0.0260 (0.0626)
N	73,819	73,819	73,819	73,819
<i>Panel B</i>				
1[Income _{Q1}]*ln(MW)	-0.2097*** (0.0565)	-0.1292*** (0.0408)	-0.1789*** (0.0359)	-0.1688*** (0.0362)
1[Income _{Q2}]*ln(MW)	-0.0369 (0.0433)	-0.0065 (0.0379)	-0.0621* (0.0319)	-0.0569* (0.0310)
1[Income _{Q3}]*ln(MW)	0.0115 (0.0354)	0.0210 (0.0324)	-0.0175 (0.0242)	-0.0145 (0.0241)
1[Income _{Q1}]	0.4256*** (0.0980)	0.3003*** (0.0718)	0.3679*** (0.0687)	0.3429*** (0.0683)
1[Income _{Q2}]	0.1310* (0.0739)	0.0834 (0.0666)	0.1630*** (0.0599)	0.1491** (0.0579)
1[Income _{Q3}]	0.0267 (0.0588)	0.0100 (0.0543)	0.0666 (0.0434)	0.0588 (0.0430)
ln(MW)	0.2255*** (0.0829)	-0.0990 (0.1136)	-0.0168 (0.0635)	-0.0197 (0.0639)
N	73,819	73,819	73,819	73,819
County FEs	Y	Y	Y	Y
Year FEs	Y	N	N	N
Division-by-year FEs	N	Y	Y	Y
State-specific linear trends	N	N	Y	Y
Unemp. rate	N	N	N	Y

Notes: Panel A presents the results derived using Equation (4). Both the minimum wage and the unemployment rate are measured in year $t - 1$. Panel B presents the results that are estimated by dividing counties into quartiles based on their per-capita income and compare the outcome in counties in the first-, second-, and third-income quartiles relative to those in the top-income quartile. The first column uses county and year fixed effects, the second column adds division-by-year fixed effects, the third column further adds state-specific linear trends, and the fourth column adds county-level unemployment rates. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Table A9: Low versus High Income Countries: Dropping after 2007

	(1)	(2)	(3)	(4)
<i>Panel A</i>				
1[Low Income]*ln(MW)	-0.1735*** (0.0604)	-0.1155*** (0.0427)	-0.1119*** (0.0275)	-0.0988*** (0.0281)
1[Low Income]	0.2800*** (0.0940)	0.1892*** (0.0670)	0.1810*** (0.0447)	0.1594*** (0.0452)
ln(MW)	0.3351*** (0.0983)	-0.1573 (0.1898)	-0.0836 (0.1692)	-0.0843 (0.1690)
N	49,201	49,201	49,201	49,200
<i>Panel B</i>				
1[Income _{Q₁]*ln(MW)}	-0.2512** (0.1061)	-0.1599** (0.0786)	-0.1697*** (0.0517)	-0.1486*** (0.0521)
1[Income _{Q₂]*ln(MW)}	-0.1247 (0.0776)	-0.0800 (0.0671)	-0.0884** (0.0403)	-0.0768* (0.0422)
1[Income _{Q₂]*ln(MW)}	-0.0230 (0.0718)	0.0054 (0.0654)	-0.0164 (0.0408)	-0.0098 (0.0416)
1[Income _{Q₁]}	0.4249** (0.1644)	0.2803** (0.1218)	0.2858*** (0.0844)	0.2503*** (0.0843)
1[Income _{Q₂]}	0.2198* (0.1212)	0.1490 (0.1053)	0.1547** (0.0664)	0.1350* (0.0691)
1[Income _{Q₃]}	0.0548 (0.1111)	0.0088 (0.1011)	0.0370 (0.0648)	0.0260 (0.0662)
ln(MW)	0.3317*** (0.1083)	-0.1616 (0.1811)	-0.0786 (0.1666)	-0.0820 (0.1661)
N	49,201	49,201	49,201	49,201
County FEs	Y	Y	Y	Y
Year FEs	Y	N	N	N
Division-by-year FEs	N	Y	Y	Y
State-specific linear trends	N	N	Y	Y
Unemp. rate	N	N	N	Y

Notes: Panel A presents the results derived using Equation (4). Both the minimum wage and the unemployment rate are measured in year $t - 1$. Panel B presents the results that are estimated by dividing counties into quartiles based on their per-capita income and compare the outcome in counties in the first-, second-, and third-income quartiles relative to those in the top-income quartile. I limit the sample to the pre-Great Recession Period, 1992-2007. The first column uses county and year fixed effects, the second column adds division-by-year fixed effects, the third column further adds state-specific linear trends, and the fourth column adds the county-level unemployment rate. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.

Appendix B

Table B1: **Effects on SSI Benefit Payment: Aggregate Sample**

	(1)	(2)
ln(MW)	-0.1681*** (0.0460)	-0.1714*** (0.0458)
N	61,750	61,750
County FEs	Y	Y
Cross-border pair FEs	Y	Y
Unemp. rate	N	Y

Notes: The table presents the results that are estimated based on Equation (2). Both the minimum wage and the unemployment rate are measured in year $t - 1$. I apply the weight, which is calculated as the inverse of the number of times that a county appears in border-pairs. Column 2 adds the county-level unemployment rate as a control variable. The standard errors are clustered at the state level. *** denotes significance at the one percent level, ** denotes at the five percent level, and * denotes at the ten percent level.