THE EFFECT OF MINIMUM WAGE ON CONSUMER BANKRUPTCY

Diego Legal

Eric Young

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Diego Legal and Eric R. Young*

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Abstract

We use cross-state differences in minimum wage levels (MW) and county-level consumer bankruptcy rates from 1991-2017 to estimate the effect of changes in minimum wages on consumer bankruptcy by exploiting policy discontinuities at state borders. We find that Chapter 7 bankruptcy rates are significantly lower in counties belonging to states with higher MW compared to neighboring counties in the lower MW state: a 10 percent increase in MW decreases the bankruptcy rate by around 4 percent. Before the 2005 Bankruptcy Reform, this effect was almost twice as large as for the entire sample.

JEL Classification Codes: J65, E24, E44, J22, J31, J64, J65

Keywords: Consumer bankruptcy, unsecured credit, minimum wage

*Legal: Central Bank of Paraguay, diegolegal85py@gmail.com. Young: University of Virginia and Federal Reserve Bank of Cleveland, ey2d@virginia.edu. The Bankard Fund of Political Economy is acknowledged for financial support. All errors are ours. Opinions in this paper are of the authors and do not represent the views of the Central Bank of Paraguay or the Federal Reserve Bank of Cleveland.

Introduction

Since January 2014, twenty-nine states plus the District of Columbia have chosen to set their minimum wage (MW) rates higher than the federal minimum wage rate of $7.25 per hour.[1] Moreover, 18 of these states have scheduled annual adjustments for their MW that, in many cases, are aimed at a long-run target of $15 per hour.[2] Most of the MW debate focuses on its labor market consequences, primarily employment and earnings.[3] However, an emerging literature is also focusing in its effects on consumer credit markets.[4] This literature has documented facts regarding the effect of MW on credit availability, liquidity, debt, credit card delinquency, and credit scores. However, the effect on consumer bankruptcy has been left unexplored. In this paper, we fill this gap by focusing on the effect of minimum wages on consumer bankruptcy. We use a border discontinuity design using cross-state differences in MW and county level consumer bankruptcy rates from 1991-2017 to estimate the effect of minimum wages on consumer bankruptcy. The key is that we exploit policy discontinuities across state borders, as minimum wages are set at the state level.[5]

Consumer bankruptcy in the US can be granted under Chapter 7, which implies the discharge of qualifying unsecured debt in exchange for filers' non-exempt assets, or Chapter 13, which implies a partial repayment plan along with some debt discharge. Arguably, MW policy is primarily aimed at improving labor market conditions for young- to middle-aged and low-earning workers, which are also the main characteristics of individuals filing for consumer bankruptcy. Moreover, bankruptcy filers have strong labor market attachment in the sense that the employment rate among bankruptcy filers is slightly above the population counterpart (Fisher [2019]). Using data from the Administrative Office of the U.S. Courts from 2007, we find that among filers reporting monthly gross regular wages, the 25^{th} and 50^{th} percentiles are $\$1,460$ and $\$1,995$ for Chapter 7 filers and $\$1,665$ and $\$2,600$, for Chapter

[1] See the "Minimum Wage Tracker" by the Economic Policy Institute (https://www.epi.org/minimum-wage-tracker/)

[2] See US Department of Labor (https://www.dol.gov/agencies/whd/minimum-wage/state) and the National Conference of State Legislature (https://www.ncsl.org/research/labor-and-employment/state-minimum-wage-chart.aspx)

[3] For instance, Neumark and Wascher [1992] and Card and Krueger [1994]. Totty [2017] provides a nice review of this literature.

[4] For example, Aaronson et al. [2012], Dettling and Hsu [2020], and Cooper et al. [2020]

[5] For other examples of this empirical approach, see Card and Krueger [1994], Dube et al. [2010],Dube et al. [2016], Hagedorn et al. [2019], Arslan et al. [2021].

13 filers. Hourly MW in the same year ranges from \$5.85 (federal) to \$9.15 (in California), which implies a monthly earning for full-time MW workers between $\$1,018$ and $\$1,592$.[6] These facts suggest that MW policies would be particularly relevant for the lower half of the earnings distribution of filers, and in particular, for Chapter 7 filers.[7] Thus, MW policy could potentially have important consequences for consumer bankruptcy.

We find that Chapter 7 bankruptcy rates are lower in counties belonging to states with higher minimum wages compared to a neighboring county in a lower minimum wage state. In addition, before the 2005 Bankruptcy Reform the effect of the minimum wage on bankruptcy was larger than after the reform. Our headline number is that a 10 percent increase in the minimum wage reduces Chapter 7 bankruptcy rate by around 0.011 percentage points, or equivalently, reduces this rate by roughly 4 percent (for an average bankruptcy rate of 0.28 percent in the population). To interpret this estimate as economically sizable, we can do a back-of-the-envelope calculation considering that the average amount of debt discharged under Chapter 7 is around $\$180,000$. Our estimate implies that a 10 percent increase in the minimum wage, say from \$8.0 to \$8.80 on average, implies a decline of roughly \$6 billion in debt discharged (which represents around 5% of the amount discharged).[8] In addition, there are non-pecuniary benefits associated with lower bankruptcy rates, since credit scores are often used to screen renters and job applicants, and perhaps lower deadweight losses due to unproductive court costs. We do not find a statistically significant effect of MW on Chapter 13 bankruptcy.

We consider a stylized two-period default model with minimum wages to provide the reader with some theoretical guidance about interpreting our results. In light of the theoretical model presented in Section 1.2 we are capturing a reduced form estimate of the total effect of MW changes, suggesting that the direct effect that operates through increased wealth could be dominating.

A common concern in this methodology is the spillovers associated with the fact that the policy change in a given state can affect neighboring states' outcomes. We perform

[6] We consider full time work as requiring 40 hours each week.

[7] The evidence for ripple effects of minimum wage increases on individuals earning more than the minimum wage (Autor et al. [2016], Dube [2019]) implies that MW policy affects households earning above the lower bound as well.

[8] The estimated amount of unsecured debt discharged under Chapter 7 consumer bankruptcy was obtained from the BAPCPA Reports 2007-2017.

several tests for spillovers of minimum wage changes on consumer bankruptcies and find that spillovers are not a concern for our results. We also consider that our results could still suffer from omitted variable bias and reflect trends in other policies or economic fundamentals that differ across states with more generous MW policies. If minimum wage policies are correlated with these other state trends, it would be impossible for us to identify the causal effect of the regulation. We consider a series of different specifications that include controlling for other state-level policies or adding additional state-level variables. We also consider specifications with census division-time fixed effects, state linear trends, and lags and leads. Our results survive all of these modifications. Finally, even though our preferred specification uses a border discontinuity design, we also test how sensitive our results are to the sample choice. We perform a similar exercise using a sample with all counties instead of just the bordering counties. Our estimates are very similar between the two samples, with the estimates from the sample with all counties being slightly larger.

Before the 2005 Bankruptcy Reform (BAPCPA), the effect of the minimum wage on Chapter 7 bankruptcy was larger than after the reform. As reported by Albanesi and Nosal [2018] and Gross et al. [2021], BAPCPA shifted households away from Chapter 7 and into delinquency, as it substantially increased the costs of filing; since this increased cost would fall primarily on low-income (minimum wage) households, it seems perverse that an increase in the minimum wage should have a smaller effect of bankruptcies after the reform.

1 Conceptual Framework

1.1 Related Literature

We contribute to the literature that documents the effect of MW on consumer credit by providing an empirical estimate of the effect of MW on consumer bankruptcy. Theoretically, there are many mechanisms on how MW could affect consumer bankruptcy, and their strength, in turn, depends on borrower characteristics and the institutional framework. For example, if dis-employment risk remains constant, higher MW implies higher income for MW-workers which could reduce bankruptcy risk at a given debt level. However, if higher MW also encourages debt accumulation or riskier behavior or increases dis-employment risk, bankruptcy risk could increase. Higher risk will make lenders reprice loans, which could

discourage borrowing. The literature has documented important facts regarding the effect of MW on credit availability, liquidity, debt, credit card delinquency, and credit scores that could help us guide our intuition in order to interpret our estimates.

Dettling and Hsu [2020] and Cooper et al. [2020] document more credit availability following increases in MW. Dettling and Hsu [2020] report an increase in credit card direct-mail offers for low-income households as well as an increase in credit lines through both existing and new cards. Cooper et al. [2020] also report higher success rates for credit applications following an increase in the minimum wage, particularly for young and subprime borrowers (who are more likely to be constrained). Furthermore, Cooper et al. [2020] also show that auto loans increase in response to an increase in MW, again with larger effects for subprime and young borrowers.[9] Finally, Cooper et al. [2020] show that debt for the average individual barely changes, but debt levels for subprime individuals decrease when the minimum wage rises.

From the results above, it is unclear what would be the implied effect of MW on bankruptcy. First, lower debt levels for subprime borrowers could translate into lower bankruptcies. However, since average debt levels do not change by much, higher debt levels by some groups could lead to higher bankruptcy risk; given that this group should pose lower risk than the subprime borrowers, it seems plausible to argue that the overall bankruptcy rate would decline.

Second, since we do not observe asset levels, it is impossible to determine how net worth changes with MW. However, since 88% of bankruptcy filers have negative net worth (Athreya et al. [2018]), and certain classes of assets are exempted from bankruptcy proceedings, the issue of unobserved assets does not seem critical. However, Zhu [2011] finds that household expenditures on durable consumption goods such as automobiles contributes significantly to personal bankruptcy filings.

Third, higher liquidity coming from increases in credit lines could help some borrowers deal with unforeseen contingencies, but it could also be used to pay for the legal fees to file for bankruptcy as reported by Gross et al. [2014] for the case of tax rebates. Our belief is that this mechanism is limited, given that fees can and are waived for hardship considerations.

[9]This result is consistent with prior work by Aaronson et al. [2012], who that find that the additional spending following an increase in MW comes primarily from a small number of households purchasing debt-financed new vehicles.

Lastly, Dettling and Hsu [2020] documents that credit card delinquency falls by 0.6 percentage points (about 5% at the mean) for workers living in Census blocks with a high fraction of workers having less-than-high school education. A lower delinquency rate for this group could translate into lower bankruptcy. As reported by Athreya et al. [2018] around 84.5% of delinquent borrowers make payments during the next quarter, 13% remain delinquent, and 2.5% file for bankruptcy. Hence, it is not obvious if MW would lead to fewer distressed borrowers filing for bankruptcy or just help those delinquent borrowers who would have become current anyway do so more quickly (which would also carry some benefits, of course). Also, Dettling and Hsu [2020] focus on workers with less-than-high school education, which is a relatively-small group even among filers: Fisher [2019] report that among bankruptcy filers, around 17% corresponds to filers with less than high school, 34% with high school, 35% with some college, and 14% with college or more. It is not clear whether this result holds across education groups.

But this group may be particularly important for our question. According to the Bureau of Labor Statistics, around 3% of those without a high school diploma earned the federal minimum wage or less, compared with 2% of those who had a high school diploma, 2% percent of those with some college or an associate degree, and about 1% percent of college graduates (https://www.bls.gov/opub/reports/minimum-wage/2019/).

1.2 A Two-Period Model of Bankruptcy and Minimum Wage

The goal of this section is to explain how minimum wages and default incentives interact, to give the reader some guidance about how to interpret our empirical results. A key result is that that, theoretically, raising minimum wage can either increase or decrease credit utilization and default. We use a standard equilibrium default model with competitive lending and incomplete markets against idiosyncratic risk. Households borrow by issuing bonds, which are purchased at a discount by a competitive market of intermediaries; households can default on their bond obligations at a constant utility cost. The economy lasts for two periods, 1 and 2. First-period income y_1 is known but second-period income, y_2, is stochastic with a distribution given by Π. We approximate minimum wage policies by assuming that if y_2 is above the minimum wage, w, the agent will be working and receive y_2; otherwise, she will be unemployed receiving an income transfer, f. The interest rate on risk-free debt, r is

exogenous and fixed and we do not model the taxes that fund the income transfer.

Given her income realization and the existing stock of debt, the household problem in the second period is deciding whether to repay or not her debt ($b < 0$). The optimal default decision, $d(b, y_2)$, solves

$$v_2(b, y_2) = \max_{d \in \{0,1\}} \{(1-d) \times u(y_2 + b) + d \times [u(y_2) - \lambda]\} \tag{1}$$

if the agent is working ($y_2 > w$). If unemployed, we substitute f for y_2. It is easy to show that the default set is an interval $(-\infty, b^*(y_2))$, since the payoff to solvency is decreasing in b while the payoff to default is constant.[10]

The particular trade-off of MW increases is that, on the one hand, increases expected income conditional on remaining employed, but on the other hand, increases the probability of becoming unemployed; that is, we should expect to see less default among the employed but more unemployed, so that default could rise or fall as we move w around.

In the first period, agents decide how much to borrow in terms of a discount bond with its price given by $q(b)$, which is a function of the loan's face value b. The problem in the first period is

$$v_1(y_1) = \max_b \{u(y_1 - q(b)b) + \beta E_{y_2}[v_2(b, y_2)]\} \tag{2}$$

where β is the discount factor. The loan price schedule satisfies the break-even condition for intermediaries for each loan ex ante:

$$q(b) = \frac{1}{1+r} E_{y_2}[1 - d(b, y_2)]. \tag{3}$$

We can represent the optimal borrowing decision in the space (b, q). In this space, we plot the loan-price schedule that results in zero expected profit for the intermediaries (and, if the law of large numbers holds and there are no aggregate shocks, also generates zero realized profits).

Figure 1 shows the price schedules for three different levels of MW. In order to describe these functions, let us consider the initial equilibrium at the point A. The price schedule decreases as debt sizes become large (b more negative). For low debt levels, the utility cost λ

[10] This result holds more generally; see Chatterjee et al. [2007]. We break indifference by assuming the household does not default.

outweighs any benefit from debt relief, making it optimal for borrowers to repay their debts with certainty. So, the price schedule is flat for low debt levels, reflecting only the risk-free rate. Next, since for income realizations below MW agents become unemployed, this fact introduces a discontinuous fall in the price schedule. We have then a second flat portion that reflects debt levels for which would be optimal to default if unemployed. Beyond this second flat portion, the price schedule continuously decreases as higher debt levels imply defaulting in more income states.

We also plot indifference curves, i.e., the combinations of (b, q) that achieve a given level of utility; to keep the graphs simple, we plot only the indifference curve for the optimal choice. This indifference curve touches the price schedule at the optimal debt level and otherwise lies everywhere above it. To understand the shape of these curves, consider what happens if the agent borrows beyond the point A. To keep utility constant, q has to fall to offset the increase in resources available for consumption from the additional borrowing, so the indifference curve passing through A is monotone-decreasing over the range we plot (the indifference curves are not invariant to the other aspects of the economy, in particular w). Note also that this household is "constrained"; at point A, the indifference curve is not tangent to the price function, because increasing the amount of debt would add an additional discrete income level to the default set.

Another case is represented at the equilibrium in the point C, where the household is issuing risk-free and is not locally constrained. Since additional borrowing has no effect on default costs, q must rise to reduce the value of current consumption to maintain indifference. Once the household enters the region of positive default-risk, the indifference curve reverts to the previous shape.[11]

Conditional on remaining employed, an increase in w increases expected income. However, it also increases the unemployment risk. Since unemployment is a low-income state, a higher unemployment risk translates into a higher default risk. In turn, higher default risk implies lower q. In the numerical example in Figure 1, we have that the household decides to increase the face value of her loan to compensate for the fall in q after an increase in w, moving from point A to B. In this case, default risk increases.

[11]For sufficiently high debt, where the household defaults with probability 1 in the next period, the indifference curves also slope upward. Obviously this region is not relevant and therefore is not presented in the figure.

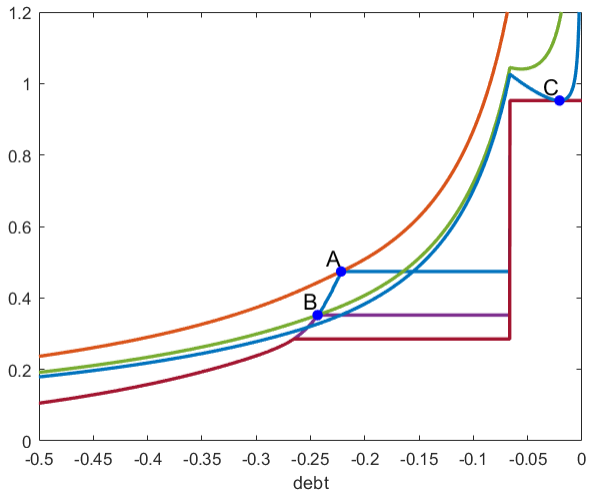

Figure 1: Examples in which minimum wage increases can either increase or decrease borrowing and default.

A further increase in w that moves the equilibrium from B to C is also depicted in Figure 1. In this case, an additional increase in w makes borrowing expensive enough due to the higher default risk that the agent decides to reduce her borrowing to risk-free levels. Thus, increases in the minimum wage can also reduce default risk.

We can also look at the Laffer curve for debt (figure 2), i.e., a curve that relates the amount of resources $q(b) * (-b)$ that a household receives by issuing a discount bond with face value $-b$. The highest point of the Laffer curve can be interpreted as a credit limit – no household would ever willingly borrow beyond this point, since it would reduce the amount of resources delivered today and raise the expected cost of default tomorrow. We mention this point because the model does not have a unique notion of a credit limit, but some results in the literature (e.g., Dettling and Hsu [2020] and Cooper et al. [2020]) relate credit limits to minimum wages and we find this notion most helpful in this regard.[12]

Figure 2 shows that the increase in w that moves the equilibrium from point A to B implies a rising credit limit; the agent can borrow more, but due to rising interest rates

[12] An alternative notion of the credit limit is the lowest debt level at which $q = 0$. Obviously, no household would borrow more than that amount as well, but our preferred notion is more strict since it is easy to show that the Laffer curve is increasing at $b' = 0$.

will receive less additional consumption today. Increasing w again, moving the economy to point C, again increases the credit limit but substantially reduces *credit utilization* as rates become quite high. Thus, this example shows that raising the minimum wage (i) increases credit limits but (ii) can either increase or decrease credit utilization and default.

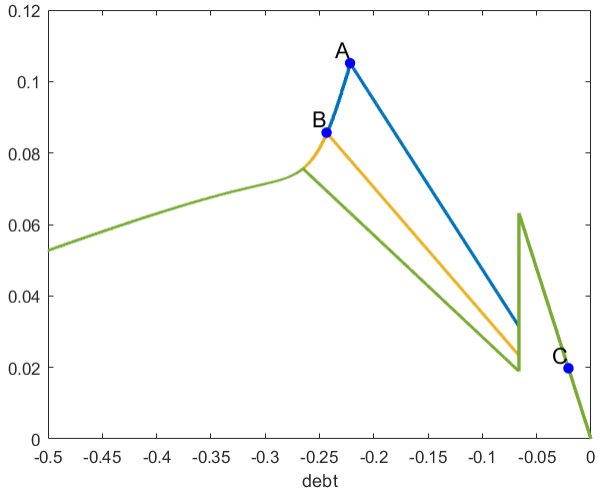

Figure 2: Laffer curve.

In the example above, increasing the minimum wage increases expected income conditional on being employed, but it also increases dis-employment risk, which is a low-income state. In the numerical exercise of Figure 1, expected income falls with the increases in the MW, meaning that the dis-employment effect dominates. Since part of the literature on minimum wages argues that dis-employment effects are negligible, Figure 3 considers the case in which there is no dis-employment effect after increasing the MW. The point A in Figure 3 is the optimal decision when there is no MW available. An implementation of MW without dis-employment effect is done by giving the MW to all workers with income levels below the MW. This situation will increase expected income and is represented in the point B. In this case, the MW reduces borrowing, and agents borrow as much as they can at risk-free (default risk is reduced to zero).

The example in Figure 3 shows how (a sufficiently high) MW compensates income risk to make borrower reduce their debt to the point of borrowing at the risk-free rate. When

only income risk is considered, a further increase in the MW allows agents to borrow more without increasing their default risk (point C). This example focuses on the role of MW in limiting the income risks component of default risk, reducing default rates.

This model, while simple, illustrates the theoretically ambiguous relationship between minimum changes and borrowing and default. The final effect of minimum wage changes depends not only on the strength of the mechanisms considered in this stylized example but also on other potential mechanisms, as discussed in the related literature.

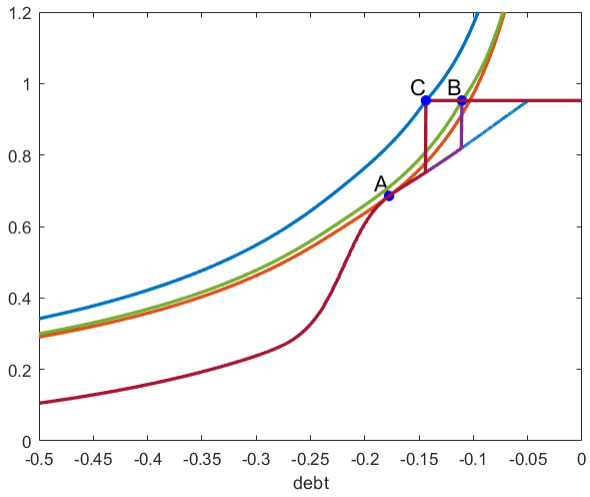

Figure 3: Case in which minimum wage increases do not have dis-employment effect.

1.3 Institutional Background

Minimum wage laws started at the state level, with Massachusetts as the first state to enact a law in 1912. The federal minimum wage was created by the Fair Labor Standards Act of 1938 during the administration of Franklin D. Roosevelt. Since then, federal and states minimum wages have been revised periodically, with many states adopting MW levels above the federal level.

The last revision of the federal minimum wage was in 2009 when it was set to $7.25 per hour. By May 2021, thirty states plus the District of Columbia have chosen to set their MW

rates higher than the federal rate. For those states without minimum wage or minimum wage below the federal level, the federal limit applies. In eighteen states and DC, the MW is automatically adjusted each year for increases in prices.[13] Moreover, eighteen states with MW above the federal have scheduled annual adjustments that aim at a long-run target of $15 per hour in many cases.[14]

Consumer bankruptcy is a legal procedure through which borrowers can formally default on their qualifying unsecured debts. Unsecured debt refers to any debt that is *not* backed by an asset used as collateral; important examples are credit cards, personal loans, payday loans, installment loans, lines of credit, and unpaid utility bills. Some debts, such as student loans, alimony, and most tax debts, cannot generally be discharged.

In the US, consumer bankruptcies are almost entirely filed under either Chapter 7 or Chapter 13 of the US Bankruptcy Code. Chapter 7, also called a "fresh start", represents around 70 percent of all consumer bankruptcies. Chapter 7 implies the full discharge of qualifying unsecured debt –shielding debtors' current and future earnings from any debt collection action– in exchange for filers' non-exempt assets. However, it is rare for a filer to have any such assets.[15] In contrast, Chapter 13 is a reorganization of debt. Debtors keep their assets and pay back a fraction of their debts through a repayment plan, with a typical length of 5 years. The final amount paid back to lenders will depend on the debtor's income, expenses, and type of debt. At any point, the debtor has the option to refile under Chapter 7. However, households can only file under Chapter 13 once every nine months, and Chapter 7 only once every 8 years.

The Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA) was the last major change to the US Bankruptcy Code. BAPCPA introduced many changes to increased the barriers for individuals to file for bankruptcy. For example, means-testing for Chapter 7, credit counseling requirement at the expense of the debtor, and more complicated paperwork requirements that resulted in higher court and legal fees (a 50 percent increase from $921 to $1,377 (U.S.GAO [2008])).

[13] See the "Minimum Wage Tracker" by the Economic Policy Institute (https://www.epi.org/minimum-wage-tracker/)

[14] See US Department of Labor (https://www.dol.gov/agencies/whd/minimum-wage/state) and the National Conference of State Legislature (https://www.ncsl.org/research/labor-and-employment/state-minimum-wage-chart.aspx)

[15] Livshits et al. [2007] report that only 5 percent of Chapter 7 cases yield assets that could be liquidated to repay creditors.

2 Empirical Analysis

2.1 Data Sources

The data on annual county-level Chapter 7 bankruptcy rates comes from US Courts records; our sample covers the period 1991-2017. We updated the data provided by Keys [2018]. Data on minimum wages comes from Dube et al. [2016], which we update using the historical tables available at the US Department of Labor website.[16] The list of bordering counties is provided in Dube et al. [2010].

The data for state-level UI comes from different issues of the "Significant Provisions of State UI Laws" of the US Department of Labor. These publications contain records on the maximum number of weeks and the maximum weekly benefit amount (WBA) that is available under the regular UI program.[17] We follow Hsu et al. [2018] by defining UI generosity in a given state as the maximum amount of benefits available during an unemployment spell (i.e., the maximum number of weeks times maximum weekly benefit amount). These reports are available twice a year, in January and July. Since the data on bankruptcy is available at an annual frequency, we use the average to compute the UI values for a given year.

Data on state-level homestead exemption levels comes from Pattison [2018]. The county unemployment rate comes from the Local Area Unemployment Statistics (LAUS) from the Bureau of Labor Statistics. County-level income comes from the Bureau of Economic Analysis (BEA) website.

County Statistics The total number of bordering counties used each year ranges from $1,099$ to $1,117$, which represents around 36 percent of the total number of counties in the mainland US and contains almost one-third of the population.[18]

One concern with the bordering-counties specification is that this sample may not contain the same information as the all-counties sample, which could happen if there are significant and systematic differences between bordering and interior counties. Table 1 shows some statistics from both samples. Both samples are quite similar in terms of the variables of

[16] Available at https://www.dol.gov/agencies/whd/state/minimum-wage/history
[17] Available at https://oui.doleta.gov/unemploy/statelaws.asp
[18] Over the sample some counties disappeared and new ones were formed.

Table 1: County Statistics

	All counties				
	Mean	Std. Dev.	25th perc.	Median	75th perc.
Chap. 7 BK rate (%)	0.24, 0.28*	0.16	0.12	0.20	0.32
Min. Wage (per hour)	5.86	1.35	4.88	5.15	7.25
Max. UI Benefits	8,685	2,992	6,500	8,112	10,530
Unemp. Rate (%)	6.24	2.88	4.20	5.64	7.66
Income	3,353,919	12,952,007	273,022	645,628	1,799,394
	Bordering counties				
Chap. 7 BK rate (%)	0.24, 0.28*	0.16	0.12	0.21	0.32
Min. Wage (per hour)	5.86	1.36	4.88	5.15	7.25
Max. UI Benefits	8,725	3,120	6,422	8,203	10,647
Unemp. Rate (%)	6.21	2.86	4.16	5.63	7.68
Income	3,154,821	11,500,000	256,170	627,258	1,741,193

*First value of mean is unweighted, the second is the population weighted mean. The data on annual county-level Chapter 7 bankruptcy rates comes from US Courts records and represents an update of the data from Keys [2018]. Minimum wage data comes from Dube et al. [2016], which we update using the historical tables available at the US Department of Labor website. The data for state-level UI comes from different issues of the "Significant Provisions of State UI Laws" of the US Department of Labor. Data on state-level homestead exemption levels comes from Pattison [2018]. The county unemployment rate comes from the Local Area Unemployment Statistics (LAUS) from the Bureau of Labor Statistics. County-level income comes from the Bureau of Economic Analysis (BEA) website.

interest, which mitigates the potential concern about the information cost of reducing the number of counties.

2.2 Identification Strategy

Comparing states can be misleading since they may be quite different in terms of observable and unobservable characteristics, both in levels and in growth rates. State/county fixed effects control for this heterogeneity as long as it is constant over time. However, since MW is determined at the state level, changes in underlying state conditions can influence both MW changes as well as bankruptcy decisions. A regression using state-levels (or all counties within states) would erroneously attribute changes in bankruptcy to changes in MW because it fails to control for these underlying changes.

To control for changes in underlying state-level conditions that may drive both MW changes and bankruptcy, we examine the difference in MW generosity between neighboring counties that belong to different states with different levels of MW. We refer to such counties as county-pairs (see for example Dube et al. [2010], Hagedorn et al. [2019], and Arslan et al.

[2021]). The basic idea is that changes in underlying conditions do not stop at the border and therefore state-level shocks affect neighboring counties symmetrically. Also, bordering counties are similar in terms of geography, climate, labor market conditions, infrastructure, etc., so it seems plausible that unobserved heterogeneity between contiguous counties would be highly correlated over time. The discontinuity of MW policy at the border can be then exploited by using a difference-in-difference (DID) type regression to identify if differences in MW across county-pairs are associated with differences in bankruptcy rates.

Contiguous border counties represent good control groups if there are significant differences in treatment intensity within cross-state county-pairs. Figure 5 shows that, for the period in consideration, the minimum wage differentials range from 200 to 1600, and the average minimum wage difference between pairs ranges from 4 percent to 18 percent.

As a benchmark specification, we estimate the following DID regression:

$$BK_{cpt} = \alpha + \eta \log(MW_{s(c)t}) + \phi_c + \tau_{pt} + X_{ct} + \varepsilon_{cpt} \tag{4}$$

Here BK_{cpt} represents bankruptcy rate (either Chapter 7 or Chapter 13) in county c belonging to pair p at time t. $\log\left(MW_{s(c)t}\right)$ is the natural logarithm of the real hourly minimum wage.[19] The term ϕ_c represents a county fixed effect that controls for observable and unobservable characteristics that are constant over time. The variable τ_{pt} is a pair-specific time fixed effect that controls for changes in state-level underlying conditions, which is the key element in our identifying assumption.[20] To control for time-varying differences that are observed, X_{ct} includes county-level unemployment rate and income as well as other relevant state policies such as state home exception and Unemployment Insurance generosity.[21] Controlling for these policies addresses potential simultaneous treatment effect problems.

Standard errors are two-way clustered at the state level and the border segment.[22] Our

[19] All the results are robust to using the nominal wage instead of the real wage. While it may seem odd to consider using a nominal wage, this constancy implies that we do not need to worry about the appropriate choice of price level.

[20] More specifically, the comparison is between bordering counties at a given point in time in which county-level variables were demeaned by their average (and controlling for other observables in X_{ct}).

[21] When an individual files for bankruptcy, the state median income of a family of the same size is used both to determine eligibility for Chapter 7 and the length of the Chapter 13 plan. We use average state income as a proxy for median income, and the results presented here are robust to adding this control as well.

[22] A border segment is defined as the set of all counties on both sides of a border between two states.

Table 2: The effect of Minimum Wage on Consumer Bankruptcy (1991-2017)

	Chapter 7 bankruptcy rate			Chapter 13 bankruptcy rate		
	1991-2017	1991-2004	2007-2017	1991-2017	1991-2004	2007-2017
$\log(MW_{it})$	**-0.115**	**-0.255**	-0.045	-0.001	0.002	0.006
	(0.039)	(0.082)	(0.029)	(0.026)	(0.045)	(0.015)
Covariates (X_{ct})	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y
Pair-specific time FE	Y	Y	Y	Y	Y	Y
N. Obs.	60,794	31,780	24,528	60,794	31,780	24,528

Standard errors are in parenthesis. Bolded coefficients are significant at the 1 percent level and italicized coefficients are significant at the 5 percent level. Standard errors are two-way clustered at the state level and at the border segment. X_{ct} includes county-level unemployment rate and income as well as other relevant state policies such as state home exception and Unemployment Insurance generosity.

argument for clustering this way relies on two points. First, the MW is constant across counties within a state. Second, each county is repeated as many times as it can be paired with a neighboring county in the other state. As explained in Dube et al. [2010], the presence of a single county in more than one pair induces a mechanical correlation across county-pairs and potentially across the entire border segment. Also, all standard errors are corrected for heteroskedasticity.

The identifying assumption for this local specification is that within-pair differences in minimum wages are uncorrelated with differences in the residual bankruptcy rate in either county (conditional on counties characteristics).

2.3 Results

Table 2 shows a 10 percent increase in the minimum wage reduces Chapter 7 bankruptcy rate by around 0.011 percentage points, or equivalently, reduces this rate by roughly 4 percent (for an average bankruptcy rate of 0.28 percent in the population). We do a back-of-the-envelope calculation to interpret this estimate considering that the average amount of debt discharged under Chapter 7 is around $\$180,000$. Our estimate implies that a 10 percent increase in the minimum wage, say from \$8.0 to \$8.80 on average, implies a decline of roughly \$6 billion in

debt discharged.[23] For the case of Chapter 13 bankruptcy, we find no statistically significant effect of minimum wages. In light of the theoretical model presented in Section 1.2 we are capturing a reduced form estimate of the total effect of MW changes, suggesting that the direct effect that operates through increased wealth could be dominating.[24]

One potential problem with our estimates is that the period in consideration contains a major bankruptcy reform in 2005 (BAPCPA). Among other changes, BAPCPA raised the cost of filing for Chapter 7 and imposed means-testing on income. With this change in mind, Table 2 shows the results restricted to the sub-period 1991-2004. The main result is that before BAPCPA, the effect of minimum wages on Chapter 7 is twice as large as the overall sample: a 10 percent increase in minimum wages was associated with a roughly 8 percent decrease in the bankruptcy rate (for an average bankruptcy rate of 0.31 percent during that period).

Analyzing the effect of minimum wages on bankruptcy after 2005 poses additional challenges due to the Great Recession, characterized by a significant rise in long-term unemployment and a shift in the nature of household default from bankruptcy to delinquency (Athreya et al. [2015]). Table 2 also reports the result for the sub-period 2007-2017. For this period, the effect of minimum wages on Chapter 7 bankruptcy rate is smaller but imprecisely estimated.

One explanation is that the increased filing cost from BAPCPA reduced the insurance component of the bankruptcy legislation, particularly for relatively low-income borrowers (Albanesi and Nosal [2018], Gross et al. [2021]).[25]

[23] The estimated amount of unsecured debt discharged under Chapter 7 consumer bankruptcy was obtained from the BAPCPA Reports 2007-2017.

[24] We understand that the county-level aggregation can pose some challenges to this interpretation in the sense of being a good proxy for individual risk, in fact, unemployment is not statistically significant in our regressions.

[25] Albanesi and Nosal [2018] documents that BAPCPA also shifted households away from Chapter 7 in general and towards delinquency (informal default), confirming the simulation results from Athreya et al. [2015].

3 Robustness Analysis

3.1 Spillovers

A common concern in this methodology involves spillovers: a policy change in one given state can affect neighboring states' outcomes. For example, workers at the state borders could choose to search more intensively for jobs in the neighboring state that raised the MW, or firms in the state with lower MW could try to match compensation in order to better retain workers, and perhaps other effects; given the number of different effects it is unclear which direction we should expect the spillovers to work. Dube et al. [2010] showed that the spillover effects of MW on employment and average earnings for the relevant workers are statistically insignificant (that is, the different effects cancel each other out). In this section, we confirm that spillover effects are not an issue for our analysis. First, we perform the same exercise conducted by Dube et al. [2010], in which we consider outcomes in county-pairs relative to outcomes in the interior of the state (which are less likely to be affected by such spillovers). In particular, we estimate the following regression:

$$(BK_{cpt} - \bar{BK}_{st}) = \alpha + \eta \log(MW_{s(c)t}) + \phi_c + \tau_{pt} + (X_{ct} - \bar{X}_{ct}) + \varepsilon_{cpt}. \tag{5}$$

Here, $\bar{BK}_{st}$ is the average bankruptcy rate in the interior counties for state s at time t and serves as a control for possible spillover effects.[26] Under this specification, η measures the effect of a change in the MW on one side of the border on the outcome relative to the state interior compared to the relative outcome on the other side of the border.

Table 4 in the appendix shows the result of testing for spillover effects under the specification in equation 5. Column (1) replicates the benchmark result from Table 2 and Column (2) show the estimates for equation 5. The estimate for η in Column (2) is not statistically significant, which implies that there is no evidence for spillover effects.

Another way to test for spillovers is to divide the sample according to some geographic criteria. For example, as Figure 8 indicates, counties in the western part of the country tend to be larger, more irregular in shape, and have longer distance between bordering county centroids. Table 3 shows the regression result for the whole country, for the subregions (West vs. East), and for bordering counties with centroid distances of more and less than

[26] $\bar{X}_{ct}$ is similarly defined for the other (county-level) control variables.

75 kilometers (as in Dube et al. [2016]).

We expect that the commuting cost associated with working in a neighboring county to be larger for western states than eastern states. That is, the spillover effect should be lower for states in the western part of the US. As we can see, the effect of spillover tends to have an attenuating bias since the coefficient for the western counties is more negative (a similar result is found for county pairs with centroid distances of more than 75 kilometers).

3.2 Time-varying Heterogeneity

Minimum wages are of course not randomly assigned across states. One concern may be that our results could suffer from omitted variable bias and reflect trends in other policies or economic fundamentals that differ across states with more generous MW policies. If minimum wage correlates with other state trends, it is impossible to disentangle the causal effect of the regulation from these underlying trends. Table 5 in the appendix contains five additional specifications to check how sensitive our estimates are in our benchmark specification in equation 4.

One potential concern with our identification strategy is the possibility that MW covaries with other state-level policies, so our estimates would be contaminated by the effects of other related policies. For this reason, our benchmark specification controls for UI and Bankruptcy Exemption policies. However, our results do not rely on those controls as column (2) in Table 5 shows that our estimate is very similar, maybe slightly less precise but still statistically significant at 5%, without those controls.

Another potential concern is that the spatial correlation of MW policies might lead the implementation of higher MW to be correlated with general changes in the state economic environment. In column (3), we include additional state-level controls such as state unemployment rates, income, and median income. These additional state-level controls do not affect our estimates and are not statistically significant, further supporting our assumption that any state-level shock affects county pairs symmetrically.[27] Also, we examine the robustness of our results of the addition state-linear trends and census division-time fixed effect (following Allegretto et al. [2017], Dettling and Hsu [2020], for example). Column (4) considers state linear trends. Our results are robust to the inclusion of such trends, which also

[27] We report p-values for these additional state-level variables in Table 5.

speaks well about our difference-in-difference assumptions of parallel trends. In column (5), we substitute our pair-time fixed effect with census division-time fixed effect, and in column (6), we consider time fixed effect instead. Our results are virtually the same, maybe slightly imprecise, but still significant at the 5% significance level.

3.3 Lags and Leads

As an additional way to validate our difference-in-difference assumption of parallel trends, we follow Dettling and Hsu [2020] and include a one-year lead in MW. By including a lead, we can capture any preexisting trends in bankruptcy rates in states that would implement higher MW one year later (reflecting natural lags in the political process and preaanouncement effects). In particular, column (1) of Table 6 reports the benchmark specification with two lags and one lead. Column (2) considers up to four lags and two leads. Lead coefficients are never statistically significant, which gives further support to the parallel trends assumption. Perhaps surprising is that lag coefficients are not significant either, which suggests that the reductions in bankruptcy materialize in the year of the MW change.

3.4 Sample Choice

As discussed earlier, bordering counties are a better control group than randomly-selected pairs. However, naturally they represent a smaller sample. We run our regression equation 4 on all counties, substituting the pair-time fixed effect with a time fixed effect and adding state linear trends. Table 7 in the appendix compares our estimates for Chapter 7 bankruptcy rates between the these two samples for the whole sample period and the periods before and after BAPCPA. The estimates are very similar between the two samples, with the estimates from the sample with all counties being slightly large.[28] We interpret these results as further validating our design.

3.5 Large Metropolitan Areas

Our assumption implies that the border counties do not unduly influence the political process determining the minimum wage in a state. As noted, these countries only represent around

[28]Not reported, but the estimates for Chapter 13 remain insignificant using all counties.

1/3 of the total population, but for some states, this assumption might be problematic as some large cities might have disproportionate political influence. To address this potential concern, we redo our exercise excluding bordering counties with large cities such as New York City, Philadelphia, Kansas City, St. Louis, and Charlotte (NC). Table 8 shows that our results are virtually the same once we exclude bordering counties near large cities.

4 Conclusion

Labor income is the main source of income for most households, which makes labor market risk the primary source of income risk. Minimum wage policy is aimed at improving labor market conditions for young- to middle-aged or low-earning workers, which also characterize the majority of individuals filing for bankruptcy. In this paper, we argue that the potential consequences of MW changes on financially distressed households should be part of the policy debate. We find that Chapter 7 bankruptcy rates are lower in counties belonging to states with higher minimum wages compared to neighboring counties with lower minimum wages. We also find that before the 2005 Bankruptcy Reform the effect of minimum wage on reducing bankruptcy was larger than after the reform.

We consider a stylized two-period default model with minimum wage that we believe is helpful in providing the reader with some theoretical guidance about how to interpret our results. As shown in Derenoncourt et al. [2021], gains in wages may accrue even to those workers not subject to the minimum wage (in their case, a voluntary minimum wage imposed by Amazon), and there is evidence of "ripple effects" on higher-wage workers (see Harris and Kearney [2014]). Since workers are now earning weakly higher wages, standard models would suggest bankruptcy rates should fall as households have higher wealth. However, it is also possible that minimum wage hikes increase unemployment and/or unemployment risk (we do not wish to wade into this contentious literature at all, so we will leave it at that), which would be expected to increase bankruptcy rates. We believe that we are identifying the direct effect that operates through increased wealth (see Section 1.2).

The obvious next step is to develop a quantitative model capable of exploring the connections between labor market policies and credit market policies[29] Positive welfare effects

[29]In Legal and Young [2020] we explore the connection between unemployment insurance and Chapter 7 bankruptcy.

from bankruptcy options are hard to find in models with competitive labor markets, as the inter-temporal distortion in consumption caused by borrowing limits overwhelms any potential gain from a better intra-temporal distribution of consumption tomorrow (Athreya et al. [2010]); effectively, bankruptcy shrinks the opportunity set of the household too much relative to the potential insurance gain. Search frictions and minimum wages may well change this calculus, especially if credit checks are part of the employee screening process (Corbae and Glover [2019]); by not filing for bankruptcy, an individual may improve their labor market options.

References

David Neumark and William Wascher. Employment effects of minimum and subminimum wages: Panel data on state minimum wage laws. *Industrial and Labor Relations Review*, 46(1):55–81, 1992. ISSN 00197939, 2162271X. URL http://www.jstor.org/stable/2524738.

David Card and Alan B Krueger. Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *American Economic Review*, 84(4):772–793, September 1994. URL https://ideas.repec.org/a/aea/aecrev/v84y1994i4p772-93.html.

Evan Totty. The effect of minimum wages on employment: A factor model approach. *Economic Inquiry*, 55(4):1712–1737, 2017. doi: https://doi.org/10.1111/ecin.12472. URL https://onlinelibrary.wiley.com/doi/abs/10.1111/ecin.12472.

Daniel Aaronson, Sumit Agarwal, and Eric French. The spending and debt response to minimum wage hikes. *American Economic Review*, 102(7):3111–39, December 2012. doi: 10.1257/aer.102.7.3111. URL https://www.aeaweb.org/articles?id=10.1257/aer.102.7.3111.

Lisa J Dettling and Joanne W Hsu. Minimum Wages and Consumer Credit: Effects on Access and Borrowing. *The Review of Financial Studies*, 34(5):2549–2579, 09 2020. ISSN 0893-9454. doi: 10.1093/rfs/hhaa091. URL https://doi.org/10.1093/rfs/hhaa091.

Daniel Cooper, María José Luengo-Prado, and Jonathan A. Parker. The Local Aggregate Effects of Minimum Wage Increases. *Journal of Money, Credit and Banking*, 52(1):5–35, February 2020. doi: 10.1111/jmcb.12684. URL https://ideas.repec.org/a/wly/jmoncb/v52y2020i1p5-35.html.

Arindrajit Dube, T. William Lester, and Michael Reich. Minimum wage effects across state borders: Estimates using contiguous counties. *The Review of Economics and Statistics*, 92(4):945–964, 2010. ISSN 00346535, 15309142. URL http://www.jstor.org/stable/40985804.

Arindrajit Dube, T. William Lester, and Michael Reich. Minimum Wage Shocks, Employment Flows, and Labor Market Frictions. *Journal of Labor Economics*, 34(3):663–704, 2016. doi: 10.1086/685449. URL https://doi.org/10.1086/685449.

Marcus Hagedorn, Fatih Karahan, Iourii Manovskii, and Kurt Mitman. Unemployment Benefits and Unemployment in the Great Recession: The Role of Macro Effects. *Mimeo*, 1 2019.

Yavuz Arslan, Ahmet Degerli, and Gazi Kabas. Unintended Consequences of Unemployment Insurance Benefits: The Role of Banks. *Finance and Economics Discussion Series 2021-027. Washington: Board of Governors of the FederalReserve System*, 2021. URL https://doi.org/10.17016/FEDS.2021.027.

Jonathan D. Fisher. Who Files for Personal Bankruptcy in the United States? *Journal of Consumer Affairs*, 53(4):2003–2026, 2019. doi: https://doi.org/10.1111/joca.12280. URL https://onlinelibrary.wiley.com/doi/abs/10.1111/joca.12280.

David H. Autor, Alan Manning, and Christopher L. Smith. The contribution of the minimum wage to us wage inequality over three decades: A reassessment. *American Economic Journal: Applied Economics*, 8(1):58–99, January 2016. doi: 10.1257/app.20140073. URL https://www.aeaweb.org/articles?id=10.1257/app.20140073.

Arindrajit Dube. Minimum wages and the distribution of family incomes. *American Economic Journal: Applied Economics*, 11(4):268–304, October 2019. doi: 10.1257/app.20170085. URL https://www.aeaweb.org/articles?id=10.1257/app.20170085.

Stefania Albanesi and Jaromir Nosal. Insolvency after the 2005 Bankruptcy Reform. *National Bureau of Economics Working Paper Nro. 24934*, 2018.

Tal Gross, Raymond Kluender, Feng Liu, Matthew J Notowidigdo, and Jialan Wang. The economic consequences of bankruptcy reform. *American Economic Review*, 2021. URL https://www.aeaweb.org/articles?id=10.1257/aer.20191311&&from=f.

Kartik Athreya, Juan Sánchez, Xuan S. Tam, and Eric R. Young. Bankruptcy and delinquency in a model of unsecured debt. *International Economic Review*, 2018.

Ning Zhu. Household consumption and personal bankruptcy. *The Journal of Legal Studies*, 40(1):1–37, 2011. ISSN 00472530, 15375366. URL http://www.jstor.org/stable/10.1086/649033.

Tal Gross, Matthew J. Notowidigdo, and Jialan Wang. Liquidity Constraints and Consumer Bankruptcy: Evidence from Tax Rebates. *The Review of Economics and Statistics*, 96(3):431–443, 7 2014. URL https://ideas.repec.org/a/tpr/restat/v96y2014i3p431-443.html.

Satyajit Chatterjee, Dean Corbae, Makoto Nakajima, and José-Víctor Ríos-Rull. A Quantitative Theory of Unsecured Consumer Credit with Risk of Default. *Econometrica*, 75 (6):1525–1589, 2007. ISSN 1468-0262. doi: 10.1111/j.1468-0262.2007.00806.x. URL http://dx.doi.org/10.1111/j.1468-0262.2007.00806.x.

Igor Livshits, James MacGee, and Michèle Tertilt. Consumer Bankruptcy: A Fresh Start. *American Economic Review*, 97(1):402–418, 3 2007. URL https://ideas.repec.org/a/aea/aecrev/v97y2007i1p402-418.html.

U.S.GAO. Bankruptcy Reform: Dollar Costs Associated with the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005. *Report to Congressional Requesters GAO-08-697. U.S. Government Accountability Office.*, 2008.

Benjamin J. Keys. The Credit Market Consequences of Job Displacement. *The Review of Economics and Statistics*, 100(3):405–415, 7 2018. URL https://ideas.repec.org/a/tpr/restat/v100y2018i3p405-415.html.

Joanne W. Hsu, David A. Matsa, and Brian T. Melzer. Unemployment Insurance as a Housing Market Stabilizer. *American Economic Review*, 108(1):49–81, 1 2018. doi: 10.1257/aer.20140989. URL http://www.aeaweb.org/articles?id=10.1257/aer.20140989.

Nathaniel Pattison. Consumption smoothing and debtor protections. *Mimeo*, 2018.

Kartik Athreya, Juan M. Sánchez, Xuan S. Tam, and Eric R. Young. Labor market upheaval, default regulations, and consumer debt. *Review of Economic Dynamics*, 18(1):32 – 52, 2015. ISSN 1094-2025. doi: http://doi.org/10.1016/j.red.2014.08.001. URL http://www.

sciencedirect.com/science/article/pii/S1094202514000453. Money, Credit, and Financial Frictions.

Sylvia Allegretto, Arindrajit Dube, Michael Reich, and Ben Zipperer. Credible research designs for minimum wage studies: A response to neumark, salas, and wascher. *ILR Review*, 70(3):559–592, 2017. doi: 10.1177/0019793917692788. URL https://doi.org/10.1177/0019793917692788.

Ellora Derenoncourt, Clemens Noelke, and David Weil. Spillover effects from voluntary employer minimum wages. Technical report, Princeton University, 2021. URL Availableathttps://sites.google.com/view/ellora-derenoncourt/research.

Benjamin H. Harris and Melissa S. Kearney. The "ripple effect" of a minimum wage increase on american workers. Technical report, Brookings Institute, 2014. URL https://www.brookings.edu/blog/up-front/2014/01/10/the-ripple-effect-of-a-minimum-wage-increase-on-american-workers/.

Diego Legal and Eric Young. Unemployment Insurance and the composition of personal bankruptcy. *Mimeo. University of Virginia.*, 2020.

Kartik Athreya, Xuan S. Tam, and Eric R. Young. Personal bankruptcy and the insurance of labor income risk. Manuscript., 2010.

Dean Corbae and Andrew Glover. Employer Credit Checks: Poverty Traps versus Matching Efficiency. Unpublished, 2019.

Neale Mahoney. Bankruptcy as implicit health insurance. *American Economic Review*, 105 (2):710–46, 2 2015. doi: 10.1257/aer.20131408. URL http://www.aeaweb.org/articles?id=10.1257/aer.20131408.

Henry S. Farber, Jesse Rothstein, and Robert G. Valletta. The effect of extended unemployment insurance benefits: Evidence from the 2012-2013 phase-out. *American Economic Review*, 105(5):171–76, 5 2015. doi: 10.1257/aer.p20151088. URL http://www.aeaweb.org/articles?id=10.1257/aer.p20151088.

Appendix

A Tables

Table 3: Test of Cross-Border Spillover Effect based on Geographic Distance (1991-2017)

	Chapter 7 bankruptcy rate				
Sample	U.S.	West	East	>75 km.	<75 km.
$\log(MW_{it})$	**-0.115**	*-0.216*	*-0.086*	**-0.267**	*-0.068*
	(0.039)	(0.078)	(0.037)	(0.093)	(0.034)
Covariates (X_{ct})	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y
Pair-specific time FE	Y	Y	Y	Y	Y
N. Obs.	60,794	18,190	37,368	10,844	49,950

Standard errors are in parenthesis. Bolded coefficients are significant at the 1 percent level and italicized coefficients are significant at the 5 percent level. Standard errors are two-way clustered at the state level and at the border segment. X_{ct} includes county-level unemployment rate and income as well as other relevant state policies such as state home exception and Unemployment Insurance generosity.

Table 4: Test of Cross-Border Spillover Effect from Minimum Wage Changes (1991-2017)

	Chapter 7 bankruptcy rate	
	BK_{cpt}	$(BK_{cpt} - \bar{BK}_{st})$
$\log(MW_{it})$	**-0.115**	-0.048
	(0.039)	(0.031)
Covariates	Y	Y
County FE	Y	Y
Pair-specific time FE	Y	Y

Standard errors are in parenthesis. Bolded coefficients are significant at the 1 percent level and italicized coefficients are significant at the 5 percent level. Standard errors are two-way clustered at the state level and at the border segment.

Table 5: Additional Robustness Analysis (1991-2017)

	Chapter 7 bankruptcy rate					
Specifications:	(1)	(2)	(3)	(4)	(5)	(6)
$\log(MW_{it})$	**-0.115**	*-0.102*	**-0.119**	**-0.121**	*-0.119*	*-0.113*
	(0.039)	(0.040)	(0.041)	(0.042)	(0.052)	(0.059)
State unemployment rate p-value			0.374			
State income p-value			0.346			
State median income p-value			0.561			
County-level controls as benchmark	Y	Y	Y	Y	Y	Y
Other State-level policies as benchmark	Y		Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y
Pair-specific time FE	Y	Y	Y	Y		
State linear trends				Y		
Census Division-time FE					Y	
Time FE						Y
N. Obs.	60,794	60,794	60,794	60,794	62,214	62,214

Standard errors are in parenthesis. Bolded coefficients are significant at the 1 percent level and italicized coefficients are significant at the 5 percent level. Standard errors are two-way clustered at the state level and at the border segment.

Table 6: Inclusion of Lags and Leads (1991-2017)

	Chapter 7 bankruptcy rate	
	(1)	(2)
$\log(MW_{it})$	*-0.073*	**-0.104**
	(0.030)	(0.034)
$\log(MW_{i,t-1})$	-0.026	-0.019
	(0.026)	(0.024)
$\log(MW_{i,t-2})$	-0.028	-0.023
	(0.043)	(0.027)
$\log(MW_{i,t-3})$		0.011
		(0.025)
$\log(MW_{i,t-4})$		-0.034
		(0.051)
$\log(MW_{i,t+1})$	-0.041	0.004
	(0.035)	(0.062)
$\log(MW_{i,t+2})$		-0.061
		(0.055)
Covariates X_{ct}	Y	Y
County FE	Y	Y
Pair-specific time FE	Y	Y
N. Obs.	53,956	47,124

Standard errors are in parenthesis. Bolded coefficients are significant at the 1 percent level and italicized coefficients are significant at the 5 percent level. Standard errors are two-way clustered at the state level and at the border segment. X_{ct} includes county-level unemployment rate and income as well as other relevant state policies such as state home exception and Unemployment Insurance generosity.

Table 7: The effect of Minimum Wage on Consumer Bankruptcy

Chapter 7 bankruptcy rate	Bordering counties			All counties		
	1991-2017	1991-2004	2007-2017	1991-2017	1991-2004	2007-2017
$\log(MW_{it})$	**-0.115**	**-0.255**	-0.045	-0.141*	*-0.264*	*-0.175*
	(0.039)	(0.082)	(0.029)	(0.074)	(0.112)	(0.070)
Covariates (X_{ct})	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y
Pair-specific time FE	Y	Y	Y			
State linear trends				Y	Y	Y
Time FE				Y	Y	Y
N. Obs.	60,794	31,780	24,528	82,064	42,866	33,142

Standard errors are in parenthesis. Bolded coefficients are significant at the 1 percent level, italicized coefficients are significant at the 5 percent, and "*" for coefficients significant at the 10 percent. For the bordering counties sample, standard errors are two-way clustered at the state level and at the border segment. For the sample with all counties, standard errors are clustered at the state level. X_{ct} includes county-level unemployment rate and income as well as other relevant state policies such as state home exception and Unemployment Insurance generosity.

Table 8: The effect of Minimum Wage on Consumer Bankruptcy

Chapter 7 bankruptcy rate	Bordering counties (benchmark)			Excluding large cities		
	1991-2017	1991-2004	2007-2017	1991-2017	1991-2004	2007-2017
$\log(MW_{it})$	**-0.115**	**-0.255**	-0.045	**-0.112**	**-0.258**	-0.045
	(0.039)	(0.084)	(0.029)	(0.039)	(0.112)	(0.030)
Covariates (X_{ct})	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y
Pair-specific time FE	Y	Y	Y	Y	Y	Y
N. Obs.	60,794	31,780	24,528	59,822	31,276	24,132

Standard errors are in parenthesis. Bolded coefficients are significant at the 1 percent level, italicized coefficients are significant at the 5 percent, and "*" for coefficients significant at the 10 percent. For the bordering counties sample, standard errors are two-way clustered at the state level and at the border segment. X_{ct} includes county-level unemployment rate and income as well as other relevant state policies such as state home exception and Unemployment Insurance generosity. Excluded bordering counties near New York city area are: New York County (NY), Bronx County (NY), Bergen County (NJ), Hudson County (NJ). Near Kansas City: Johnson County (KS), Wyandotte County (KS), Atchison County (KS), Miami County (KS), Leavenworth County (KS), Jackson County (MO), Platte County (MO), Cass County (MO), Clay County (MO). Near St. Louis: St. Louis City (MO), Madison County (IL), St. Clair County (IL). Near Philadelphia: Philadelphia County (PA), Burlington County (NJ), Camden County (NJ), Gloucester County (NJ). Near Charlotte: Mecklenburg County (NC), Lancaster County (SC), York County (SC). Washington DC is not in the main sample due to data limitation.

Table 9: Asset Exemptions (2007)

State	Homestead	Vehicle	Retirement	Other Financial Assets	Wildcard	Federal Available
Alabama	10,000	0	Unlimited	0	6,000	No
Alaska	67,500	7,500	Unlimited	3,500	0	No
Arizona	150,000	10,000	Unlimited	300	0	No
Arkansas	Unlimited	2,400	40,000	0	500	Yes
California, system 1	75,000	4,600	Unlimited	1,825	0	No
California, system 2	0	2,975	Unlimited	0	19,675	No
Colorado	90,000	6,000	Unlimited	0	0	No
Connecticut	150,000	3,000	Unlimited	0	2,000	Yes
Delaware	0	0	Unlimited	0	500	No
District of Columbia	Unlimited	5,150	Unlimited	0	17,850	Yes
Florida	Unlimited	2,000	Unlimited	0	2,000	No
Georgia	10,000	7,000	Unlimited	0	11,200	No
Hawaii	40,000	5,150	Unlimited	0	0	Yes
Idaho	50,000	6,000	Unlimited	0	1,600	No
Illinois	15,000	2,400	Unlimited	0	4,000	No
Indiana	0	0	Unlimited	0	20,000	No
Iowa	Unlimited	1,000	Unlimited	0	200	No
Kansas	Unlimited	40,000	Unlimited	0	0	No
Kentucky	10,000	5,000	Unlimited	0	2,000	No
Louisiana	25,000	0	Unlimited	0	0	No
Maine	70,000	10,000	Unlimited	0	12,800	No
Maryland	0	0	Unlimited	0	22,000	No
Massachusetts	1,000,000	1,400	Unlimited	1,250	0	Yes
Michigan	7,000	0	Unlimited	0	0	No
Minnesota	200,000	7,600	Unlimited	0	0	Yes
Mississippi	150,000	0	Unlimited	0	10,000	No
Missouri	15,000	6,000	Unlimited	0	1,250	No
Montana	200,000	5,000	Unlimited	0	0	No
Nebraska	12,500	0	Unlimited	0	0	No
Nevada	400,000	30,000	1,000,000	0	0	No
New Hampshire	200,000	8,000	Unlimited	0	8,000	Yes
New Jersey	0	0	Unlimited	0	2,000	Yes
New Mexico	60,000	8,000	Unlimited	0	1,000	Yes
New York	20,000	0	Unlimited	0	10,000	No
North Carolina	13,000	3,000	Unlimited	0	8,000	No
North Dakota	80,000	2,400	200,000	0	0	No
Ohio	10,000	2,000	Unlimited	800	800	No
Oklahoma	Unlimited	6,000	Unlimited	0	0	No
Oregon	33,000	3,400	15,000	15,000	800	No
Pennsylvania	0	0	Unlimited	0	600	Yes
Rhode Island	200,000	20,000	Unlimited	0	0	Yes
South Carolina	10,000	2,400	Unlimited	0	0	No
South Dakota	Unlimited	0	500,000	0	4,000	No
Tennessee	7,500	0	Unlimited	0	8,000	No
Texas	Unlimited	0	Unlimited	0	60,000	Yes
Utah	40,000	5,000	Unlimited	0	0	No
Vermont	150,000	5,000	Unlimited	1,400	8,400	Yes
Virginia	0	4,000	35,000	0	32,000	No
Washington	40,000	5,000	Unlimited	0	4,000	Yes
West Virginia	0	4,800	Unlimited	0	51,600	No
Wisconsin	40,000	0	Unlimited	2,000	10,000	Yes
Wyoming	20,000	4,800	Unlimited	0	0	No
Federal	18,500	5,900	Unlimited	0	20,450	n/a
Averages*	58,821	4,884	298,333	501	6,592	0

Source: Mahoney [2015]. Note: Contemporaneous exemptions for couples filing jointly from Elias (2007). Under contemporaneous law, California residents can choose between system 1 and 2, and residents can choose federal exemptions in states where federal exemptions are available. States that did not have homestead exemptions are assigned a value of zero.
*Excludes states with unlimited or n/a exemptions.

Table 10: Homestead exemptions 1989 and 2017

State	1989	2007	Years of change
Alabama	5000	15000	2015
Alaska	54000	72900	1992, 1999, 2004, 2008, 2012
Arizona	100000	150000	2004
Arkansas	999999	999999	
California	30000	75000	1990, 2010
Colorado	20000	60000	1991, 2000, 2007
Connecticut	0	75000	1993
Delaware	0	125000	2006, 2010, 2011, 2012
Florida	999999	999999	
Georgia	5000	21500	2001, 2012
Hawaii	20000	20000	
Idaho	30000	100000	1992, 2006
Illinois	7500	15000	2006
Indiana	7500	17600	2005, 2010
Iowa	999999	999999	
Kansas	999999	999999	
Kentucky	5000	5000	
Louisiana	15000	35000	2000, 2009
Maine	7500	47500	1991, 2001, 2003, 2008
Maryland	0	23675	2011, 2013, 2016
Massachusetts	100000	500000	2000, 2004
Michigan	3500	38225	2005, 2008, 2011, 2017
Minnesota	999999	390000	1993, 2007, 2010, 2012
Mississippi	30000	75000	1991
Missouri	8000	15000	2003
Montana	40000	250000	1997, 2001, 2007
Nebraska	10000	60000	1997, 2007
Nevada	95000	550000	1995, 2003, 2005, 2007
New Hampshire	5000	100000	1992, 2002, 2004
New Jersey	0	0	
New Mexico	20000	60000	1993, 2007
New York	10000	75000	2005, 2011
North Carolina	7500	35000	1991, 2006, 2009
North Dakota	80000	100000	2009
Ohio	5000	132900	2008, 2010, 2013
Oklahoma	999999	999999	
Oregon	15000	40000	1993, 2006, 2009
Pennsylvania	0	0	
Rhode Island	0	500000	1999, 2001, 2004, 2006, 2012
South Carolina	5000	59100	2006, 2010, 2012, 2016
South Dakota	999999	999999	
Tennessee	5000	5000	
Texas	999999	999999	
Utah	8000	30000	1997, 1999, 2013
Vermont	30000	125000	1997, 2009
Virginia	5000	5000	
Washington	30000	125000	1999, 2007
West Virginia	7500	25000	1996, 2002
Wisconsin	40000	75000	2009
Wyoming	10000	20000	2012

Source: Pattison [2018] constructed from Elias, Renauer and Leonard "How to File for Bankruptcy" (1989-2013) and state statutes.

Table 11: Annual Bankruptcy Rates by States 1991-2017

	Chapter 7				Chapter 13				
state	mean	sd	min	max	mean	sd	min	max	N. Obs.
Alabama	0.274	0.107	0.141	0.614	0.398	0.055	0.280	0.481	27
Alaska	0.133	0.065	0.043	0.309	0.016	0.004	0.009	0.025	27
Arizona	0.334	0.121	0.102	0.609	0.073	0.027	0.022	0.109	27
Arkansas	0.290	0.147	0.146	0.716	0.231	0.073	0.117	0.368	27
California	0.324	0.122	0.076	0.515	0.084	0.033	0.027	0.161	27
Colorado	0.323	0.158	0.166	0.849	0.060	0.017	0.036	0.102	27
Connecticut	0.229	0.078	0.101	0.382	0.039	0.009	0.025	0.060	27
DC	0.168	0.098	0.049	0.369	0.073	0.042	0.016	0.145	27
Delaware	0.190	0.062	0.077	0.348	0.095	0.034	0.041	0.173	27
Florida	0.277	0.101	0.087	0.494	0.092	0.036	0.035	0.150	27
Georgia	0.285	0.088	0.163	0.500	0.389	0.085	0.250	0.525	27
Hawaii	0.191	0.115	0.060	0.436	0.031	0.015	0.006	0.063	27
Idaho	0.353	0.153	0.157	0.738	0.070	0.030	0.024	0.117	27
Illinois	0.347	0.118	0.146	0.697	0.133	0.034	0.071	0.176	27
Indiana	0.457	0.182	0.224	1.042	0.126	0.046	0.050	0.203	27
Iowa	0.243	0.109	0.117	0.585	0.020	0.004	0.014	0.030	27
Kansas	0.289	0.133	0.126	0.692	0.094	0.018	0.057	0.123	27
Kentucky	0.379	0.140	0.196	0.812	0.104	0.024	0.060	0.141	27
Louisiana	0.207	0.121	0.080	0.545	0.206	0.046	0.096	0.257	27
Maine	0.204	0.099	0.074	0.461	0.026	0.008	0.016	0.042	27
Maryland	0.302	0.114	0.084	0.489	0.122	0.044	0.076	0.214	27
Massachusetts	0.198	0.073	0.076	0.366	0.045	0.013	0.029	0.083	27
Michigan	0.332	0.139	0.160	0.725	0.100	0.037	0.060	0.183	27
Minnesota	0.241	0.070	0.111	0.405	0.060	0.020	0.027	0.096	27
Mississippi	0.303	0.131	0.140	0.596	0.226	0.043	0.157	0.330	27
Missouri	0.314	0.126	0.170	0.743	0.122	0.026	0.076	0.178	27
Montana	0.242	0.114	0.101	0.565	0.038	0.016	0.017	0.077	27
Nebraska	0.249	0.097	0.135	0.554	0.076	0.025	0.035	0.117	27
Nevada	0.478	0.189	0.138	0.816	0.154	0.064	0.062	0.291	27
New Hampshire	0.241	0.084	0.095	0.387	0.038	0.018	0.018	0.081	27
New Jersey	0.260	0.078	0.091	0.426	0.111	0.037	0.066	0.172	27
New Mexico	0.255	0.113	0.109	0.567	0.039	0.028	0.013	0.117	27
New York	0.221	0.089	0.106	0.489	0.053	0.014	0.029	0.077	27
North Carolina	0.120	0.062	0.057	0.302	0.146	0.047	0.080	0.232	27
North Dakota	0.205	0.105	0.069	0.508	0.013	0.007	0.002	0.027	27
Ohio	0.371	0.169	0.191	0.984	0.110	0.031	0.070	0.181	27
Oklahoma	0.382	0.197	0.145	0.999	0.067	0.020	0.038	0.113	27
Oregon	0.356	0.149	0.157	0.764	0.086	0.026	0.048	0.127	27
Pennsylvania	0.194	0.095	0.095	0.485	0.085	0.029	0.048	0.147	27
Rhode Island	0.327	0.107	0.117	0.506	0.038	0.019	0.016	0.082	27
South Carolina	0.104	0.044	0.038	0.173	0.122	0.044	0.079	0.219	27
South Dakota	0.208	0.092	0.097	0.475	0.015	0.007	0.005	0.038	27
Tennessee	0.333	0.116	0.177	0.623	0.433	0.077	0.308	0.565	27
Texas	0.127	0.070	0.045	0.353	0.119	0.038	0.065	0.194	27
Utah	0.347	0.148	0.132	0.667	0.186	0.068	0.075	0.314	27
Vermont	0.169	0.079	0.067	0.363	0.026	0.014	0.003	0.055	27
Virginia	0.301	0.112	0.092	0.468	0.121	0.026	0.072	0.156	27
Washington	0.334	0.135	0.128	0.629	0.088	0.024	0.053	0.128	27
West Virginia	0.309	0.189	0.139	0.925	0.025	0.005	0.017	0.034	27
Wisconsin	0.288	0.102	0.148	0.595	0.067	0.026	0.023	0.104	27
Wyoming	0.268	0.132	0.104	0.590	0.026	0.009	0.013	0.042	27
Total	0.272	0.142	0.038	1.042	0.104	0.099	0.002	0.565	1377

Summary statistics for Consumer Bankruptcy by States constructed using bankruptcy filings data from the US Courts and population data from Census.

Table 12: Unemployment Insurance statistics 1991-2017

	Regular number of weeks				Maximum weekly benefit amount				
state	mean	sd	min	max	mean	sd	min	max	N. Obs.
Alabama	26	0	26	26	217.22	39.69	150	265	27
Alaska	26	0	26	26	352.67	65.90	284	442	27
Arizona	26	0	26	26	215.83	25.69	170	240	27
Arkansas	25.33	1.62	20	26	357.50	81.65	225	454	27
California	26	0	26	26	350.74	107.06	210	450	27
Colorado	26	0	26	26	400.65	107.90	234	570.5	27
Connecticut	26	0	26	26	512.48	118.54	320	691	27
DC	25.93	0.38	24	26	341.07	28.19	293	425	27
Delaware	26	0	26	26	309.72	31.01	225	330	27
Florida	23.85	4.47	12	26	266.67	15.50	225	275	27
Georgia	23.93	4.22	14	26	278.43	55.93	185	330	27
Hawaii	25.89	0.58	23	26	438.54	97.79	275	592	27
Idaho	25.74	1.29	21	28	311.30	58.30	210.5	410	27
Illinois	25.78	0.42	25	26	443.39	106.81	270	613	27
Indiana	26	0	26	26	314.41	85.82	166	390	27
Iowa	26	0	26	26	381.30	99.52	233	553.5	27
Kansas	24.81	3.00	16	26	358.41	85.77	226.5	474	27
Kentucky	26	0	26	26	338.63	80.28	204	431.5	27
Louisiana	26	0	26	26	233.70	33.10	181	284	27
Maine	26	0	26	26	439.41	112.62	288	621	27
Maryland	26	0	26	26	323.13	81.79	219	430	27
Massachusetts	28.90	1.71	26	30	762.70	218.40	423	1103	27
Michigan	24.69	2.51	20	26	333.17	33.94	276	362	27
Minnesota	26	0	26	26	470.02	135.37	262.5	683	27
Mississippi	26	0	26	26	204.81	26.93	155	235	27
Missouri	24.52	2.58	20	26	254.56	59.96	170	320	27
Montana	27.09	1.00	26	28	334.91	103.16	197	514	27
Nebraska	26	0	26	26	267.39	81.76	144.5	400	27
Nevada	26	0	26	26	324.17	74.52	206.5	432.5	27
New Hampshire	26	0	26	26	336.54	94.26	173.5	427	27
New Jersey	26	0	26	26	489.00	120.10	291	677	27
New Mexico	26	0	26	26	336.09	116.74	177	503	27
New York	26	0	26	26	371.48	52.44	270	427.5	27
North Carolina	24	4.62	12	26	379.22	83.37	245	522	27
North Dakota	26	0	26	26	365.52	136.19	202	631.5	27
Ohio	26	0	26	26	437.96	97.53	291	592.5	27
Oklahoma	26	0	26	26	328.50	89.76	204.5	510	27
Oregon	26	0	26	26	416.57	102.31	253	597	27
Pennsylvania	26	0	26	26	466.74	100.69	299	581	27
Rhode Island	26	0	26	26	556.48	129.36	345	707	27
South Carolina	24.56	2.55	20	26	274.44	51.70	180.5	326	27
South Dakota	26	0	26	26	256.89	72.24	147	385	27
Tennessee	26	0	26	26	256.39	45.32	165	325	27
Texas	26	0	26	26	342.24	82.84	224	493	27
Utah	26	0	26	26	369.35	96.52	221	524	27
Vermont	26	0	26	26	337.76	95.65	187	462	27
Virginia	26	0	26	26	302.44	73.56	198	378	27
Washington	27.33	1.92	26	30	483.48	123.68	257	697	27
West Virginia	26	0	26	26	357.87	60.87	257	424	27
Wisconsin	26	0	26	26	319.30	47.41	225	370	27
Wyoming	26	0	26	26	335.28	102.42	200	490	27
Total	25.85	1.58	12	30	357.97	131.32	144.5	1103	1377

Summary statistics for UI. Data comes from Farber et al. [2015] and US Department of Labor.

B Graphs

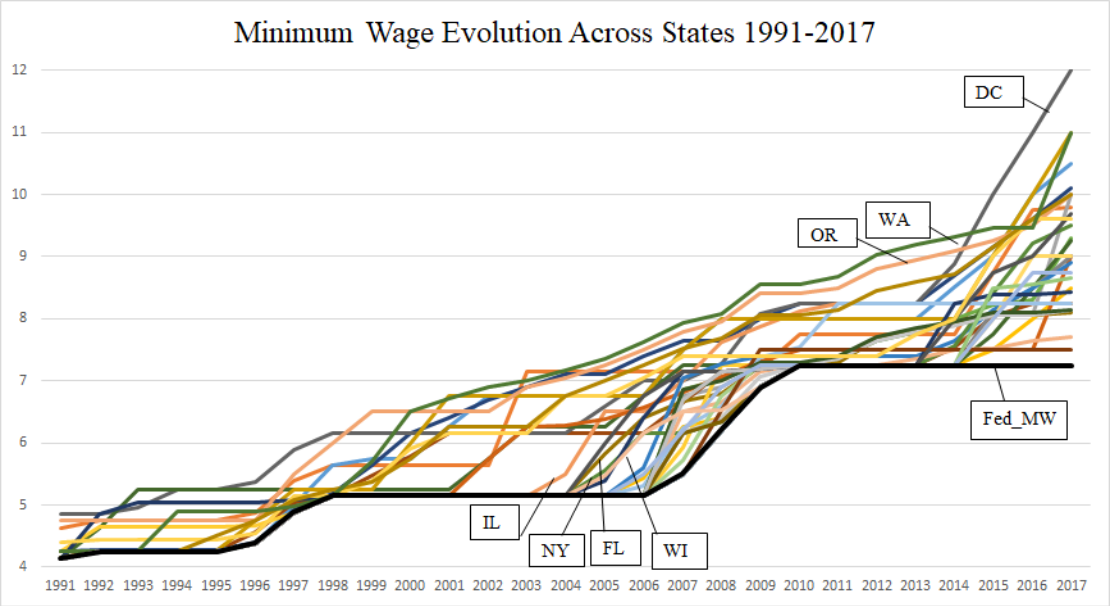

Figure 4: Nominal minimum wage evolution across states from 1991-2017. Data on minimum wages comes from Dube et al. [2016], which we update using the historical tables available at the US Department of Labor website.

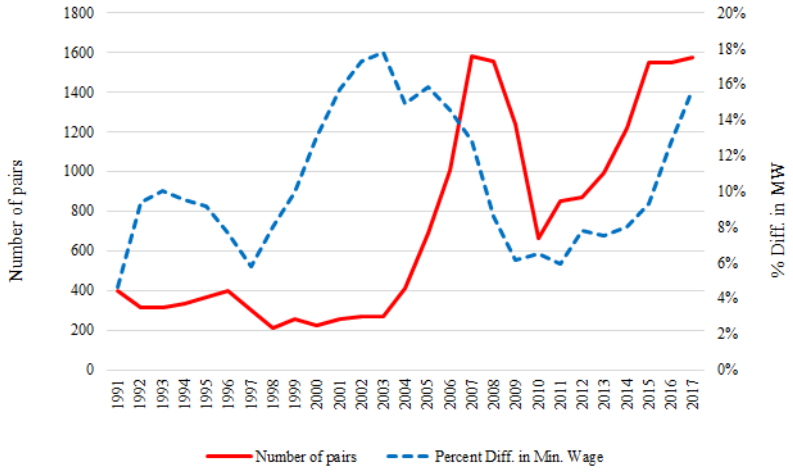

Figure 5: Number of county-pairs with difference in MW and average MW differentials from 1991-2017. The list of bordering counties is provided in Dube et al. [2010]. Data on minimum wages comes from Dube et al. [2016], which we update using the historical tables available at the US Department of Labor website.

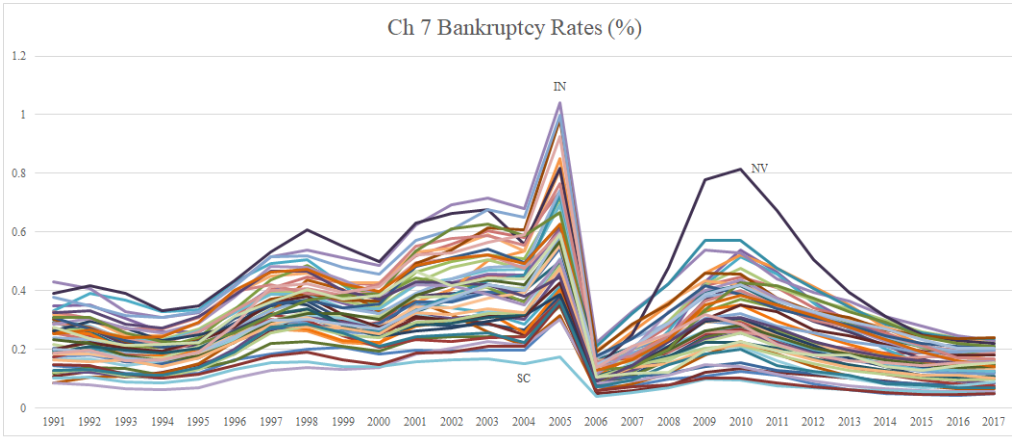

Figure 6: Average annual Chapter 7 consumer bankruptcy rate (in %) for each state from 1991-2017. Data on bankruptcy filings were obtained from the US Courts website and population data from Census.

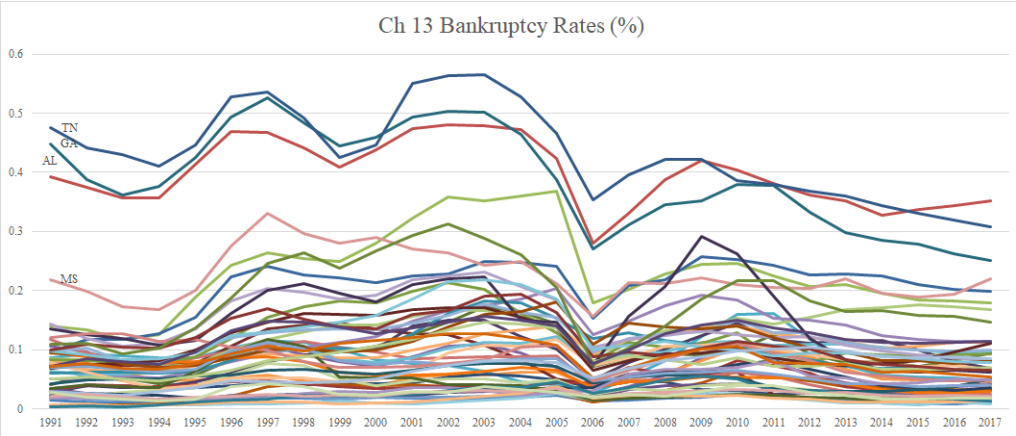

Figure 7: Average annual Chapter 13 consumer bankruptcy rate (in %) for each state from 1991-2017. Data on bankruptcy filings were obtained from the US Courts website and population data from Census.

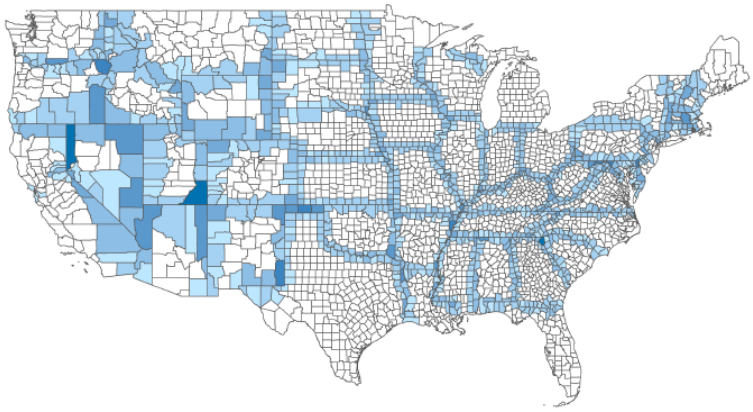

Figure 8: Longer distance among bordering-counties in the west half. Potentially lower spillovers. The list of bordering counties is provided in Dube et al. [2010].


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