

Personal Bankruptcy and the Accumulation of Shadow Debt*

Bronson Argyle[†] Benjamin Iverson[‡] Taylor Nadauld[§] Christopher Palmer[¶]

December 2021

Abstract

Before filing for bankruptcy, many households incur debt not reported to credit bureaus through the nonpayment of goods and services. Such “shadow debt” is an important liquidity source for distressed debtors; using new liability-level data, we estimate 44% of unsecured debt reported at bankruptcy is shadow debt. We use wage garnishment rules to isolate shocks to the benefits of bankruptcy filing and test for a particular reliance on shadow debt immediately before bankruptcy. We find that a \$100 decrease in monthly wage garnishing results in an increase in shadow debt of \$6,000 and an extra month delay in bankruptcy filing.

Keywords: personal bankruptcy, unsecured debt, shadow debt, wage garnishing

*We thank conference, seminar, and workshop participants at the AEA, AFA, Boston Federal Reserve, BYU, CFPB, City University of Hong Kong, Dartmouth, the FDIC Consumer Symposium, Harvard Business School, MIT, Michigan State University, PUC Chile, Texas A&M, the University of Rochester, and WEAI; our discussants Pat Akey, Arpit Gupta, Ryan Lewis, Feng Liu, Neale Mahoney, and Michelle White; and Emanuele Colonnelli, Carter Davis, Anthony DeFusco, Paul Goldsmith-Pinkham, Kyle Herkenhoff, Sasha Indarte, Ben Keys, Raymond Kluender, Sam Kruger, Brigitte Madrian, Gregor Matvos, Carlos Parra, Antoinette Schoar, Amit Seru, Felipe Severino, Adrien Verdelhan, and Jialan Wang for helpful comments. We appreciate the research assistance of Tammy Lee, Joseph Leung, and Richard Maxwell. We benefited tremendously from helpful conversations with David Sime, Clerk of the Utah Bankruptcy Court, and thank the Utah, Minnesota, Florida North and Florida South Bankruptcy Courts for data access. Palmer acknowledges funding from NSF CAREER Grant 1944138. This project received exempt status from MIT’s IRB.

[†]Brigham Young University; bsa@byu.edu

[‡]Brigham Young University; ben_iverson@byu.edu

[§]Brigham Young University; taylor.nadauld@byu.edu

[¶]Massachusetts Institute of Technology and NBER; cjpalm@mit.edu

1 Introduction

Over 10% of U.S. households have filed for bankruptcy at least once (Stavins, 2000; Keys, 2018), and an equivalent of \$832 per U.S. adult is discharged through personal bankruptcy each year, making bankruptcy one of the largest social insurance programs offered by the U.S. government.¹ In our data, average total debt at the time of filing is approximately \$240,000, including around \$95,000 in unsecured debt and \$110,000 in mortgage debt.² As we show below, the average bankruptcy petitioner waits almost two years after her first severe delinquency before filing for bankruptcy. Once severely delinquent, an individual’s credit access declines from lenders who can observe her credit report. In this paper, we document that informal borrowing from creditors who do not report to credit bureaus appears to play an important role in the dynamics of distressed debtors’ liabilities. Through a systematic comparison of liabilities listed on the credit registry with debt disclosed on bankruptcy filings, we estimate that roughly 44% of filers’ unsecured liabilities are not on credit reports at the time of filing for a total of \$40 billion of shadow debt discharged per year.³ Examples of such “shadow debt” include unpaid utilities, healthcare bills, unpaid rent, some payday loans, unpaid taxes, and unpaid business-related debt.⁴ Though distressed debtors likely face borrowing constraints in formal credit markets, shadow debt’s prevalence and our empirical results indicate that informal credit markets (where lenders are less likely to be informed) play a role in relieving credit constraints, simultaneously prolonging bankruptcy filings and increasing the debt discharged at filing.⁵

Figures 1 and 2 illustrate the central empirical facts of the paper. Figure 1 shows that distressed households’ formal borrowing—defined as total debt reported to credit bureaus—peaks around one year prior to filing and declines thereafter. The trend for revolving debt is similar and more pronounced, as shown in panel B of Figure 1. Meanwhile, panel C of Figure 1 shows that revolving credit limits fall substantially as individuals approach bankruptcy, consistent with distressed in-

¹US Courts (2019) estimates that U.S. households discharged \$2.03 trillion in debt from 2009-2018 (2.03 trillion/10 years/242.8 million adults in 2015 = \$832 per adult).

²Average mortgage debt is averaged over about half of bankruptcy filers that have no mortgage debt.

³As credit bureaus are designed to tabulate the debts that are reported to them, we interpret these results as evidence that the debt of distressed borrowers captured by credit bureaus is an incomplete picture of household liabilities rather than as commentary on the accuracy of credit-bureau data.

⁴Shadow debt is similar to the concept of overdue trade credit in the corporate sector. Trade credit makes up 22.5% of total liabilities for large corporations that enter bankruptcy (Ivashina, Iverson, and Smith, 2016).

⁵We use the term “informal creditor” to refer to shadow-debt lenders that do not report to credit bureaus.

dividuals being screened out of formal credit markets as they approach bankruptcy. In contrast, Figure 2 shows that while formal debt *decreases* leading into bankruptcy, outstanding shadow debt *increases* into bankruptcy. The credit report of the median borrower reports \$22,258 of unsecured debt six months prior to bankruptcy, compared to only \$16,881 at bankruptcy. In contrast, the bankruptcy filing of the median borrower implies \$31,291 of unsecured debt outstanding six months prior to filing, compared to \$47,902 at the time of filing.⁶ The increase in shadow debt leading up to bankruptcy suggests borrowers increasingly rely on informal debt markets in the period preceding bankruptcy.

Why does the existence of informal consumer credit markets matter? The scale of shadow debt as a share of total unsecured debt indicates that these informal credit markets are an important source of liquidity for distressed individuals. The ability to delay payment is beneficial for many consumers but has the cost that significant amounts of shadow debt are eventually discharged in bankruptcy. The information asymmetries about a given buyer’s financial distress inherent in such transactions likely lead to the inefficiencies that accompany any market with information frictions. While the bankruptcy system provides valuable protection and relief for distressed individuals (Dobbie and Song, 2015), in a competitive market, the costs of this debt discharge must be passed on to non-defaulting consumers in the form of higher prices for goods and services and a higher cost of credit (Gross et al., 2021).⁷

The overall magnitude of shadow debt can be estimated using nationally representative administrative data. The Administrative Office of the U.S. Courts (AOUSC) reports total secured and unsecured liabilities from consumer bankruptcies annually, and these figures can be compared to representative debt on the credit reports of bankruptcy filers as reported in Razeto and Romeo (2019). While aggregate amounts of reported *secured* debt are essentially identical from the two sources, we estimate that the average bankruptcy has \$36,500 of *unsecured* shadow debt at the time of filing, amounting to \$40.2 billion of discharged shadow debt annually.⁸

Although aggregate data establish the magnitude of shadow debt, we require detailed microdata

⁶See section 4.1 for a precise description of how we construct Figures 1 and 2.

⁷In contrast to corporations only paying an extra 23 basis points for unsecured credit relative to secured loans (Luck and Santos, 2021), the secured-unsecured spread in consumer credit is roughly an order of magnitude larger. For example, holding fixed borrower credit score, loan maturity and loan amount, the current spread on Bankrate.com between the interest rates on an unsecured personal loan and a secured auto loan is about 300 basis points.

⁸From 2007 to 2018, total unsecured debt reported on bankruptcy filings amounted to \$442 billion more than unsecured debt reported in credit reports (Razeto and Romeo, 2019), or \$40.2 billion per year.

on filer balance sheets to understand the dynamics of shadow debt prior to bankruptcy. Moreover, while the AOUSC and Razeto and Romeo (2019) data should be representative of the same population, as aggregate statistics they do not allow us to ensure that we have measured credit-bureau and bankruptcy petition debt for the same individuals. Our principal dataset is obtained by downloading the Schedules of Assets and Liabilities and the Statement of Financial Affairs for individual bankruptcy filers from the U.S. Court’s Public Access to Court Electronic Records (PACER) websites for the Minnesota, Utah, Florida Northern, and Florida Southern Bankruptcy Courts. Our data consist of borrower-level data from 606,120 personal bankruptcy filings with over 15 million individual debts across these bankruptcy districts between the years 2001-2018. These schedules provide line-by-line descriptions of a filer’s itemized real estate assets, personal assets, secured debts, unsecured priority debts, unsecured non-priority debts, monthly income, and monthly expenses.

After anonymizing, we supplement the bankruptcy data with credit-bureau data for a subset of the bankruptcy filings to paint the broadest possible picture of each filer’s credit profile. Insights from this merged dataset characterize the dynamics of distressed household balance sheets. Comparing liabilities listed on the credit bureau’s registry with debt disclosed on bankruptcy filings yields an individual-level measure of shadow debt. Disclosed debts are verified by a court-appointed trustee, and filers have every incentive to accurately disclose all of their debts at the time of filing for bankruptcy in order to receive the maximum possible relief from discharge. Accordingly, a comparison of borrower liabilities listed on bankruptcy schedules to those reported to credit bureaus gives an accurate measure of the debt that is missed by estimates of consumer leverage that depend solely on data from credit reports. On average, consumers have about \$41,000 of unsecured shadow debt at the time of bankruptcy in our individual-level data, a figure that is quite similar to that derived from administrative-level aggregates discussed above.

Though Figures 1 and 2 are suggestive, missing origination-date data prevent direct measures of the dynamics of shadow debt accumulation for many of the borrowers in our sample. Instead, we evaluate how inframarginal filers interact with informal debt markets by exploiting policy changes to wage garnishment that exogenously decrease the benefits of immediate bankruptcy filing for certain delinquent borrowers. Many borrowers file for bankruptcy after their wage garnishing becomes too onerous (Lefgren and McIntyre, 2009). Easing wage garnishment therefore nudges some borrowers to delay filing for bankruptcy and changes the dynamics of shadow debt accumulation for these

borrowers.

To identify exogenous shocks to wage garnishment, we use pre-scheduled federal minimum wage increases combined with the stipulations of Title III of the 1970 Consumer Credit Protection Act. Per the Act, debtors subject to wage garnishing are allowed to keep a minimum amount of wages for subsistence, set to be equivalent to at least 30 hours of federal minimum wage earnings a week, although states can set higher thresholds (see Carter, 2020, for details). Accordingly, federal minimum wage changes induce quasi-random changes in wage garnishing for lower-wage debtors who earn close to this subsistence threshold. Meanwhile, borrowers who are far above and below the threshold are unaffected by changes to the minimum wage. During our sample period, the federal minimum wage increased three times, on July 24 of 2007, 2008, and 2009, resulting in lower garnishment for certain debtors in our sample. Given the timing of the law changes and debtor incomes, minimum wage changes impact garnishment for about 5%-10% of debtors depending on the sample. Changes to the federal minimum wage allow for within-year comparisons of outcomes between otherwise similar debtors with identical incomes but different levels of wage garnishing. We find that when wage garnishment exogenously decreases by \$100, treated debtors accumulate nearly \$6,000 of additional shadow debt and delay filing for bankruptcy for an additional month. Meanwhile, we estimate that overall unsecured debt rises by \$4,000, suggesting a slight decrease in *non-shadow* unsecured debt. Similarly, we find no increase in secured debt for these borrowers who delay entering bankruptcy. Together, these results suggest that shadow debt markets play a fundamental role in providing liquidity for borrowers near bankruptcy. Further, increases in shadow debt just prior to bankruptcy are consistent with shadow debt lenders being uninformed about the borrower's credit condition, raising the possibility that information asymmetries help create inefficiencies in shadow debt markets. As such borrowers are screened out of formal debt markets where lenders are more informed, information asymmetries in shadow debt markets increase.

There are several possible threats to the identifying assumption behind our experiment. For example, our estimates of debt accumulation could be biased if households with latently higher debt are relatively more likely to file after wage garnishment decreases, especially given our sample's selection conditioning on having filed. Importantly, we find that our wage garnishing shocks do not have any distinguishable effect on the propensity to enter bankruptcy, the level of secured debt at the time of filing, or the observable attributes of filers. Credit bureau data further show that

the debt amounts of *non-filers* are not different before and after garnishment changes, indicating that changes to garnishment do not appear to induce an observably different type of borrower to file. The exogeneity condition could also be violated if minimum wage changes directly impact the amount of debt held by distressed individuals through an income effect. However, we find that our results continue to hold in Florida, where the state-level minimum wage was higher than the federal minimum wage and hence there was no direct income effect due to minimum wage changes. We discuss these and other possibilities in detail in section 5.3.

Because we cannot observe borrower intentions, our results do not conclusively show that shadow debt accumulation by delaying filers reflects purposeful moral hazard behavior; borrowers may be incurring additional debt just to subsist or in an effort to avoid bankruptcy. However, we note that from a creditor’s perspective, any additional debt that is discharged in bankruptcy is costly, and these costs are likely passed on to other borrowers in the form of higher borrowing costs and prices (Gross et al., 2021). In the case of shadow debt, this is likely reflected in higher prices of goods or services purchased on credit, including rent, medical services, and utilities. We conclude that even if filing delays and the associated additional debt accumulation are unintentional, such effects have significant scope to impose negative externalities on non-defaulting borrowers. Of course, this does not necessarily indicate that bankruptcy benefits are too generous, as other literature (reviewed below) shows that the benefits of bankruptcy are high. Rather, our work explores one potential channel of the associated externality by highlighting that seemingly small modifications to the benefits of filing for bankruptcy can elicit significant changes in average debt accumulation and filing timing behavior.

2 Related Literature

Our paper contributes to the vast literature on asymmetric information in consumer credit markets. Beginning with Akerlof (1970) and Stiglitz and Weiss (1981), the literature has argued that information asymmetries result in undersupplied credit overall and create the potential for an over-provision of credit to borrowers with negative private information. Though we do not evaluate general equilibrium welfare or pricing effects, our evidence is consistent with shadow debt markets over-supplying credit to borrowers who are highly likely to default, which in turn could lead to higher interest rates

and prices, and hence lower consumption and an overall underprovision of credit.

Much of the prior work on personal bankruptcy decision-making focuses on the determinants of bankruptcy filing at the extensive margin. Fay, Hurst, and White (2002) use observational data to argue that bankruptcy generosity does predict filing. Domowitz and Sartain (2003) take the level of indebtedness as given and argue that the bankruptcy code structure and the level of certain types of debt are important predictors of filing. More recently, Gross et al. (2014) and Indarte (2020) use quasi-experimental variation to demonstrate the importance of liquidity shocks to bankruptcy filing decisions. In contrast to these papers, we take the decision to ultimately file as given and instead focus on the intensive margin of the amount of debt that individuals have at bankruptcy and the timing of the filing decision. Regardless of the underlying bankruptcy motive, our findings on shadow debt demonstrate its prevalence, aggregate importance, and its role in distressed debtor financial management as bankruptcy approaches.

A few other papers study how the *level* of household debt changes in response to the bankruptcy system. For example, Gropp, Scholz, and White (1997) and Severino and Brown (2017) both estimate that increases in state-level asset exemption limits (the amount of assets exempt from seizure by bankruptcy creditors) lead to increases in credit demand and simultaneous increases in interest rates. Romeo and Sandler (2021) use individual level data and find very little reaction in credit demand or supply to changes in bankruptcy asset exemptions.⁹ Our paper complements these studies by focusing explicitly on highly delinquent consumers for whom bankruptcy is likely more salient. As a result, we find that these individuals are very sensitive to garnishment laws, resulting in increased credit demand and filing delays when garnishment is lax. Further, we highlight that this demand is manifest in shadow debt markets, where lenders are likely less informed about the borrower's financial condition.

Our work is primarily concerned with borrowers' debt decisions prior to filing, potentially imposing negative spillovers on non-defaulting consumers via higher costs of goods and services (Gross et al., 2021). While we note this as one particular cost of the bankruptcy system, a large literature studies other outcomes that are affected by bankruptcy, including access to credit, financial and

⁹See also recent theoretical work by Exler et al. (2020), which finds that over-optimistic consumers inefficiently borrow too much and file too late. Zhang et al. (2015) and Gan et al. (2021) model the joint endogeneity of debt and bankruptcy and also find a limited role for strategic debt accumulation to take advantage of the filing option.

labor market outcomes, entrepreneurship, and homeownership.¹⁰ More structural work also quantifies the optimality and welfare benefits of the current bankruptcy system (Livshits, MacGee, and Tertilt, 2007; Auclert et al., 2019; Dávila, 2019). To be able to weigh the real benefits of a more lenient bankruptcy system documented by these papers against the potential costs of increased debt discharged, our work establishes that such costs are likely to be important and identifies filing delays and shadow debt as key channels through which they operate.

3 Conceptual Framework

As a borrower’s financial condition worsens, risk-based underwriting should tighten a debtor’s credit constraints. Thus, we would expect seriously delinquent borrowers to essentially maintain or decrease debt amounts nearing bankruptcy when lenders are informed of the debtor’s financial condition, consistent with Figure 1.¹¹ However, our work shows that informal credit markets exist in which lenders are uninformed. The fact that the average (median) bankruptcy petitioner files for bankruptcy 22.3 (15.3) months after first being 90 days past due on a debt suggests that financially constrained borrowers are able to access some credit, at least informally. “Accidental creditors,” such as health-care providers, utility companies, and landlords do not always observe a borrower’s financial condition when deciding to provide goods and services. Among other obstacles, informal lenders often lack strong instruments and the institutional framework to screen a borrower’s credit quality, consistent with Figure 2 and our formal tests below.

A separate question that we do not test in this paper is *why* shadow debt lenders do not become informed. Intuitively, we expect this is for two reasons. First, if consumers place a relatively high value on the ability to purchase goods and services on credit, they may be willing to bear higher prices due to a small fraction of consumers who default. In turn, informal lenders may find this less costly than adapting transaction processes and paying credit bureaus to become informed. Second, many shadow debt lenders, such as hospitals, may benefit reputationally from providing services regardless of a consumer’s ability to pay. For these lenders, there is no real benefit of becoming informed as they will sell their services to all consumers regardless.

¹⁰See, for example, Fisher and Lyons (2010), Dobbie and Song (2015), Dobbie, Goldsmith-Pinkham, and Yang (2017), Parra (2018), and Dobbie, Goldsmith-Pinkham, Mahoney, and Song (2020).

¹¹One notable exception would be the possibility that fines and fees associated with delinquencies could be capitalized into outstanding debts (Di Maggio, Ma, and Williams, 2020)

Our empirical analysis focuses on establishing the existence of shadow debt and documenting how it responds to nudges to delay bankruptcy. We do not evaluate the consequences of increases in bankruptcy-filer indebtedness on demand, prices, quantities, the welfare of non-defaulting buyers (who know they will not declare bankruptcy and will thus pay full price), and overall economic efficiency. Conceptually, as more individuals discharge shadow debt in bankruptcy, equilibrium prices should rise due to the haircut that sellers take from defaulting buyers, consistent with empirical evidence in Gross et al. (2021). The higher prices paid by non-defaulting consumers would reduce welfare for non-defaulters and create an aggregate deadweight loss as some consumers with elastic demand would be priced out of the market by higher prices. Regardless of whether debtors intentionally or unintentionally increase debt before bankruptcy, equilibrium prices should rise (and welfare of non-defaulters fall) when defaulting borrowers increase debt levels prior to bankruptcy. Overall, our empirical results establish that delinquent borrowers increasingly turn to shadow debt as they approach bankruptcy, suggesting that this behavior could affect equilibrium prices and create negative externalities on non-defaulting consumers.

4 Data and Descriptive Evidence

This section overviews our data sources, data processing procedures, and summary statistics.¹²

Our main dataset consists of data processed from filings obtained from the U.S. Court’s Public Access to Court Electronic Records (PACER) website. We obtained academic fee waivers that allow us to download data from four bankruptcy court districts: the Northern District of Florida, the Southern District of Florida, the District of Minnesota, and the District of Utah.¹³ For each bankruptcy case in these districts, we search the court docket for the Schedules of Assets and Liabilities and the Statement of Financial Affairs. These documents are required filings for all bankruptcy petitioners and are typically filed either jointly with the bankruptcy petition or within the first week of the bankruptcy filing.

The Schedules of Assets and Liabilities and the Statement of Financial Affairs that constitute the basis of our data contain a rich set of petitioner attributes. Each document contains a summary

¹²See Appendix A for background on the U.S. personal bankruptcy code and bankruptcy court procedures.

¹³We selected these districts to give geographical diversity across the United States. Our fee waiver petition to the Florida Middle District was denied.

of the household's total real estate assets, personal assets, secured debt, unsecured priority debt, unsecured non-priority debt, monthly income, and monthly expenses. In subsequent schedules, petitioners list individually all assets and all liabilities, detailed monthly income and expense budgets, and information on the petitioner's employment, number of dependents, and marital status. Filers also list their income over the previous three years in the Statement of Financial Affairs, lawsuits they are a party to, and any businesses they own (among other items). We scrape these PDF documents for the relevant information and reformat it into a standardized dataset.

PACER contains very few electronic PDF documents before 2004. Accordingly, we begin our sample in January 2004 and end in September 2018. In the first two years of our sample, as courts were still adopting electronic filings, coverage ramps up from just over 50% of cases to close to 90% by the end of 2006. Following this time, a small percentage of schedules are handwritten documents that we are unable to process, leaving us with about 90% coverage of all bankruptcy cases through the remainder of the sample. The resulting dataset contains 606,120 individual bankruptcy filings. Of these, we drop 50,712 cases that are missing portions of either the Schedules of Assets and Liabilities or the Statement of Financial Affairs, which prevent calculating control variables such as employment status or whether the individual owns a business. We also exclude extreme income observations outside the 1st and 99th percentiles. Our final sample contains 554,942 observations. Florida Northern, Florida Southern, Minnesota, and Utah make up 7.7%, 34.9%, 32.6%, and 24.8% of the total sample, respectively.

Table 1 reports summary statistics. The average bankruptcy petitioner in our sample declares a current monthly income after required deductions of \$2,973. Calculating the garnishable wages for each petitioner based on the applicable state statute and federal minimum wage, the average petitioner has \$727 in monthly wages potentially subject to wage garnishing by creditors. Average total assets are approximately \$134,000, although this varies widely across the sample with a standard deviation of over \$200,000 and the bottom of the distribution having essentially zero assets. Average total debt is approximately \$240,000, which includes more than \$95,000 in unsecured debt and nearly \$110,000 in mortgage debt, the latter averaging across almost half of the sample with no mortgage. Total indebtedness also varies significantly in the cross section of filers with a long right tail, especially for unsecured debt, which has a standard deviation of \$570,000. On average, bankruptcy filers reported 53% of their liabilities as unsecured debt. The Chapter 7 share of filers in

our data is 74%, while 56% of the sample are homeowners, and 24% are business owners. Looking at demographics, 33% of bankruptcy petitions were joint filings by a married couple, the average number of dependents is around one (although over half of the sample reports zero dependents), about 12% are unemployed, and very few filers are retired or disabled.

Debt Categories The average debtor has over 30 individual loans reported in their schedules, resulting in over 15 million individual liabilities in our data. To summarize the composition of liabilities at bankruptcy, we categorize these loans by processing the text in the loan descriptions provided. We begin with simple keyword searches for easily-categorized loans with search terms such as “credit card,” “mortgage,” or “auto.” We then use Latent Dirichlet Allocation (LDA) as a topic modeling technique to assign hard-to-categorize loans.¹⁴ This combined process allows us to classify about 85% of all loans (94% of the total dollar amount of debt) into specific categories. The remaining 15% are placed in an “unknown” category; these unknown loans all have vague descriptions (e.g., “Collections” or “Loan”) that do not allow us to definitively categorize them. Examining word frequencies in this category, the most common words are related to debt that is in collections, with the original creditor or purpose unspecified.

Table 2 displays the distribution of debt across these loan categories. Looking across categories, mortgages (63%) and auto loans (29%) comprise the majority of secured debt reported by bankruptcy filers, and around half of bankruptcy filers have a mortgage and around half have an auto loan. Other forms of secured debt are less common among bankruptcy filers and make up less than 3% of total liabilities. Credit card debt is the most common type of unsecured debt; 77% of filers report credit-card debt, making up 30% of their unsecured debt on average. Unsecured personal loans and retail debt are also common, making up 13% and 11% of unsecured debt, respectively, with each held by a majority of filers in our sample. Student loans are held by almost 25% of the sample and comprise 8% of unsecured liabilities on average.

Several categories of debt are constituted by “unintentional lenders” who are unlikely to report these debts to credit bureaus. This includes medical debt, which is held by over half of our sample and is similar in size to student loans, and unpaid utility bills, which appear in 41% of filings. In

¹⁴LDA looks for common usage of words across loans and places those loans together in the same “topic.” For example, if “hospital” and “medical” often appear together in a loan description, LDA would then group other loans with the word “hospital” into the medical category even if they do not contain the word “medical.” See Appendix B for further details.

addition, debts that are housing related (such as unpaid rent or HOA fees), as well as large portions of the unknown category, are likely not reported to credit bureaus.¹⁵ We discuss these unreported “shadow debts” in the next section. Finally, despite being under acute financial distress, only 9% of filers in our data report outstanding debts identifiable as payday loans or debts to check cashers, comprising less than 0.4% of total debt.

4.1 Shadow Debt

Before using our detailed, individual-level data described above, we use nationally representative administrative data to document the existence of shadow debt. We define shadow debt as the difference between total debt amounts reported in bankruptcy filings and the amount reported in credit registries. We obtain debt amounts reported on bankruptcy filings from the Administrative Office of the U.S. Courts (AOUSC), which has released aggregate statistics on the total liabilities reported in consumer bankruptcy filings since 2007.¹⁶ To measure total debt reported in credit registries at bankruptcy, we use data from Razeto and Romeo (2019), who identify bankruptcy filers from a nationally representative sample of five million de-identified credit records.¹⁷ A comparison of these two sources reveals that unsecured shadow debt is quite large, and secured debt is essentially non-existent. From 2007 to 2018, AOUSC data reports an aggregate of \$442.3 billion (2001 dollars) more in unsecured debt on bankruptcy filings than what is recorded on credit registries from the same time period as reported in Razeto and Romeo (2019). This translates to \$36,500 in unsecured shadow debt per bankruptcy case on average. Meanwhile, secured debt amounts from the two sources are nearly identical, with the average bankruptcy case having about \$200 more secured debt reported in the credit registry than what is reported on the bankruptcy filing. This is expected, as nearly all secured debt is originated by formal lenders that report to credit bureaus.

The difference in unsecured liabilities between credit reports and bankruptcy filings reflects the fact that credit bureaus can only collect information on debts that are reported to them, typically

¹⁵Many loans in the unknown category are debts that have been sent to collections, making it impossible for us to observe the original purpose of the loan. If lenders that do not report to credit bureaus are also more likely to sell delinquent debts to collectors (rather than collecting debts in-house as many large banks and other formal lenders do), then much of this category would also represent “shadow debt.”

¹⁶Data available at <https://www.uscourts.gov/statistics-reports/caseload-statistics-data-tables>.

¹⁷We thank Charles Romeo and the CFPB for sharing aggregate numbers from this report with us. For confidentiality, we cannot share exact numbers, but the data are those used to create Figures 5 and 6 in their report, rounded to the nearest \$1,000.

by formal lending institutions, retail institutions with formal lending arms such as store brand credit cards and, in some cases, debt collectors. By contrast, bankruptcy filings reveal a wide array of liabilities that would not generally appear on a credit report, including bounced checks, unpaid medical, utility, or telecommunications bills, and fines and fees. In search of maximal relief from creditors, an individual filing for bankruptcy has strong incentives to list all of their debts, such that we view the liabilities listed in the Schedules of Assets and Liabilities to represent a complete view of their total indebtedness. Since such debt is not administratively reported anywhere else, bankruptcy potentially offers the only opportunity to characterize the size and scope of such informal credit markets.

Having established that shadow debt is large in aggregated administrative data, we merge a set of bankruptcy filers from our individual-level data to credit-bureau records to better understand shadow debt and its dynamics. The credit-bureau data available to us contain only individuals who have had or currently have a mortgage serviced by one of the top twenty mortgage servicers, and details of the merging process are available in Appendix C.¹⁸ Table 3 reports summary statistics of bankruptcy filing variables for the merged sample, along with several measures in panel B only available for the merged sample. Given that there is little to no secured shadow debt, we focus on unsecured shadow debt. Indeed, we verify in our data that a relatively small portion of our sample has second mortgages, home equity lines of credit, or auto loans that do not appear in the credit report. Such secured shadow debt likely reflects a reporting issue in the credit registry. Meanwhile, unsecured debt varies widely between the bankruptcy schedules and credit records. The average borrower in our sample has \$41,680 in shadow debt, a figure remarkably similar to the \$36,500 we estimate based on nationally representative administrative data.¹⁹ Shadow debt makes up 7% and 11% of the average and median bankrupt individual’s total listed debt, respectively, and composes 44% of the average individual’s total unsecured debt at the time of bankruptcy. Informal credit

¹⁸The limited sample of credit bureau data available has the potential to introduce some selection concerns, and some of our findings on shadow debt will be limited only to mortgagors. However, we note that whenever possible in our analysis (for tests that do not use credit bureau data), we use the full sample of bankruptcy filers and find similar results. We further discuss sample selection below.

¹⁹While the debt registered against a given debtor varies across credit bureaus, several facts suggest that our results are not simply the effect of one particular credit bureau missing debts that other credit bureaus have recorded: the average level of shadow debt we measure using a single credit bureau is similar to the average amount of shadow debt from aggregate administrative results, the debt “missing” from credit bureau records is correlated with categories we a priori expect to not be collected by credit bureaus, and our results below that find statistically significant effects of nearly bankrupt debtor cash flows on shadow debt.

markets constitute a material portion of total liabilities for individuals in acute financial distress.

The accuracy of our shadow debt estimates relies on the accuracy of each dataset and the fidelity of the merge between them. The similarity of estimated mean shadow debt between national administrative data and our individual-level dataset reassures us that large discrepancy is not simply because of a low-quality merge. Even so, we note that, because we do not have the same unique identifiers in both datasets, the merge between the datasets will necessarily be imperfect. We examine whether incorrectly merged records are affecting our results by alternatively focusing on the set of observations for which there is only a single bankruptcy filing in a 5-digit zip \times filing-month cell. In these cases, we have a one-to-one merge between the two datasets and are confident that close to 100% of these matches are correct.²⁰ For these 6,046 observations, we find that the 25th, 50th, and 75th percentiles of shadow debt levels are \$11,100, \$28,400, and \$60,800, respectively—a distribution almost identical to the distribution estimated using the full sample of matches. Furthermore, in contrast to the mean-zero differences that would be expected under a low-quality-merge data generating process, we find that the total amount of unsecured debt on credit records only rarely exceeds the total amount of unsecured debt on bankruptcy filings for a given individual. The average and median unsecured debt on credit-bureau records are \$57,800 and \$14,700, respectively, while on the bankruptcy schedules, the comparable figures are much larger at \$94,700 and \$44,500. Finally, shadow debt summary statistics are similar for single and joint filers, suggesting that misattributing debt to one spouse instead of another is not driving our estimates of shadow debt amounts.

A second potential concern is that debt amounts reported in the bankruptcy filings are fraudulently inflated, making it appear that there is a large amount of shadow debt. This is unlikely to be the case because the schedules are most often prepared by a bankruptcy lawyer and are always reviewed by a trustee, both of whom require documentation of loans so that creditors can be notified and an official record of debt discharge created. A final concern is that debt amounts in the credit reports are lower simply due to a lag in reporting or differences between the timing of the bankruptcy filing and when the credit report is pulled in our data. However, we find essentially identical amounts of shadow debt regardless of whether we use the credit report from a month prior to or a month after the bankruptcy filing. Timing differences between bankruptcy filing and credit

²⁰To verify this assumption of high match-quality for this subsample, we note that outstanding first mortgage amounts in the two datasets are within \$2,000 of each other for the vast majority of these matches even though we are not using the mortgage amount for the match.

records cannot explain the preponderance of shadow debt that we detect.

Shadow debt constitutes a large proportion of total liabilities for bankrupt individuals. We cannot precisely determine which loans in the bankruptcy schedules are not in credit reports because our credit-bureau data do not contain loan-level tradeline detail. However, we note that loan categories that are likely to contain shadow debt are large. In particular, medical debt, unpaid rent or utility bills, deficiency balances on repossessed vehicles, legal costs, bounced checks, and other fees are, for the most part, not reported to credit bureaus. These categories alone amount to \$45,400 for the average bankrupt borrower in our dataset.

To characterize the drivers of our shadow debt measure, we estimate the correlation between the unsecured shadow debt share of total debt and the unsecured debt categories in Table 2 at the individual level. Figure 3 plots the resulting correlation coefficients in descending order. The types of unsecured liabilities that are most correlated with shadow debt are housing-related (e.g., unpaid rent), unknown unsecured (e.g., debt in collections without other identifying information), miscellaneous unsecured (e.g., unpaid insurance premia and bounced checks), unsecured auto (e.g., the negative-equity portion of a car loan), medical, and business-related. Utilities, payday loans, and priority unsecured liabilities (e.g., unpaid taxes) are also positively correlated with shadow debt. Meanwhile, unsecured liabilities that are usually well captured by credit reports are not correlated with shadow debt (student loans) or are negatively correlated with shadow debt (personal loans, retail, and credit card debt). Combining these correlations with the overall debt share statistics in Table 2, we estimate that the largest components of informal shadow debt are medical debt and debt in the unknown category. That said, we also note that the average filer only has about \$7,000 of medical debt relative to a total shadow debt of approximately \$40,000 such that medical debt makes up at most 17% of shadow debt. It appears unlikely that our results are simply driven by medical debt.

We emphasize the fact that debt amounts at bankruptcy only indicate the *sources* of financing that borrowers used, not their *uses*. Because money is fungible, individuals have the choice of using borrowed funds for any purchase. For example, two individuals with identical initial medical expenses could file for bankruptcy with significantly different medical debt amounts if one of the two individuals chose to use credit card borrowing to cover her medical expenses. Similarly, as individuals approach bankruptcy, they may choose to stop paying medical bills in order to free up

liquidity for gas, food, or even non-necessary expenses. These individuals would have large amounts of medical debt on their bankruptcy filing, but the funds were used for other expenses. Distressed debtors may turn to this source of financing precisely because shadow debt is likely easier than formal debt to obtain. In addition, because we cannot directly observe at the tradeline-level which debts are recorded in the credit registry and which are not, we cannot precisely determine which categories of shadow debt increase prior to bankruptcy. Summarizing, we focus on shadow debt as a source of funds category for distressed individuals and remaining agnostic on how individuals may be using these funds.

We reiterate that credit bureaus are not designed to collect data on such liabilities (and in some cases are legally prohibited from doing so). Accordingly, rather than an indictment on the accuracy of credit records, these descriptive statistics show that informal credit markets are large and important sources of credit for distressed borrowers. In our analysis below, we seek to better understand how debtors accumulate shadow debt in the run-up to bankruptcy by estimating how shadow debt responds to changes in the costs and benefits of entering bankruptcy.

5 Shadow Debt Dynamics Approaching Bankruptcy

The descriptive results above establish that shadow debt is a quantitatively important source of credit for distressed households. In the remainder of the paper, we estimate the dynamics of shadow debt usage as individuals approach bankruptcy. This objective is taxing from a data perspective, as shadow debt is difficult to observe except at the time of bankruptcy. First, we revisit panel A of Figure 1, which displays the average total formal debt held by individuals over the course of three years prior to filing for bankruptcy, using all individuals in our credit bureau data with at least three years of data recorded prior to entering bankruptcy.²¹ From 36 to about 15 months prior to bankruptcy, formal debt increases by about \$17,000 for the average filer. However, at around 15 months before filing, formal debt plateaus and then decreases starting about nine months before bankruptcy. We see a similar pattern in panel B, which shows total unsecured debt before bankruptcy.

This decline in credit-bureau registered debt leading into bankruptcy is consistent with either

²¹This figure uses all individuals in the credit bureau data who file for bankruptcy across the U.S. instead of limiting the sample to the Utah, Florida, and Minnesota bankruptcy districts we do elsewhere in the paper.

a reduction in credit supply or credit demand. In particular, if formal lenders who report to credit bureaus are informed, they will likely decrease the supply of credit for highly delinquent borrowers. Alternatively, credit demand by distressed borrowers may decline as they approach bankruptcy, potentially as they delever in an effort to ease their financial distress. While both of these hypotheses are plausible, our analysis below suggests that the decline in formal debt balances likely reflects contracting credit supply, resulting in distressed borrowers shifting their borrowing into shadow debt markets. Indeed, panel C of Figure 1 suggests a drop in credit supply by showing that revolving credit limits fall by about \$3,500 as individuals approach bankruptcy. Further, since severely distressed borrowers are likely also cash constrained, one would anticipate that their demand for liquidity would likely remain high, raising a puzzle that such borrowers are able to avoid bankruptcy for nearly two years as their credit limits constrict.

We hypothesize that shadow debt is a significant portion of this liquidity, but we cannot dynamically measure shadow-debt borrowing in a similar way, as shadow debt is by definition not recorded in any credit registry. For 14% of the filers in our sample, the precise date individual liabilities were incurred is reported on their schedules of liabilities. Using this information, we estimate the level of unsecured debt six months before filing by subtracting the balances of all debts originated in the last six months from the total reported at the time of filing.²² Figure 2 shows the distribution of total unsecured debt outstanding as reported in the credit registry and on the bankruptcy filing at two points in time: six months prior to filing and at the time of bankruptcy. We observe that median debt on the credit registry declines by \$5,377 in the six months leading up to bankruptcy, but debt recorded on bankruptcy schedules rises by \$16,611 in the six months prior to bankruptcy. The \$22,000 gap between these two sources indicate that distressed individuals turn to shadow debt as a significant source of liquidity after being shut out of formal lending markets.

Figures 1 and 2 are suggestive evidence for the hypothesis that distressed borrowers rely on shadow debt. However, liabilities listed on the bankruptcy filing only contain debt outstanding at the time of bankruptcy. This further limits the interpretation of Figure 2 because we may be missing some shadow debt that was outstanding six months prior to bankruptcy that was subsequently paid off or charged off before filing. For example, suppose that a distressed borrower has \$10,000 of

²²There are a few caveats with this exercise: we are limited to a sample with precise origination date data, and the origination date for forms of revolving credit is likely to be the date the credit line was opened, not necessarily the date the total amount of debt was originated.

shadow debt at month $t - 6$ and that she repays \$5,000 of this prior to filing for bankruptcy. In our data, we would only observe \$5,000 of shadow debt at time $t - 6$ because the other \$5,000 was paid off prior to bankruptcy. Given this data limitation, we turn to a natural experiment that illuminates how inframarginal bankruptcy filers interact with shadow debt markets. We exploit federal minimum-wage changes that affect the amount of wage garnishing a delinquent borrower could experience.²³ When an individual files for bankruptcy, this halts any wage garnishment. Hence, decreases in wage garnishment reduce the benefits of bankruptcy, leading marginal filers to potentially delay filing. If borrowers rely on shadow debt to fund these delays, we would expect to see that borrowers with exogenously lower wage garnishment simultaneously have more shadow debt and prolonged periods between severe delinquency and entering bankruptcy. Further, we would not anticipate that they would have higher formal debt if they are credit constrained by these lenders.

We identify quasi-exogenous variation in wage garnishment from changes to the federal minimum wage, which occurred on July 24th in 2007, 2008, and 2009 during our sample period. For certain debtors, Title III of the 1970 Consumer Credit Protection Act ties the maximum level of garnishable wages to the federal minimum wage. The statutory maximum amount of income per month that can be garnished for an individual is

$$Garnishable\ Wages_{it} = \begin{cases} 0 & \text{if } Inc_i \leq 4.33\omega_s MinWage_t \\ Inc_i - 4.33\omega_s MinWage_t & \text{if } 4.33\omega_s MinWage_t < Inc_i < 5.8\omega_s MinWage_t \\ 0.25 \cdot Inc_i & \text{if } Inc_i \geq 5.8\omega_s MinWage_t \end{cases} \quad (1)$$

for borrower i filing in bankruptcy district court s on date t . For each individual, we measure Inc_i as the monthly income they report on their bankruptcy filing after withholding taxes and $MinWage_t$ as the prevailing federal minimum wage on the date when the individual enters bankruptcy. Individuals earning below the subsistence amount $4.33 \cdot \omega_s \cdot MinWage_t$ are not garnished at all (the rules use a factor of 4.33 to convert weekly to monthly figures). The prevailing federal minimum wage $MinWage_t$ is measured on the date when the individual enters bankruptcy.

This statutory structure results in three possible income regions, plotted in Figure 4. For higher-income individuals with $Inc_i > 5.8 \cdot \omega_s \cdot MinWage_t$, maximum garnishable wages are simply 25% of income. For low-income individuals whose income is below a given subsistence level $4.33 \cdot \omega_s \cdot$

²³See Appendix D for more details on wage garnishment.

$MinWage_t$, there is no allowable wage garnishing. In Florida and Utah, the subsistence allowance ω_s is the federally mandated minimum of 30 hours of federal minimum wage earnings, while in Minnesota $\omega_s = 40$.²⁴ In the middle region, when $4.33 \cdot \omega_s \cdot MinWage_t < Inc_i < 5.8 \cdot \omega_s \cdot MinWage_t$, every marginal dollar of income above $4.33 \cdot \omega_s \cdot MinWage_t$ is garnishable. Importantly, the boundaries between these regions depend directly on $MinWage_t$. When the federal minimum wage increases, a) individuals just above the lower boundary are pushed into the no-garnishing region, b) all individuals in the middle region are garnished less, and c) individuals just above the upper boundary move to the middle region and are garnished less. For this reason we refer to the middle region of income as the treated region in our experiment.

For example, as illustrated in Figure 4, prior to July 24, 2007 when the federal minimum wage was \$5.15, an individual in Utah with a monthly income of \$750 has garnishable wages of $\$750 - 4.33 \cdot 30 \cdot \$5.15 = \$81.02$, or 10.8% of their income. On July 24, 2007, the federal minimum wage increased to \$5.85. Beginning with this date, a debtor with an income of \$750 will no longer face any wage garnishing. The premise of our identification strategy is that such federal minimum wage increases alter the incentives for otherwise identical debtors who haven't filed before the minimum wage increase to delay bankruptcy because they have discontinuously lower garnishable wages and thus higher take-home pay. The logic behind this strategy is based on the growing body of evidence that debtors make decisions based on their ability to meet monthly debt-service obligations, defaulting or declaring bankruptcy mostly when unable to meet those obligations (e.g., Indarte, 2020; Ganong and Noel, 2020). A positive shock to take-home pay thus alleviates the immediate need to file for debt relief via bankruptcy. We address the possibility that federal minimum wage changes affect distressed-borrower indebtedness in other ways in section 5.3.

We estimate the causal effect of a change in wage garnishment on a general outcome Y_{ist} by estimating equations of the form

$$Y_{ist} = \pi_1 \cdot Treatment_i \times Garnishable\ Wages_{ist} + \pi_2 \cdot Treatment_i + \pi_3 \cdot Garnishable\ Wages_{ist} + \pi_4 \cdot Treat_i \times Income_i + X_i' \pi_5 + \psi_s + \theta_t + v_{ist}. \quad (2)$$

²⁴Florida household heads earning less than \$750/week may file an affidavit for exemption from wage garnishing if they contribute more than half of the support for a dependent family member. Minnesotans eligible for public assistance in the last six months are exempt from wage garnishing. For a detailed overview of state-level wage garnishing statutes, see Carter (2020).

Our objective is to isolate within-year variation in garnishable wages for borrowers with identical incomes.²⁵ This objective is complicated by the fact that income and garnishable wages are perfectly collinear for anyone with income exceeding $5.8 \cdot \omega_s \cdot \text{MinWage}_t$. By contrast, in the middle income region defined by $4.33 \cdot \omega_s \cdot \text{MinWage}_t < \text{Inc}_i < 5.8 \cdot \omega_s \cdot \text{MinWage}_t$, income and garnishable wages are no longer collinear because of within-year changes in MinWage_t . To isolate this treated region of incomes from a control region of incomes where wage garnishment is not impacted by changes in the minimum wage, we define $\text{Treatment}_i = 1$ for monthly incomes between \$600 and \$1,300.²⁶ In specifications utilizing merged credit bureau and bankruptcy filing data, 5% of bankruptcy filers have incomes in the treatment region. In the specifications that do not require the credit-bureau merge, treated borrowers represent 10% of the sample.

Equation (2) estimates the impact of an additional \$100 of wage garnishment on Y_{ist} for borrowers of identical income with the $\text{Treatment} \times \text{Garnishable Wages}$ interaction. Controlling for $\text{Treatment} \times \text{Income}$ allows the effect of income to differ in the treated region and means that the only residual variation in $\text{Treatment} \times \text{Garnishable Wages}$ will be due to within-year minimum-wage changes. Outside the treated region, income and garnishment are perfectly collinear such that the income main effect is absorbed by the garnishable wages main effect. Filer controls X_i improve our precision in subsample tests and include other plausible shifters of outcomes: the number of dependents and indicators for bankruptcy chapter choice, marital status, homeownership, business ownership, credit score, retired status, and disability status.²⁷ To allow for time shocks or fixed differences across courts in average filing timing, we control for court-district fixed effects ψ_s and year fixed effects θ_t . Subsequent robustness checks control for unobservable geographic variation over time by including court-district \times year fixed effects and allow for time-varying income elasticities through income \times year fixed effects and income quartile controls. Conditional on this rich set of controls, the coefficient π_1 will be identified from filers that have identical incomes and filed in the same year but faced different potential wage garnishing levels because they filed before or after a

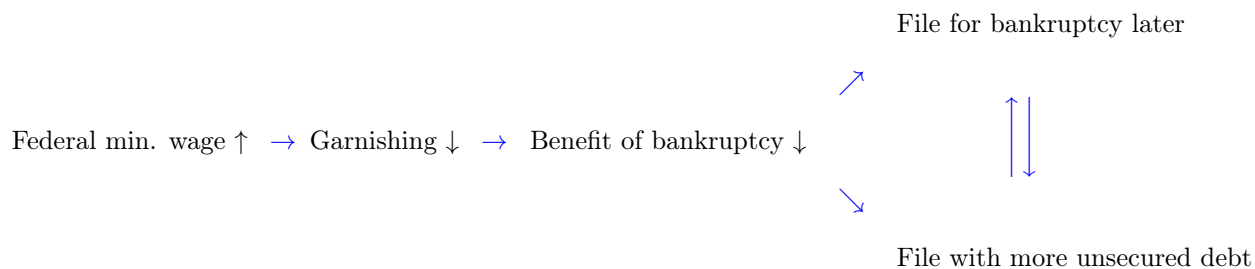
²⁵It is possible that wage garnishment changes only affect bankruptcy filings gradually, in which case including year fixed effects might force comparisons between treated and control samples before garnishment impacts the treated sample. Our results are essentially unchanged if we allow for broader comparisons by using two-year fixed effects instead of one-year.

²⁶We expand the treatment region outside the sharp kinks shown in Figure 4 and implied by the expression in equation (1) ($4.33 \cdot \omega_s \cdot \text{MinWage}_t < \text{Inc}_i < 5.8 \cdot \omega_s \cdot \text{MinWage}_t$) to allow for income volatility and measurement error (e.g., if unobserved garnishing from alimony or taxes affected net income for a given individual).

²⁷All of our results are also robust to not including additional controls and fixed effects.

federal minimum wage change.

We focus on two sets of outcome variables Y_{ist} . The first set are debt amounts at the time of bankruptcy, with a particular emphasis on shadow debt. Second, we test whether changes to wage garnishment induce individuals to delay entering bankruptcy, where the delay is measured as the time from their first 90-day delinquency on any debt until they enter bankruptcy. We test for these two outcomes because we hypothesize that delinquent borrowers respond to a decrease in wage garnishment by accumulating more shadow debt and delaying entering bankruptcy. Filing timing and indebtedness as of filing are likely jointly determined. Consumers need time to accumulate shadow debt such that filing delays could lead to more shadow debt. Meanwhile, if shadow debt markets did not exist, it is likely that these debtors would not be able to delay filing for a full month in response to a \$100 liquidity shock. Summarizing, the causal chain behind our strategy is



5.1 The Accumulation of Shadow Debt

We first focus on how changes to wage garnishment affect the amount of shadow debt held at the time of bankruptcy. In particular, we estimate equation (2) with the outcome variable $Y_{ist} = \frac{Shadow\ Debt_{ist}}{Total\ Debt_{ist}}$, where $Shadow\ Debt_{ist}$ is defined as the difference between unsecured debt reported on the bankruptcy filing and unsecured debt in an individual's credit report. Section 5.2 shows that individuals with lower wage garnishment also delay filing for bankruptcy.

The summary statistics in section 4.1 document that shadow debt represents a large and meaningful segment of the consumer credit complex, at least for distressed borrowers. Distressed borrowers may be most likely to accumulate shadow debt because shadow debt lenders (such as utility companies or hospitals) are unlikely to check credit reports before providing goods or services on credit. Table 4 shows that when garnishable wages decline due to a change in the federal minimum wage, treated individuals enter bankruptcy with more shadow debt. This holds true across various

fixed-effect structures and flexible controls for the income of the filer. The estimates indicate that when *Garnishable Wages* declines by \$100, shadow debt comprises a 1.8 to 2.1 percentage point higher share of total debt. This translates to an additional \$6,000-\$8,000 of shadow debt at the time of bankruptcy. For context, note that \$100 is roughly the average decrease around a minimum wage increase for a treated debtor in our sample.²⁸

Table 5 examines how overall unsecured debt responds to changes in wage garnishment by using $\frac{Unsecured\ Debt_{ist}}{Total\ Debt_{ist}}$ as the dependent variable.²⁹ We find that unsecured debt as a fraction of total debt rises by 0.9 to 1.2 percent of total debt in response to a \$100 decline in *Garnishable Wages*. In dollar terms, this implies about \$4,000 more of unsecured debt. The point estimates in Tables 4 and 5 indicate that the filing delays induced by minimum wage increases have a larger effect on shadow debt than total unsecured debt. These coefficients are not statistically different from one another, and we cannot reject the hypothesis that the increase in unsecured debt is completely comprised of an increase in shadow debt. However, it is also possible that some borrowers use shadow debt to pay back some formal unsecured debt. Regardless, it is clear that essentially all of the increase in unsecured debt comes in the form of shadow debt, consistent with the hypothesis that severely distressed borrowers rely on informal lenders to provide liquidity. The lack of any increase in debt from formal lenders suggests that these creditors are relatively well-informed about borrowers' credit profiles, while shadow debt lenders lack this information or choose not to screen potential borrowers.

For comparability with the results in Table 4, the first four columns of Table 5 use only the credit-bureau-matched sample. However, we do not need credit bureau data to estimate the impact of wage garnishment on total unsecured debt such that we can test whether our finding of an increase in unsecured debt holds in the full sample of over 500,000 bankruptcy filers. The final column of Table 5 displays this result, showing that unsecured debt increases by 0.46% of total debt (in dollar terms, about \$1,200) in response to a \$100 decline in garnishable wages. Although smaller in magnitude, we find the same directional effect in the full sample as the credit-bureau-matched sample. This difference in magnitudes suggests that wage garnishing effects are stronger for treated bankruptcy filers in our mortgagor-heavy credit-bureau sample, potentially because they

²⁸Each minimum wage increase in our data was \$0.70/hour. For a debtor on the relevant part of the garnishing schedule defined by equation (1) and plotted in Figure 4, this decreases maximum garnishable wages by \$90.93/month for Florida and Utah filers and \$121.24/month for Minnesota filers.

²⁹Note that our results are robust to using $\log(Unsecured\ Debt_{ist} + 1)$ instead. See Appendix Table A1.

have higher expenses and more debt overall. Regardless, we continue to find an economically and statistically significant increase in unsecured debt in the full sample.

Finally, a recent literature examines the role of medical debt in personal bankruptcy (Mahoney, 2015; Dobkin, et al., 2018; Kluender et al., 2021). Given that medical debt appears to be a significant portion of overall shadow debt, we examine whether the overall increase in shadow debt is due to increases in medical debt. However, we find similar results when we examine only the sample of borrowers that report zero medical debt at filing (see Appendix Table A2), suggesting that increases in shadow debt are likely not primarily driven by increases in medical debt. We also reiterate that the fungibility of money prevents any precise determination of which particular expenses are driving the increase in shadow debt, as argued in section 4.1.

5.2 Bankruptcy Timing

When wage garnishment declines, the immediate benefit of entering bankruptcy is reduced, potentially leading affected debtors to delay filing for bankruptcy. We test this hypothesis by reestimating equation (2) with a measure *months to file* of filing timing as the dependent variable, defined as the number of months from when a borrower first becomes 90 days delinquent on any debt in their credit file until the month in which they file for bankruptcy.

Table 6 shows that delinquent borrowers who are treated with lower wage garnishment tend to delay filing for bankruptcy. The estimated coefficient in column 1 of -1.12 months indicates that a \$100 decrease in monthly garnishable wages increases the time between the first 90-day delinquency and bankruptcy filing date by an average of 1.03 months (5% of the mean time to file). Columns 2-4 repeat the estimation with different combinations of fixed effects, with coefficient estimates all close to a one-month delay in entering bankruptcy.³⁰

The analysis shows that when borrowers have marginally weaker incentives to immediately enter bankruptcy, they tend to simultaneously incur around \$6,000 additional shadow debt, a net increase

³⁰Some individuals transition in and out of being at least 90 days past due several times before entering bankruptcy. All of our results are also robust to defining *months to file* using 120 days past due or using the last month before bankruptcy in which a consumer becomes 90 days past due on a debt.

of about \$4,000 of total unsecured debt, and delay filing for a month.³¹ As discussed above, these two outcomes are likely co-determined: borrowers would not be able to delay bankruptcy without accessing additional liquidity via shadow debt, and they would not incur more shadow debt without having time to do so by delaying bankruptcy. A testable implication of this connection between shadow debt accumulation and bankruptcy timing is that treated borrowers should incur a higher share of their unsecured debt closer to their bankruptcy filing. We estimate this relationship using the timing of newly originated debt, measured in the limited sample of liabilities listing precise origination dates used to construct Figure 2. Using these dates, we calculate the fraction of total debt at bankruptcy that was originated within six months of the filing date. In Table 7, we find that a decrease in garnishable wages is associated with a statistically significant 52-94 bp increase in the fraction of total debt accumulated in the six months before filing. While we can only perform this exercise on a limited subsample of our data, the pattern of increased debt accumulation just prior to filing is consistent with borrowers incurring more debt as they delay their filing. This additional result also helps rule out a sample selection explanation for our results, as sample selection is unlikely to predict that individuals who file after minimum wage changes would incur more of their debt just prior to bankruptcy. In the next section we further address this and related concerns.

5.3 Endogeneity and Selection Concerns

The results above indicate that changes to wage garnishment affect the timing and amount of shadow debt individuals have when they file, illustrating the dynamics and consequences of delinquent borrowers turning to shadow debt markets prior to filing for bankruptcy. The identifying assumption is that the estimated effects are actually the result of changes to wage garnishment and not through some other channel. One possible violation of this exogeneity condition would be a change in the composition of filers because of the experiment. Because we can only observe shadow debt for individuals who actually file for bankruptcy, we necessarily condition the sample on the endogenous outcome of bankruptcy, potentially resulting in a selected sample. For example, varying the level of wage garnishing could affect average-filer indebtedness by changing the composition of who files

³¹This increase can be compared to summary statistics in Figure 2, which show an increase of \$22,000 in shadow debt over the six months prior to bankruptcy, for an average of \$3,700 per month. Our estimate of \$6,000 is slightly larger than this average, but our identification strategy estimates the effect of an additional marginal month just before bankruptcy, which could very well be a time period with a larger sensitivity to take-home pay than the average sensitivity over six months prior to bankruptcy.

for bankruptcy. In particular, our estimates could be biased by selection effects if a decrease in garnishable wages causes some debtors with low unsecured debt to not file altogether or if borrowers with low garnishable wages have consistently larger unsecured debt shares regardless of when they do file.

We evaluate such selection concerns empirically along several dimensions; overall, we find no evidence that sample-selection concerns are biasing our results. First, we consider whether wage garnishment affects the overall number of individuals that enter bankruptcy. If selection at the extensive margin is at play, we should see changes in the prevalence of bankruptcy filings after minimum wage changes. Figure 5 plots total weekly personal bankruptcy filings in Florida, Minnesota, and Utah per 10,000 people in event time, where the event is any of the three changes in the federal minimum wage. We estimate these counts in event time after controlling for the state-level unemployment rate and state and week-of-year fixed effects from 25 weeks prior to the minimum wage change to 26 weeks after the change, covering one year in total. We do not see any change in the filing rate around minimum-wage induced changes in wage garnishing. For contrast, we note that bankruptcy filing rates can respond dramatically to filings incentives, as the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 caused a dramatic increase and decline in filings at its passage (Gross et al., 2021). As is apparent in Figure 5, minimum wage changes have no such effect; all point estimates are statistically indistinguishable across the year of a minimum wage change. Further, the differences in point estimates are very small, with post-minimum wage change estimates being only three more filings per million people than pre-minimum wage changes.

In the same spirit, we test directly whether the distribution of filer incomes changed around the three minimum wage changes. Figure 6 plots several percentiles of the filer income distribution by month of filing. As illustrated in Figure 4, borrowers whose wage garnishing was affected by minimum wage changes have incomes in the \$600-\$1,300 range. All of the income percentiles in this range evolve smoothly following each minimum wage change in parallel with incomes outside this range from unaffected borrowers, exhibiting the typical time-series volatility evident in other months. Further confirming this lack of selection, Figure 7 also shows that the income distribution of filers before and after each minimum wage change is identical in the control and treated regions. In particular, each figure uses two full years of bankruptcy filing data surrounding the minimum wage change, and plots the income histogram both before (semi-transparent bars) and after (solid

bars) the minimum wage increase. Blue bars indicate income regions where wage garnishment was not affected by the minimum wage increase; green bars indicate the treated region. If changes to wage garnishment affected filing rates on the extensive margin, we would anticipate that in the post period the histogram of filers in the treated region would be higher or lower than the pre period. However, we find that the two histograms are identical in all three cases. Kolmogorov-Smirnov tests for equivalence of the pre and post distributions for each of the 2007, 2008, and 2009 minimum wage changes are 0.013 ($p = 0.40$), 0.011 ($p = 0.46$), and 0.008 ($p = 0.64$), respectively. In all cases, we do not see significant selection in or out of bankruptcy around the event dates.

At the individual level, we can use credit-bureau data combining bankruptcy filers and non-filers to test whether the likelihood of entering bankruptcy changes after the federal minimum wage increases. Our credit bureau data do not contain the income of the individual, but we can observe the debt-to-income of each mortgagor at the time they originated their mortgage to impute income.³² Using this imputed income, we estimate regressions testing whether the likelihood of entering bankruptcy changes in the treated region after minimum wage increases. We first identify all individuals in the full, nationwide credit bureau data who become 90-days delinquent on at least one loan. We then calculate the fraction of these already-delinquent borrowers who file for bankruptcy within two years of becoming delinquent. In Table 8, we test whether the 2-year likelihood of entering bankruptcy changes among treated individuals after minimum wage increases. In all cases, we find precisely-estimated zero effects. Based on this nationwide sample, it does not appear that minimum-wage induced changes in wage garnishing has any effect on the likelihood that an individual enters bankruptcy. In Appendix Figure A1 we provide additional evidence against selection using the credit-bureau data, showing that the propensity to file across *all* delinquent borrowers (not just those in the treated income region) does not change after a minimum wage increase. Further, Appendix Figure A1 shows that the total debt of *non*-filers does not change after minimum wage increases, ruling out a compositional effect in which shocks to wage garnishment induce filers with more debt to enter bankruptcy while those with less debt do not. Appendix Table A3 also rules out compositional changes to observable filer characteristics as a function of treatment. Moreover, all three national minimum wage changes were decided in advance as part of the Fair

³²Our debt-to-income data is recorded in mortgage servicer records merged to our credit-bureau data by our data provider.

Minimum Wage Act of 2007 such that the policy changes themselves were not endogenous to shocks to the indebtedness of debtors in the treated income band. Finally, if a material change in filer composition occurred, it would be reasonable to expect a change in both unsecured and secured debt amounts; we see no such response in secured debt amounts (Appendix Table A1).³³

A remaining possibility is that the minimum wage change itself directly affected the demand for debt (i.e., an income effect) or mechanically affected the payback of outstanding debts by reducing the amount of wages garnished to pay down debt (i.e., a mechanical effect). The mechanical effect of decreased wage garnishment leading to higher debt is unlikely to be driving our findings, given that we estimate a \$4,000 increase in total unsecured debt when wage garnishment declines by only \$100. The magnitude of the mechanical effect is not large enough to explain the overall effect. We rule out an income effect by focusing on Florida, where the prevailing state-level minimum wage was *higher* than the federal minimum wage during this time period. Because of this, the federal minimum wage increases in 2007, 2008, and 2009 did not have any direct income effect on minimum-wage workers in Florida. But, because wage garnishment limits are set by the federal minimum wage, their wage garnishment was affected. As shown in Appendix Tables A4 and A5, when we limit the sample to Florida bankruptcies, we continue to find that treated filers increase shadow debt and delay bankruptcy.

6 Conclusion

As borrowers miss debt payments and enter delinquency, informed lenders will reduce credit supply in an effort to minimize their losses. This paper documents that as formal credit supply contracts, delinquent borrowers turn to informal shadow debt as an important source of liquidity while they delay entering bankruptcy. We find that shadow debt for an average bankruptcy filer totals about \$40,000 at the time of bankruptcy, and filers wait an average of 22 months after their first serious delinquency before filing for bankruptcy. We use descriptive statistics from national-level administrative data to establish the existence and size of shadow debt.

To estimate the extent to which consumers increase shadow debt as they approach bankruptcy,

³³Our findings that there is no selection in response to wage garnishment are also consistent with Severino and Brown (2017), who argue that bankruptcy generosity does not affect the extensive margin of filing, and papers showing no relationship between foreclosure delays and mortgagors' ultimate default behavior (Gerardi et al., 2013; Cordell et al., 2016).

we construct a new database of bankruptcy filings, complete with detailed liability-level data. We combine this data with an identification strategy that isolates quasi-exogenous variation in the incentive to delay filing for bankruptcy. Borrowers facing decreased wage garnishing due to minimum wage increases accumulate an additional \$6,000 of shadow debt while simultaneously delaying filing an average of one month relative to otherwise similar borrowers. These same borrowers do not appear to accrue any additional debt from secured or formal unsecured lenders, suggesting that they are constrained in these credit markets. Instead, distressed borrowers turn to “unintentional creditors,” including sellers of goods and services who become creditors only after buyer nonpayment. A series of robustness checks provide evidence that our results cannot be explained by selection effects or by direct effects of the minimum wage increases.

Shadow debt markets provide important financing options to distressed borrowers. Shadow debt lenders, meanwhile, have a significant informational disadvantage, resulting in an equilibrium in which highly distressed borrowers incur large amounts of shadow debt just before entering bankruptcy. Regardless of whether these distressed borrowers are intentionally running up the tab or are simply seeking to stave off bankruptcy as long as possible, discharged shadow debt creates losses for these unintentional creditors. In a typical year, aggregate shadow debt discharged in bankruptcy amounts to about \$40 billion dollars. These losses are likely passed on to non-defaulting consumers in the form of higher prices for goods and services that are typically financed with shadow debt.

Large amounts of shadow debt do not necessarily imply that bankruptcy should be made less generous in an effort to reduce losses in shadow debt markets. Instead, a social planner might optimally encourage potential defaulters to enter bankruptcy more quickly to free up cash flows to fund future consumption. In this way, bankruptcy could still provide insurance against negative shocks and encourage socially valuable risk taking while still minimizing the potential efficiency losses associated with delinquent borrowers incurring additional debt from uninformed shadow debt markets.

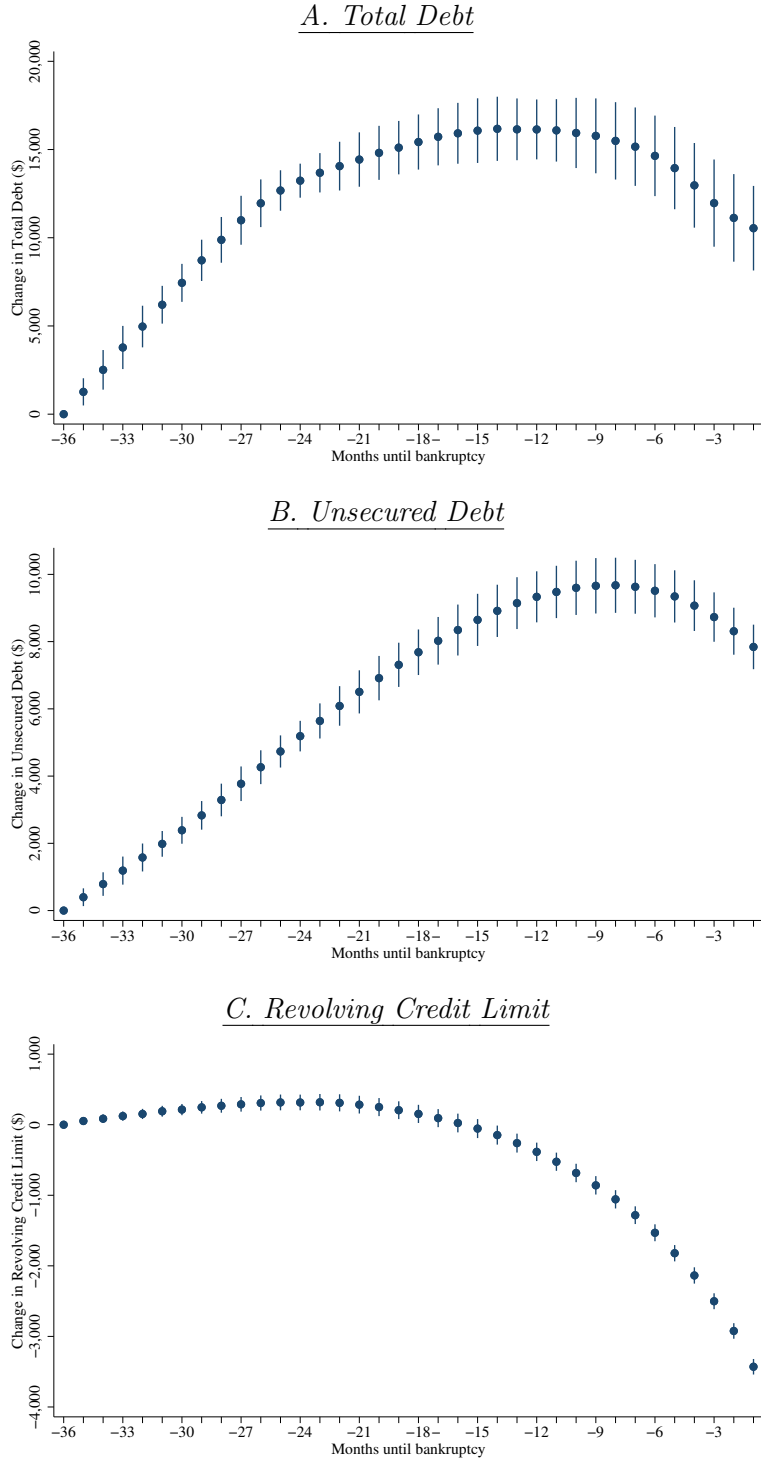
References

- ADP Research Institute**, “Garnishment: The Untold Story,” Technical Report 2014.
- Akerlof, George A.**, “The Market For “Lemons”: Quality Uncertainty and the Market Mechanism,” *Quarterly Journal of Economics*, 1970, *84* (3), 488–500.
- Auclert, Adrien, Will Dobbie, and Paul Goldsmith-Pinkham**, “Macroeconomic Effects of Debt Relief: Consumer Bankruptcy Protections in the Great Recession,” March 2019. NBER Working Paper No. 25685.
- Carter, Carolyn**, “No Fresh Start 2020: Will States Let Debt Collectors Push Families Into Poverty in the Wake of a Pandemic?,” Technical Report, National Consumer Law Center October 2020.
- Cordell, Larry and Lauren Lambie-Hanson**, “A cost-benefit analysis of judicial foreclosure delay and a preliminary look at new mortgage servicing rules,” *Journal of Economics and Business*, 2016, *84*, 30–49. Special Issue on Regulating Consumer Credit.
- Dávila, Eduardo**, “Using Elasticities to Derive Optimal Bankruptcy Exemptions,” *The Review of Economic Studies*, 10 2019, *87* (2), 870–913.
- Di Maggio, Marco, Angela T Ma, and Emily Williams**, “In the Red: Overdrafts, Payday Lending and the Underbanked,” December 2020. NBER Working Paper No. 28242.
- Dobbie, Will and Jae Song**, “Debt relief and debtor outcomes: Measuring the effects of consumer bankruptcy protection,” *American Economic Review*, 2015, *105* (3), 1272–1311.
- , **Paul Goldsmith-Pinkham, and Crystal S Yang**, “Consumer bankruptcy and financial health,” *Review of Economics and Statistics*, 2017, *99* (5), 853–869.
- , —, **Neale Mahoney, and Jae Song**, “Bad Credit, No Problem? Credit and Labor Market Consequences of Bad Credit Reports,” *Journal of Finance*, 2020.
- Dobkin, Carlos, Amy Finkelstein, Raymond Kluender, and Matthew J Notowidigdo**, “Myth and measurement: the case of medical bankruptcies,” *The New England Journal of Medicine*, 2018, *378* (12), 1076.
- Domowitz, Ian and Robert L. Sartin**, “Determinants of the Consumer Bankruptcy Decision,” *The Journal of Finance*, 1999, *54* (1), 403–420.
- Exler, Florian, Igor Livshits, James MacGee, and Michèle Tertilt**, “Consumer credit with over-optimistic borrowers,” 2020. CEPR Discussion Paper No. DP15570.
- Fay, Scott, Erik Hurst, and Michelle J White**, “The household bankruptcy decision,” *American Economic Review*, 2002, *92* (3), 706–718.
- Fisher, Jonathan and Angela Lyons**, “Information and credit access: Using bankruptcy as a signal,” *Applied Economics*, 2010, *42* (25), 3175–3193.
- Gan, Li, Manuel A. Hernandez, and Shuoxun Zhang**, “Insurance or deliberate use of the bankruptcy law for financial gain? Testing for heterogeneous filing behaviors in the United States,” *Economic Modelling*, 2021, *105*, 105673.

- Gerardi, Kristopher, Lauren Lambie-Hanson, and Paul S. Willen**, “Do borrower rights improve borrower outcomes? Evidence from the foreclosure process,” *Journal of Urban Economics*, 2013, 73 (1), 1–17.
- Government Accountability Office (GAO)**, “Bankruptcy Reform: Dollar Costs Associated with the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005,” Technical Report GAO-08-697 June 2008.
- Gropp, Reint, John Karl Scholz, and Michelle J White**, “Personal bankruptcy and credit supply and demand,” *The Quarterly Journal of Economics*, 1997, 112 (1), 217–251.
- Gross, Tal, Matthew J Notowidigdo, and Jialan Wang**, “Liquidity constraints and consumer bankruptcy: Evidence from tax rebates,” *Review of Economics and Statistics*, 2014, 96 (3), 431–443.
- , **Raymond Kluender, Feng Liu, Matthew J Notowidigdo, and Jialan Wang**, “The economic consequences of bankruptcy reform,” *American Economic Review*, 2021, 111 (7), 2309–41.
- Indarte, Sasha**, “The Impact of Debt Relief Generosity and Liquid Wealth on Household Bankruptcy,” 2019. SSRN Working Paper No. 3378669.
- Ivashina, Victoria, Benjamin Iverson, and David C Smith**, “The Ownership and Trading of Debt Claims in Chapter 11 Restructurings,” *Journal of Financial Economics*, 2016, 119 (2), 316–335.
- Keys, Benjamin J.**, “The Credit Market Consequences of Job Displacement,” *The Review of Economics and Statistics*, 2018, 100 (3), 405–415.
- Kluender, Raymond, Neale Mahoney, Francis Wong, and Wesley Yin**, “Medical Debt in the US, 2009–2020,” *JAMA*, 2021, 326 (3), 250–256.
- Lefgren, Lars and Frank McIntyre**, “Explaining the puzzle of cross-state differences in bankruptcy rates,” *The Journal of Law and Economics*, 2009, 52 (2), 367–393.
- Livshits, Igor, James MacGee, and Michèle Tertilt**, “Consumer Bankruptcy: A Fresh Start,” *American Economic Review*, March 2007, 97 (1), 402–418.
- , —, and —, “Accounting for the Rise in Consumer Bankruptcies,” *American Economic Journal: Macroeconomics*, April 2010, 2 (2), 165–93.
- Luck, Stephan and Joao AC Santos**, “The valuation of collateral in bank lending,” *Available at SSRN 3467316*, 2021.
- Mahoney, Neale**, “Bankruptcy as Implicit Health Insurance,” *American Economic Review*, February 2015, 105 (2), 710–46.
- Parra, Carlos**, “How Does Consumer Bankruptcy Protection Impact Household Outcomes?” 2018. SSRN Working Paper No. 2808851.
- Razeto, Catherine and Charles Romeo**, “Consumer Bankruptcy, BAPCPA, and the Great Recession,” Quarterly Consumer Credit Trends Report August 2019.

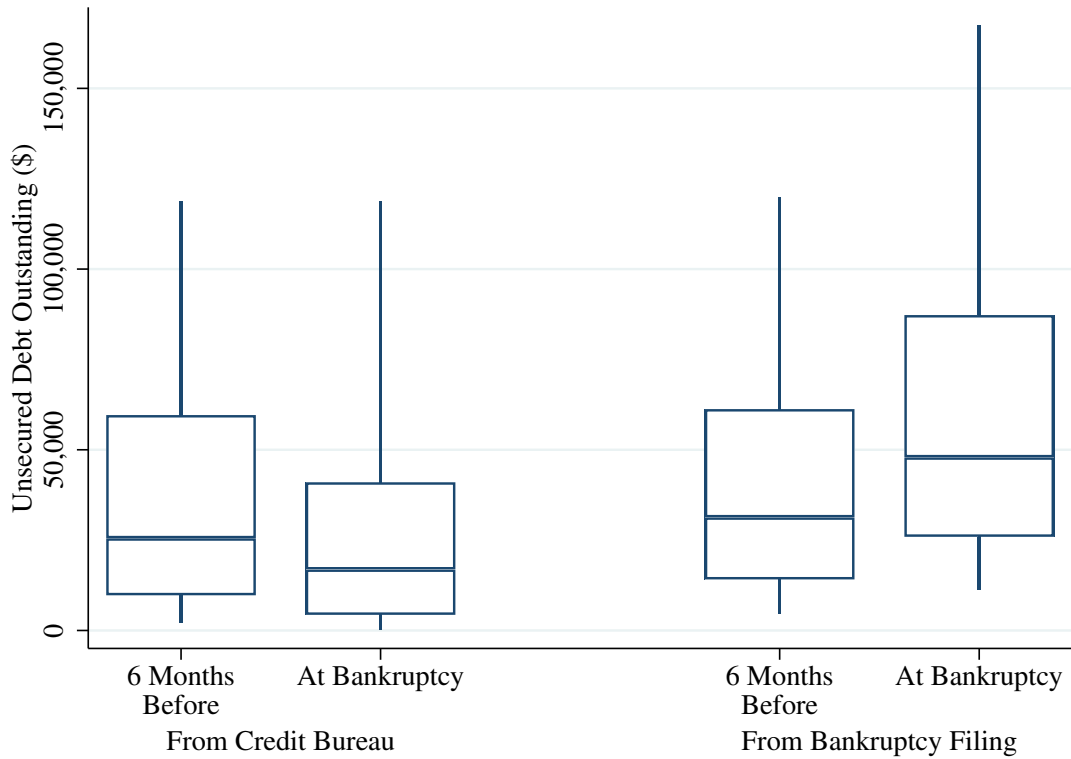
- Romeo, Charles and Ryan Sandler**, “The Effect of Bankruptcy Exemptions on Access to Credit,” 2021. Working Paper.
- Severino, Felipe and Meta Brown**, “Personal bankruptcy protection and household debt,” 2017. SSRN Working Paper No. 2447687.
- Stavins, Joanna**, “Credit card borrowing, delinquency, and personal bankruptcy,” *New England Economic Review*, 2000, (Jul), 15–30.
- Stiglitz, Joseph E and Andrew Weiss**, “Credit rationing in markets with imperfect information,” *American Economic Review*, 1981, 71 (3), 393–410.
- United States Courts**, “BAPCPA Report - 2018,” Technical Report 2019.
- Zhang, Shuoxun, Tarun Sabarwal, and Li Gan**, “Strategic or nonstrategic: The role of financial benefit in bankruptcy,” *Economic Inquiry*, 2015, 53 (2), 1004–1018.

Figure 1: Evolution of Debt on Credit Reports Before Bankruptcy



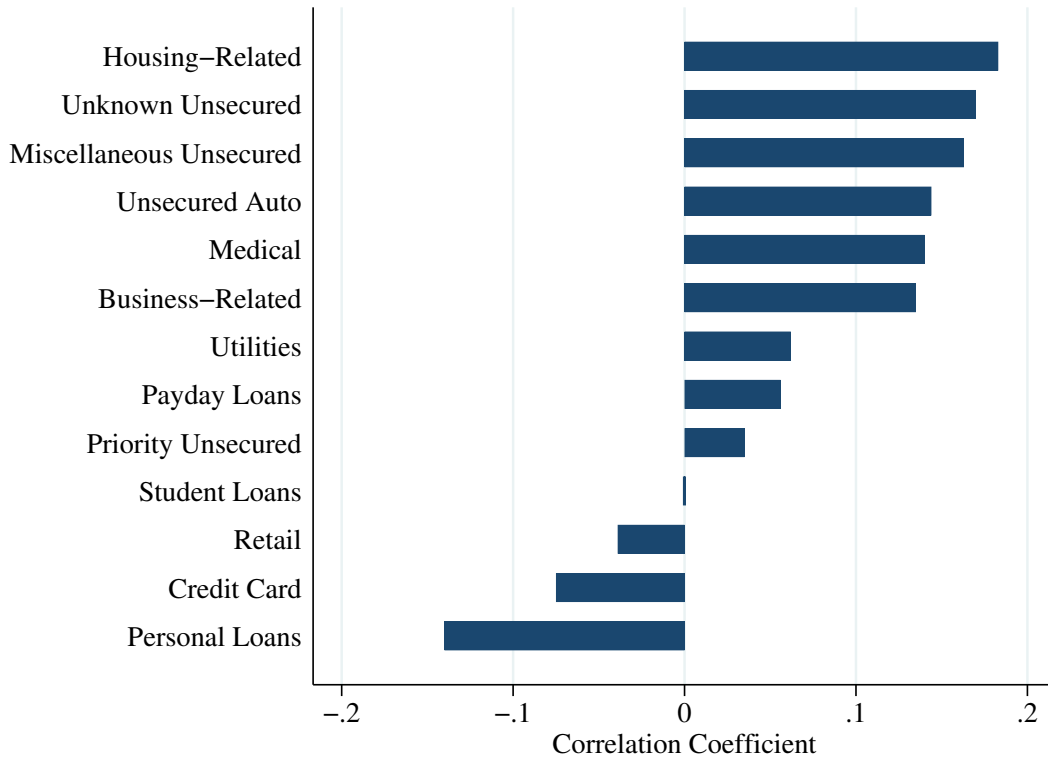
Notes: Figure plots the evolution of debt levels and credit limits as recorded by a major credit bureau for three years prior to bankruptcy. Point estimates and standard errors are displayed after removing year-month fixed effects. Sample includes all individuals in the nationwide credit bureau data who enter bankruptcy with at least three years of data prior to filing. Plotted coefficients and 95% confidence intervals are relative to month $t - 36$, the omitted time period. Panel A displays total debt balances, panel B displays total unsecured debt, and panel C displays the total revolving credit limit.

Figure 2: The Distribution of Pre-Bankruptcy Unsecured Debt by Data Source



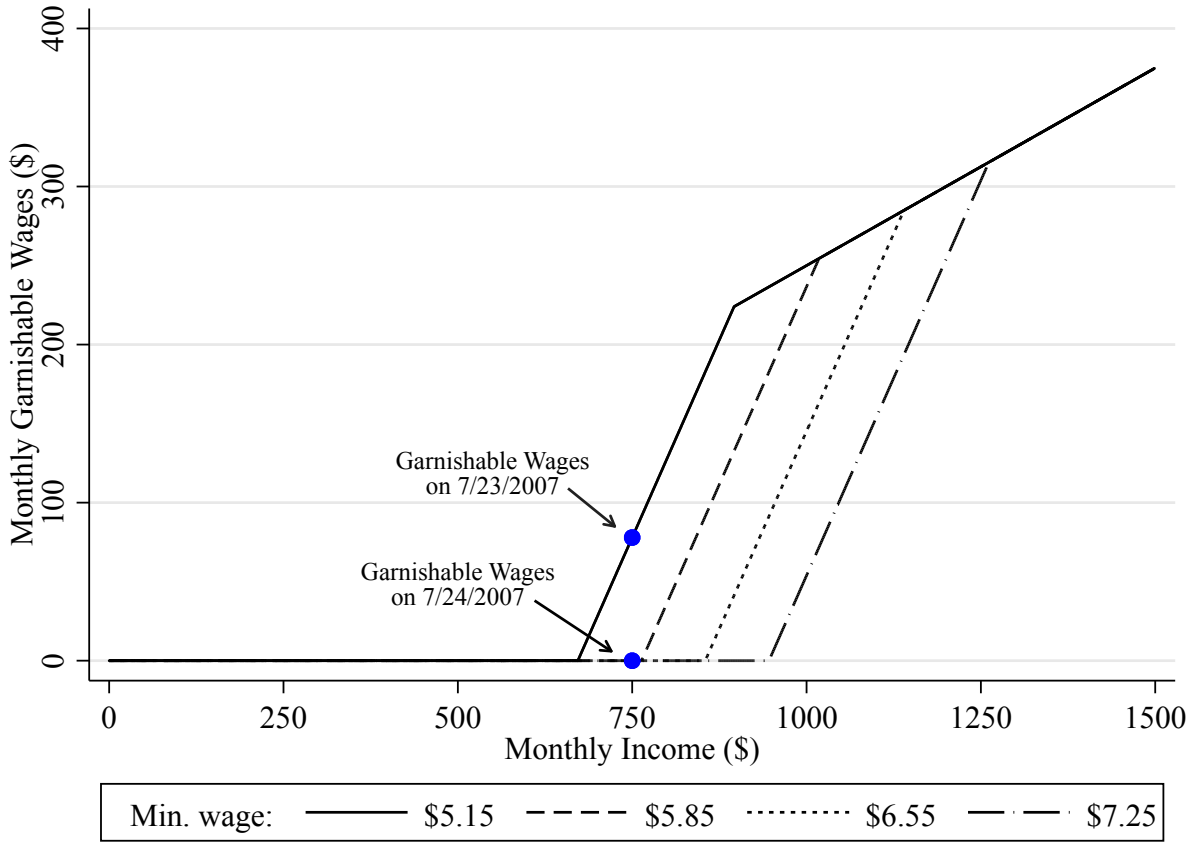
Notes: Figure shows box-and-whisker plots of the distribution of total unsecured debt reported by the credit bureau (left) and in the bankruptcy filing schedules (right). Box-and-whisker plots for 6 months prior to bankruptcy and at the time of bankruptcy are shown for each source. The extremities of the whiskers display the 10th and 90th percentiles of total unsecured debt outstanding; the top and bottom of each box is the 75th and 25th percentile. The horizontal line through each box reflects the median amount of debt. Sample includes all individuals in the matched credit bureau sample who also have specific debt origination dates recorded in their bankruptcy schedules.

Figure 3: Correlations Between Shadow Debt Share and Unsecured Debt Category Shares



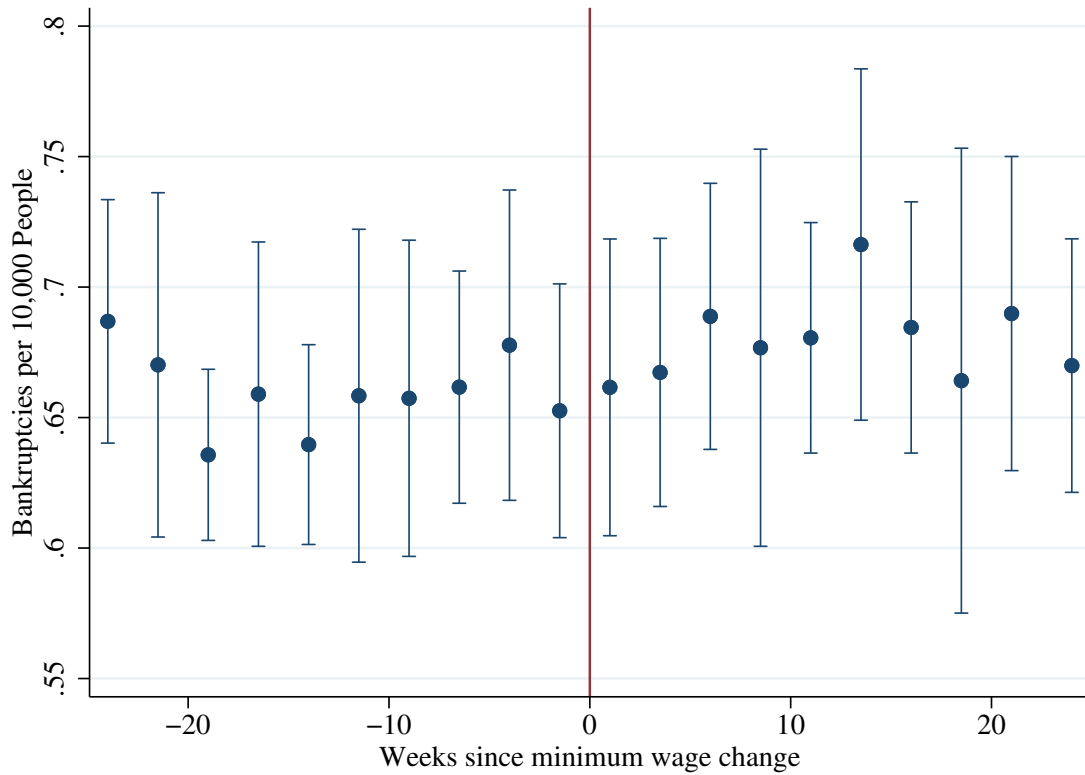
Notes: Figure plots the bivariate correlation coefficient between each listed unsecured debt category's share of total debt and the unsecured shadow debt share of total debt of at the individual level. The shadow debt share is the share of unsecured debt discharged in bankruptcy not reported in credit-bureau data. Unsecured liabilities are allocated to unsecured debt categories from textual descriptions using the LDA procedure described in Appendix B.

Figure 4: Monthly Garnishable Wages by Federal Minimum Wage Level



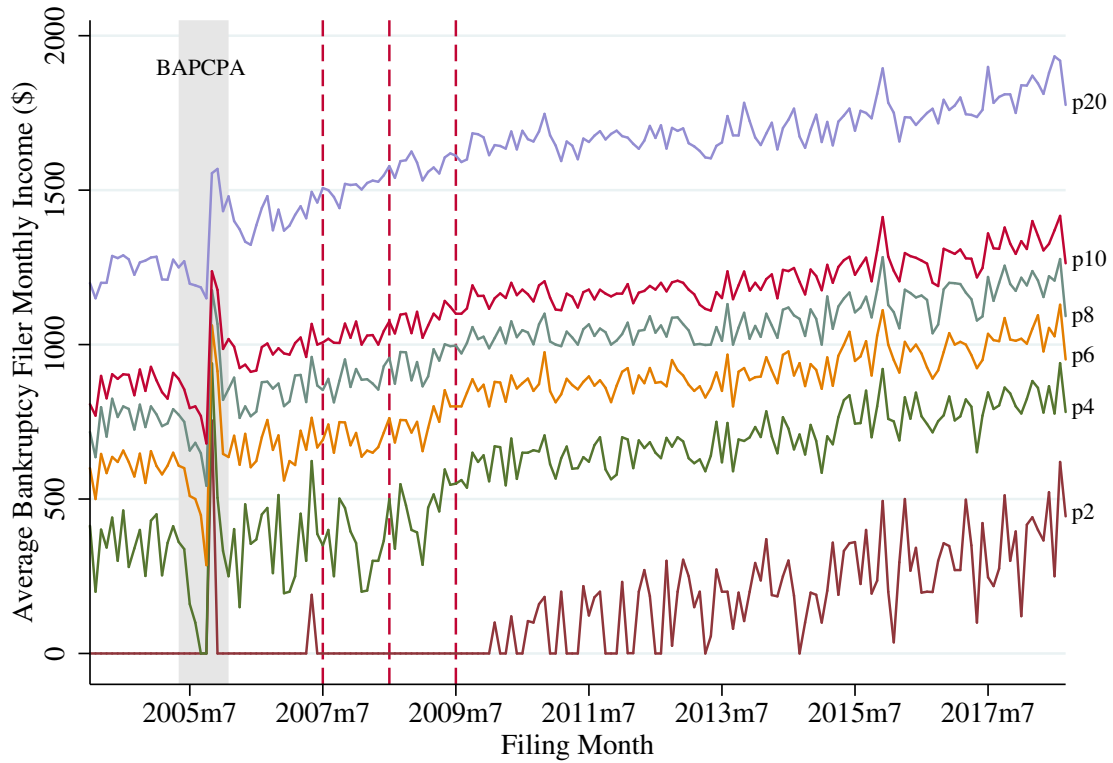
Notes: Figure plots the maximum level of monthly wages that are eligible for wage garnishing as a function of a household's monthly income for each of four federal minimum wage regimes according to equation (1) with $\omega_s = 30$, corresponding to the Florida and Utah statutes.

Figure 5: Bankruptcy Counts Around Minimum Wage Changes



Notes: Figure plots the weekly average number of bankruptcies per 10,000 people across Florida, Minnesota, and Utah after controlling for the local unemployment rate and state and week-of-year fixed effects. Graph displays the six months before and the six months after the changes in minimum wage laws along with 95% confidence intervals.

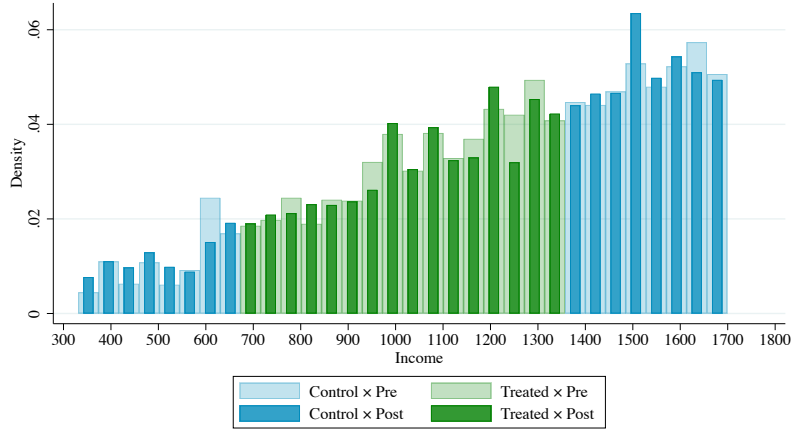
Figure 6: Distribution of Bankruptcy Filer Income



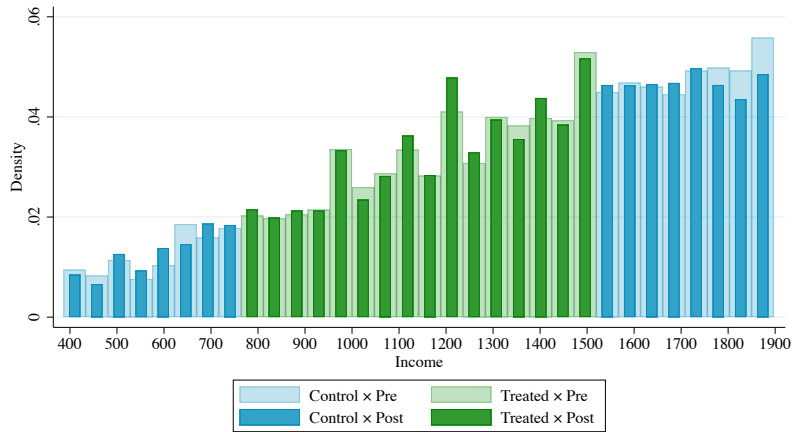
Notes: Figure plots percentiles of bankruptcy filer incomes by the month of filing. Dashed vertical lines indicate the timing of three federal minimum wage changes that affected wage garnishing for treated filers in our sample. Gray shaded area marks the announcement and passage of the Bankruptcy Abuse Prevention And Consumer Protection Act of 2005 that Gross et al. (2021) show had a large effect on personal bankruptcy filing.

Figure 7: Income Histograms of Bankruptcy Filers Around Minimum Wage Changes

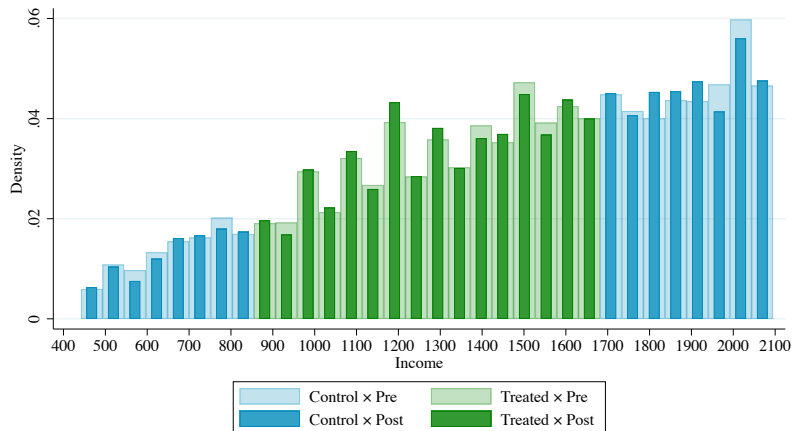
A. July 2007 Minimum Wage Change



B. July 2008 Minimum Wage Change



C. July 2009 Minimum Wage Change



Notes: Figures plot histograms of bankruptcy filer incomes one year before and one year after the three minimum wage changes during our sample period. Blue bars show the control regions where wage garnishment was not affected by the minimum wage change. Green regions are the treated regions where wage garnishment was affected. Transparent background bars show the histogram from the pre-period, and solid foreground bars are the same distribution in the post-period.

Table 1: Summary Statistics: Full Sample of Bankruptcy Filings

Variable	Mean	Std. Dev.	Percentile		
			25th	50th	75th
Monthly Income (\$)	2,973.3	1,682.3	1,786.8	2,700	3,902.2
Monthly Garnishable Wages (\$)	727.03	442.81	446.7	675	975.55
Total Assets (\$)	133,738.0	207,304.2	10,380.9	84,265.3	197,556.9
Total Debt (\$)	238,809.2	673,127.3	52,545.6	148,959.6	282,618.1
Mortgage Debt (\$)	108,291.2	171,334.7	0	64,074	169,900
Unsecured Debt (\$)	96,502.3	570,631.5	24,502	44,835.5	82,656.4
Unsecured Debt Share	0.53	0.36	0.19	0.46	0.94
Chapter 7 Indicator	0.74	0.44	0	1	1
Married Indicator	0.34	0.47	0	0	1
Divorced Indicator	0.11	0.32	0	0	0
Separated Indicator	0.04	0.19	0	0	0
Single Indicator	0.21	0.41	0	0	0
Widowed Indicator	0.02	0.13	0	0	0
Unknown Marital Status Indicator	0.28	0.45	0	0	1
Homeowner Indicator	0.56	0.50	0	1	1
Business Owner Indicator	0.24	0.43	0	0	0
Filing Jointly Indicator	0.33	0.47	0	0	1
Number of Dependents	0.98	1.27	0	0	2
Unemployed Indicator	0.12	0.33	0	0	0
Retired Indicator	0.06	0.24	0	0	0
Disabled Indicator	0.03	0.16	0	0	0

Notes: Table reports summary statistics for the universe of bankruptcy schedules. Monthly income is the self-reported current income from the filing schedules. Monthly garnishable wages is the dollar amount of monthly wage income that is exposed to garnishing according to the applicable state statute at the time of bankruptcy filing. N = 554,942.

Table 2: Share of Debt by Loan Category

Category	% of (Un)Secured	% of Total	% with Loan Type
<i>A. Secured Debt</i>			
Mortgage	63.29%	35.59%	51.62%
Auto Loan	29.18%	6.73%	47.74%
Miscellaneous Secured	3.10%	1.36%	7.16%
Unknown Secured	2.43%	0.79%	5.58%
Household Goods	1.39%	0.18%	5.37%
Other Vehicle	0.61%	0.20%	2.22%
Secured Debt Total	100.00%	44.84%	
<i>B. Unsecured Debt</i>			
Credit Card	30.41%	14.76%	76.60%
Personal Loan	12.50%	6.55%	52.55%
Retail Debt	10.87%	5.39%	71.00%
Unknown Unsecured	8.79%	5.18%	58.06%
Student Loan	7.77%	4.92%	24.72%
Medical	7.43%	4.46%	55.69%
Unsecured Auto	6.00%	3.91%	24.96%
Miscellaneous Unsecured	5.84%	3.42%	38.78%
Unsecured Priority Claims	3.25%	1.80%	22.91%
Housing Related	3.22%	2.50%	9.99%
Utilities	1.92%	1.00%	41.42%
Business Debt	1.31%	0.75%	4.80%
Payday Loans/Check Cashers	0.70%	0.39%	8.82%
Unsecured Debt Total	100.00%	55.03%	

Notes: Table reports the average share of secured debt that falls into each of 6 secured loan categories (panel A), the average share of unsecured debt that falls into each of 13 unsecured loan categories (panel B), and each category's share of total debt. The final column reports the share of bankruptcy filers that have at least one loan in each category. The miscellaneous category includes smaller categories such as unpaid insurance premia, non-priority tax liabilities, bad checks, fees, legal fees, and loans against retirement accounts or certificates of deposit. Unknown categories include all loans that did not provide enough information to be categorized. Unsecured Priority Claims include tax, child support, and alimony claims reported in Schedule E for each bankruptcy filer. See Appendix B for a detailed description of our categorization algorithm. N = 554,942.

Table 3: Summary Statistics: Credit-Bureau-Matched Sample

Variable	Mean	Std. Dev.	Percentile		
			25th	50th	75th
<i>A. Bankruptcy Filing Variables</i>					
Monthly Income (\$)	3,577.5	1,785.1	2,320.9	3,360	4,586.4
Monthly Garnishable Wages (\$)	886.12	459.83	580.24	840	1,146.61
Total Assets (\$)	245,021.2	251,136.2	125,937.0	190,834.6	286,408.5
Total Debt (\$)	394,914.6	499,685.4	194,233.9	283,777.9	442,075.2
Mortgage Debt (\$)	212,206.9	220,722.8	106,900	164,600	249,000
Unsecured Debt (\$)	97,317.1	222,097.8	29,602	54,137.5	97,809.2
Unsecured Debt Share	0.26	0.20	0.12	0.21	0.34
Chapter 7 Indicator	0.68	0.47	0	1	1
Married Indicator	0.51	0.5	0	1	1
Divorced Indicator	0.12	0.32	0	0	0
Separated Indicator	0.04	0.19	0	0	0
Single Indicator	0.19	0.39	0	0	0
Widowed Indicator	0.02	0.13	0	0	0
Unknown Marital Status Indicator	0.13	0.34	0	0	0
Homeowner Indicator	0.94	0.23	1	1	1
Business Owner Indicator	0.31	0.46	0	0	1
Filing Jointly Indicator	0.44	0.50	0	0	1
Number of Dependents	1.09	1.29	0	1	2
Unemployed Indicator	0.12	0.33	0	0	0
Retired Indicator	0.06	0.23	0	0	0
Disabled Indicator	0.02	0.14	0	0	0
<i>B. Credit-Record Derived Variables</i>					
Total Debt (\$)	259,044.9	227,790.7	133,086.5	211,034	317,250
Unsecured Debt (\$)	55,636.9	139,892.6	5,527.5	19,013	47,623.5
Mortgage Debt (\$)	195,899.9	152,242.2	103,000	172,000	255,000
Revolving Debt (\$)	19,226.7	38,177.8	981	6,260.5	20,467
Shadow Debt (\$)	41,680.2	247,231.9	3,553	27,750.5	66,775.4
Shadow Debt Share of Total Debt	0.07	0.38	0.01	0.11	0.23
Months to File	22.3	20.9	6.8	15.3	31.1
Credit Score	508.0	77.4	454	508	563

Notes: Table reports summary statistics for bankruptcy filings that merged with our credit-bureau sample. Panel A reports statistics on the same variables as Table 1 for comparison—see notes to Table 1 for further details. Panel B reports statistics on variables derived from credit records. Revolving debt is the total amount of debt listed on the filer’s credit report at the time of bankruptcy that was revolving (i.e., as opposed to installment payments for a fixed loan size). Shadow debt is the amount of unsecured debt reported on bankruptcy filings but not on credit reports. Months to file is the number of days divided by 30 that elapsed between an individual’s first 90-day delinquency on any debt in the credit report and the bankruptcy filing date. Credit score is a proprietary risk measure from our credit bureau for the bankruptcy petitioner as of the month of bankruptcy filing. N = 47,960.

Table 4: Effect of Wage Garnishing on Shadow Debt Share of Total Debt

	(1)	(2)	(3)	(4)
Treatment \times Garnishable Wages	-0.0205** (0.0094)	-0.0185* (0.0093)	-0.0175* (0.0096)	-0.0186** (0.0091)
Filer Controls	✓	✓	✓	✓
Year Fixed Effects	✓		✓	✓
District Fixed Effects	✓		✓	✓
District \times Year Fixed Effects		✓		
Income \times Year Controls			✓	
Income Quartile Controls				✓
R^2	0.51	0.51	0.50	0.51
Observations	47,960	47,960	47,960	47,960

Notes: Table reports regression results using the credit-bureau-matched sample. Dependent variable is shadow debt, defined as the dollar difference between total unsecured debt discharged in bankruptcy and the total unsecured debt reported in credit-bureau data as a share of total debt reported on bankruptcy filing. Dependent variable mean is 0.07. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). All specifications control for main effects for treatment, garnishable wages, and treatment \times income. Filer controls include income, number of dependents, Vantage credit score, log(total assets), and indicators for filing chapter, marital status, homeownership, business ownership, retired status, employment status, and disabled status. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Effect of Wage Garnishing on Unsecured Debt Share of Total Debt

Sample:	(1)	(2)	(3)	(4)	(5)
	Credit-bureau-matched				Full
Treatment \times Garnishable Wages	-0.009*** (0.0028)	-0.009*** (0.0028)	-0.012*** (0.0029)	-0.009*** (0.0029)	-0.0046*** (0.0014)
Filer Controls	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓	✓	✓
District Fixed Effects	✓		✓	✓	✓
District \times Year Fixed Effects		✓			
Income \times Year Controls			✓		
Income Quartile Controls				✓	✓
R^2	0.60	0.60	0.60	0.60	0.75
Observations	47,960	47,960	47,960	47,960	554,942

Notes: Table reports regressions of the effect of wage garnishment on unsecured debt in the credit-bureau-matched sample (columns 1-4) and the full sample (column 5). Dependent variable is the fraction of total debt disclosed in bankruptcy that is unsecured. Dependent variable mean is 0.26 for the credit-bureau-matched sample and 0.53 in the full sample. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). All specifications control for main effects for treatment, garnishable wages, and treatment \times income. Filer controls include income, number of dependents, Vantage credit score, log(total assets), and indicators for filing chapter, marital status, homeownership, business ownership, retired status, employment status, and disabled status. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Effect of Wage Garnishing on Bankruptcy Filing Timing in Months

	(1)	(2)	(3)	(4)
Treatment \times Garnishable Wages	-1.12*** (0.37)	-0.78** (0.38)	-1.03** (0.45)	-1.19*** (0.38)
Filer Controls	✓	✓	✓	✓
Year Fixed Effects	✓		✓	✓
District Fixed Effects	✓		✓	✓
District \times Year Fixed Effects		✓		
Income \times Year Controls			✓	
Income Quartile Controls				✓
R^2	0.60	0.61	0.60	0.60
Observations	47,960	47,960	47,960	47,960

Notes: Table reports regression results using the credit-bureau-matched sample. Dependent variable is the number of months between the first 90-day delinquency and the bankruptcy filing date, defined as the number of days to file divided by 30. Dependent variable mean is 22.3. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). All specifications control for main effects for treatment, garnishable wages, and treatment \times income. Filer controls include income, number of dependents, Vantage credit score, log(total assets), and indicators for filing chapter, marital status, homeownership, business ownership, retired status, employment status, and disabled status. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: Effect of Wage Garnishing on Debt Origination Timing

	(1)	(2)	(3)	(4)
Treatment \times Garnishable Wages	-0.0079** (0.0039)	-0.0052* (0.0028)	-0.0094*** (0.0010)	-0.0086** (0.0042)
Filer Controls	✓	✓	✓	✓
Year Fixed Effects	✓		✓	✓
District Fixed Effects	✓		✓	✓
District \times Year Fixed Effects		✓		
Income \times Year Controls			✓	
Income Quartile Controls				✓
Observations	80,545	80,545	80,545	80,545

Notes: Table reports regressions using the sample of filings that have precise debt origination date information. Dependent variable is the fraction of total debt disclosed in bankruptcy that is originated in the 6 months directly before filing. Dependent variable mean is 0.05. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). Filer controls include income, number of dependents, Vantage credit score, log(total assets), and indicators for filing chapter, marital status, homeownership, business ownership, retired status, employment status, and disabled status. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8: Effect of Wage Garnishing on 2-year Bankruptcy Propensity

	(1)	(2)	(3)	(4)
Treatment \times Garnishable Wages	-0.00002 (0.00002)	-0.00002 (0.00001)	-0.00002 (0.00001)	-0.00002 (0.00001)
Filer Controls	✓	✓	✓	✓
Year FEs	✓		✓	✓
District FEs	✓		✓	✓
District \times Year FEs		✓		
Income \times Year Controls			✓	
Income Quintile Controls				✓
R^2	0.50	0.50	0.50	0.50
Observations	879,897	879,897	879,897	879,897

Notes: Table reports regressions using all individuals who become 90-days delinquent in the nationwide credit bureau data. Dependent variable is an indicator of whether the individual files for bankruptcy within two years of becoming 90-day delinquent. Dependent variable mean is 0.12. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300), and income is imputed based on the individuals' debt-to-income ratios and implied monthly mortgage payments reported in matched McDash data at the time of their most recent mortgage origination. Filer controls include income, Vantage credit score, and indicators for filing chapter. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix

A Personal Bankruptcy Background

Individuals filing for bankruptcy in the U.S. can choose to file under Chapter 7 or Chapter 13 of the bankruptcy code. In Chapter 7, the debtor can protect certain exempt assets from creditors, including some home equity or a vehicle as well as personal property such as food, clothing, and furniture, but remaining assets must be turned over to a trustee to help pay creditors.³⁴ In our sample, 87% of all Chapter 7 filers do not have assets above the exemption limit and thus keep all of their personal property. Regardless, after turning over all non-exempt property, nearly all debt is discharged and the individual has no further obligation to repay these debts. Liabilities that are not discharged include secured claims in which the debtor retains the asset (e.g., a mortgage is not discharged if the debtor keeps the home), alimony and child support, some taxes, court fees, and student loans.

While this discharge can be highly beneficial for the debtor, bankruptcy comes with a variety of costs. The total cost of court filing fees, attorney fees, and mandatory debt counseling fees average about \$1,400 (GAO, 2008). While this fee is small compared to the average amount of discharged debt, Gross, Notowidigdo, and Wang (2014) show that liquidity constraints prevent a large number of individuals from filing. In addition, an individual can only obtain a Chapter 7 discharge every eight years such that filing for bankruptcy comes at the cost of losing the option to discharge debt in the medium term. Other consequences include having a bankruptcy flag on one's credit report for ten years after filing, which limits access to credit (Dobbie, Goldsmith-Pinkham, Mahoney, and Song, 2020) and imposes possible negative stigma.

Individuals who file for Chapter 13 bankruptcy propose a three- to five-year plan to repay some of their unsecured debt. Dobbie, Goldsmith-Pinkham, and Yang (2017) estimate that Chapter 13 filers propose to repay an average of 36% of their unsecured debt with the rest discharged. In exchange, debtors are allowed to keep non-exempt assets. Due to additional legal filing requirements, Chapter 13 is considerably more expensive than Chapter 7, costing the average filer about \$3,400 (GAO, 2008). Debtors who discharge debt in Chapter 13 cannot file for Chapter 7 for six years and cannot re-enter Chapter 13 for two years. Chapter 13 bankruptcy flags stay on the filer's credit report for seven years after the filing. While many prospective bankruptcy filers can choose either Chapter 7 or Chapter 13, individuals with relatively high income may not pass the required means test and would be deemed ineligible to file for Chapter 7.

For our purposes, important aspects of bankruptcy law are whether debtors can pay back debt immediately before bankruptcy and whether debt incurred immediately prior to the bankruptcy is still dischargeable. In order to ensure equal treatment of like creditors in a bankruptcy proceeding, the U.S. Bankruptcy Code instructs bankruptcy trustees to reverse any payment by already insolvent bankruptcy filers to creditors close to a bankruptcy filing that meets certain conditions (11 U.S. Code § 547(b)). In the case of personal bankruptcy filers, these conditions depend on whether the paid creditor was an insider or outsider. Trustees are to undo a payment exceeding \$600 to an outside creditor made within 90 days of filing and to an inside creditor made up to one year before filing that resulted in the creditor receiving more than would have been received from the bankruptcy proceeding, provided the payment was not part of the "ordinary financial affairs" of the debtor and (11 U.S. Code § 547(c)).

If debt incurred in the months prior to filing cannot be discharged, then individuals would obviously have no incentive to strategically increase debt levels prior to entering bankruptcy. The

³⁴While bankruptcy law is set at the federal level, exemption limits are set by states individually.

U.S. Bankruptcy Code prevents discharge of debts incurred under “false pretenses, a false representation, or actual fraud” (11 U.S. Code § 523(a)(2)(A)). The Code specifically outlines that debts incurred for luxury goods or services within 90 days of bankruptcy or cash advances within 70 days of bankruptcy are presumed to be non-dischargeable. However, the burden of proof is on the creditor to prove actual fraud by the debtor. Specifically, a creditor must prove to the court that the debtor made a representation which they knew at the time was false with the intention to deceive the creditor (In re Apte, 96 F.3d 1319, 1322 and In re Kirsh, 973 F.2d 1454, 1457). Debts arising from reckless negligence are still dischargeable because the debtor was not intentionally deceiving the creditor. Due to this high bar, very few non-dischargeability actions are filed by creditors, making it possible for debtors to discharge nearly all debts incurred in the run-up to a bankruptcy filing.³⁵

B Loan Categorization Details

We use both keyword searches and Latent Dirichlet Allocation (LDA) to categorize loans into categories, and this breakdown is displayed in Table 2. While most category labels are self-explanatory, a few categories benefit from further explanation. Retail debt contains store-brand credit cards as well as unsecured debt used to purchase big-ticket items such as furniture or jewelry. Unsecured auto debt is mostly made up of loan deficiency claims after an automobile has been repossessed but also contains loans taken out for car maintenance (e.g., tire purchases). Unsecured priority claims are reported separately in Schedule E of the bankruptcy filings and contain unpaid taxes, child support, and alimony. Housing-related unsecured liabilities include unpaid rent and homeowners association fees. Finally, we combine some smaller categories into catch-all miscellaneous groups. Miscellaneous secured debts include secured tax liens, insurance claims, 401(k) loans, timeshare and association fees, loans against certificates of deposit, secured business debt, secured utilities, and secured credit cards. Miscellaneous unsecured debts include bad checks, fees, non-priority taxes, legal fees, and insurance dues.

C Credit-Bureau Merge

Our second data source is a sample of credit-bureau records. The credit-bureau data available to us contain only individuals who have had or currently have a mortgage serviced by one of the top twenty mortgage servicers by size during our time period. In our overall bankruptcy sample, 56% of the bankruptcy filers report owning real estate, and this number is only slightly lower (51%) for chapter 7 filers. In this credit-bureau data, there are 188,975 individuals with a bankruptcy filing in Florida, Minnesota, or Utah between 2004 and 2018. However, because the bankruptcy data does not contain the Middle District of Florida our maximum number of matches is strictly less than this. We anonymously match the two datasets using a series of merges that take advantage of common information in both datasets. In particular, we have the 3- or 5-digit ZIP code, the month of bankruptcy filing, and specific debt amounts in each dataset. We merge the datasets

³⁵There is no systematic evidence on the number of non-dischargeability claims filed in bankruptcy cases. However, David Sime, the clerk of court for the Bankruptcy District of Utah, estimated in an interview that the total number of non-dischargeability actions filed in a year in Utah is at most in the hundreds and that such actions are not generally contesting debt strategically incurred just before bankruptcy, but instead relate to other non-dischargeable debt such as alimony and child support. For context, we estimate that in an average year, Utah has about 11,000 personal bankruptcy cases with an average of 30 unsecured debts per case. We conclude that only a tiny portion of all unsecured debts are contested—even if there are 1,000 non-dischargeability claims filed in Utah in a year (an order of magnitude above Sime’s estimate), they would only comprise 0.3% of all unsecured claims.

by looking for matches that are unique on sets of these characteristics. For example, if there is a single bankruptcy filing in a given month-3-digit zip cell in both the bankruptcy and credit-bureau datasets, we consider this a match. When there are multiple entries in the same month-zip, we use loan amounts to detect matches, such as matching mortgage amounts. In all cases, we require that first mortgage amounts between the two datasets are within 10% of each other to ensure that the matches are correct. In 53% of cases, loan amounts are within 1% of each other, suggesting very high match fidelity. This process results in a total of 55,357 bankruptcy filings that are matched to credit-bureau records. We require at least 30 days between the first 90 day delinquency and the bankruptcy filing and filter on income similar to the broader sample. This results in 47,960 merged observations.

The matched credit-bureau sample is somewhat different from the overall sample since all matched individuals must have or have had a mortgage in order to appear in our credit-bureau data. For comparison, panel A of Table 3 reports summary statistics for this merged sample on the same set of bankruptcy filing characteristics described in Table 1. The share of unsecured debt is lower in this sample; total assets, debt, and income are higher; and the percentage that own a home at the time of filing is near 100%. Meanwhile, other characteristics are very similar, including the number of dependents, the percentage that filed a Chapter 7 bankruptcy, the share that are retired, and the share that are disabled. Panel B of Table 3 reports statistics on variables that we only observe by virtue of the match between bankruptcy filings and credit records. Total debt and unsecured debt observed on the credit records is much less than total debt listed on bankruptcy filings, which we discuss at length in section 5.1. Mortgage debt is very similar between bankruptcy filings and credit-bureau records, consistent with our intuition above that secured debt is most likely to be formally registered with credit bureaus. Average revolving debt—mostly consisting of credit card debt—is approximately \$19,000 for the matched sample. Total shadow debt—including formal and informal flavors as defined in section 5.1—averages \$41,680 or 7% of total debt on average. Besides detecting shadow debt, one of our primary uses of the credit-bureau data is to calculate the days between when an individual first becomes 90 days past due on any debt and when they enter bankruptcy, a key measure to document the validity of our identification strategy. Our months to file variable averages 22.3 months, with significant variation between the 25th percentile (just over one month) and the 75th percentile (just over two years). The credit bureau provided us with Vantage Scores, a credit risk score comparable to a FICO score. For the merged sample, the average bankruptcy filer has a credit score of 508 in their month of filing—in line with their widespread delinquencies.

We note potential external-validity concerns for the empirical tests that rely on the merging of a sample of low-income bankruptcy filers with a sample of borrowers that had a mortgage in the last six months. Because the full bankruptcy sample differs from the matched credit-bureau sample, we present empirical results for both datasets wherever possible. The merged sample essentially trades off the benefits of measuring shadow debt and filing delays against the cost of a potentially less representative sample. However, homeownership among low-income bankruptcy filers is surprisingly common—roughly 35% of our treated sample own mortgaged real estate—suggesting our results are representative of a sizable share of bankruptcy filers.

D Wage Garnishment Background

While many factors affect if and when an individual files for bankruptcy, our identification strategy focuses on the role of wage garnishing. Wages can be garnished by any creditor who secures a court

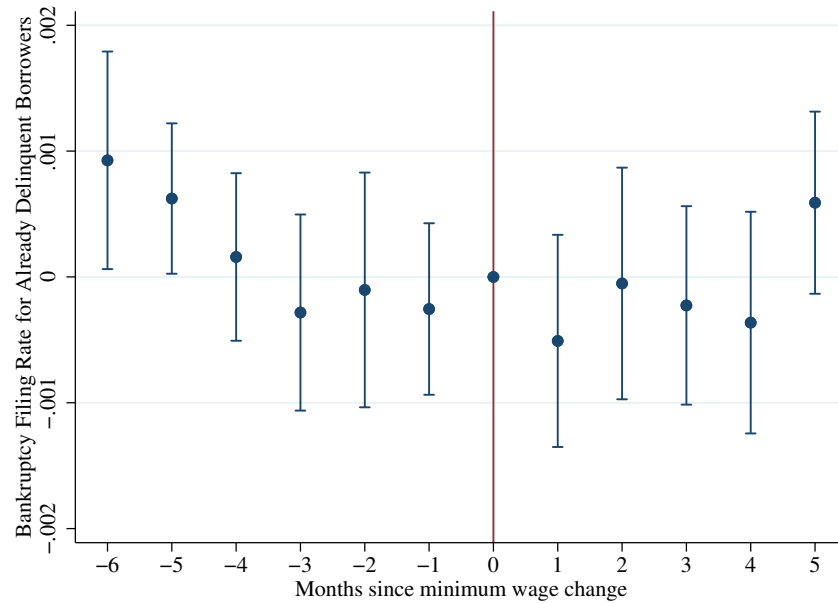
order.³⁶ Title III of the 1970 Consumer Credit Protection Act limits wage garnishing to 25% of disposable earnings or the amount by which weekly disposable earnings exceeds 30 times the federal minimum wage, whichever is lower.³⁷ For the states in our sample, these federal limits are effective in both Florida and Utah; in Minnesota, wage garnishing is limited to 25% of disposable earnings or the amount by which weekly disposable earnings exceeds 40 times the federal minimum wage, whichever is lower. Because of these limits, the amount of wage garnishing a low-income delinquent borrower faces will change discontinuously when the federal minimum wage changes. This is the basis of our identification strategy, as explained in the body of the paper. During our sample period, the federal minimum wage increased three times, on the 24th of July in 2007, 2008, and 2009 as a consequence of the Fair Minimum Wage Act of 2007. These three changes moved the minimum wage from \$5.15 per hour to \$5.85, then \$6.55, and then \$7.25 per hour. With each of these changes, the maximum amount of wage garnishing decreases for certain individuals, as illustrated by Figure 4. Importantly, wage garnishment ceases when an individual files for bankruptcy, such that higher wage garnishing presumably increases the incentive for an individual to file for bankruptcy earlier. We also note that even if a debtor is not currently being garnished, a creditor may use garnishing as a threat in their debt collection efforts, making it possible for wage garnishing to affect a large number of debtors. Intuitively, decreases in the amount of wage garnishment nudge debtors towards delaying filing by relieving some of the financial pressure caused by wage garnishment. Supporting this, Lefgren and McIntyre (2009) show that wage garnishing laws are important determinants of the bankruptcy decision.

³⁶Garnishing actions by creditors for child support, back taxes, and student loans do not require a court order.

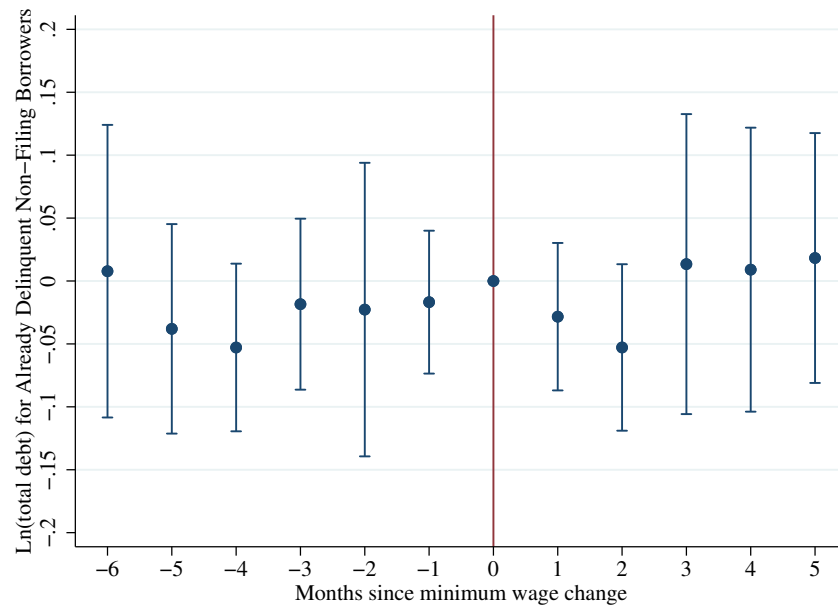
³⁷Disposable income is total income less required deductions such as federal and state taxes, involuntary pension contributions, and health insurance premiums.

Figure A1: Selection Tests Using Delinquent Borrower Outcomes Around Minimum Wage Changes

A. Delinquent Borrower Bankruptcy Rates Around Minimum Wage Changes



B. Delinquent Borrower Total Debt Around Minimum Wage Changes



Notes: Panel A plots the likelihood of filing for bankruptcy in event time for the six months before and after federal minimum wage increases. The sample in panel A consists of individuals that first became 90 days delinquent on at least one credit-bureau account at least 12 months prior to a given event-time month. Panel B plots log total debt in event time for the six months before and after federal minimum wage increases. The sample in panel B consists of borrowers in the credit-bureau data that do not eventually file for bankruptcy and first became 90 days delinquent on at least one credit-bureau account at least 12 months prior to a given event-time month. Estimates in both panels have been adjusted for month-of-year fixed effects and year fixed effects with the bankruptcy rate normalized to zero in the month of the minimum wage change. Plotted 95% confidence intervals are clustered by Zip3 \times calendar month.

Table A1: Effect of Wage Garnishing on Log Unsecured and Secured Debt

Dependent Variable	(1) log(1 + Unsecured Debt)	(2) log(1 + Secured Debt)
Treatment × Garnishable Wages	-0.04*** (0.01)	-0.02 (0.03)
Filer Controls	✓	✓
Year Fixed Effects	✓	✓
District Fixed Effects	✓	✓
R^2	0.53	0.68
Observations	554,942	554,942

Notes: Table reports regressions using the full sample of bankruptcy filings. Dependent variable is the natural log of 1 + the level of unsecured debt (column 1) and the natural log of 1 + the level of secured debt (column 2). Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). All specifications control for main effects for treatment, garnishable wages, and treatment × income. Filer controls include income, number of dependents, Vantage credit score, log(total assets), and indicators for filing chapter, marital status, homeownership, business ownership, retired status, employment status, and disabled status. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** p<0.01, ** p<0.05, * p<0.1

Table A2: Effect of Wage Garnishing on Shadow Debt Share of Total Debt - No Medical Debt

	(1)	(2)	(3)	(4)
Treatment \times	-0.0287*	-0.0267*	-0.0195*	-0.0261*
Garnishable Wages (\$00s)	(0.0148)	(0.0148)	(0.0110)	(0.0143)
Filer Controls	✓	✓	✓	✓
Year FEs	✓		✓	✓
District FEs	✓		✓	✓
District \times Year FEs		✓		
Income \times Year Controls			✓	
Income Quintile Controls				✓
R^2	0.508	0.507	0.506	0.513
Observations	23,525	23,525	23,525	23,525

Notes: Table reports regression results similar to those in Table 4, but limiting the sample to filers with zero medical debt. Dependent variable is shadow debt, defined as the dollar difference between total unsecured debt discharged in bankruptcy and the total unsecured debt reported in credit-bureau data as a share of total debt reported on bankruptcy filing. Dependent variable mean is 0.07. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). All specifications control for main effects for treatment, garnishable wages, and treatment \times income. Filer controls include income, number of dependents, Vantage credit score, $\log(\text{total assets})$, and indicators for filing chapter, marital status, homeownership, business ownership, retired status, employment status, and disabled status. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A3: Balance Tests of Filer Characteristics

Dependent Variable	(1) Home Owner	(2) Business Owner	(3) Retired	(4) Number Dependents	(5) Disabled	(6) Credit Score
Treatment \times Garnishable Wages	-0.004 (0.004)	-0.007 (0.012)	0.007 (0.008)	-0.019 (0.030)	-0.001 (0.006)	-0.883 (1.445)
Filer Controls	✓	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓	✓
District FEs	✓	✓	✓	✓	✓	✓
R^2	0.67	0.52	0.52	0.55	0.50	0.53
Observations	47,960	47,960	47,960	47,960	47,960	47,960

Notes: Table reports regressions of borrower characteristics on our treatment variable. Home Owner, Business Owner, Retired, and Disabled are indicator variables for the given characteristic as mentioned on bankruptcy petitions. Number of Dependents is the number of dependents in the household at time of filing. Credit Score is the Vantage score at time of filing. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). All specifications control for main effects for treatment, garnishable wages, and treatment \times income. For each column, filer controls exclude the dependent variable from the list of controls reported in Table 6. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A4: Effect of Wage Garnishing on Shadow Debt Share of Total Debt - Florida Only Sample

	(1)	(2)	(3)	(4)
Treatment \times Garnishable Wages	-0.051*** (0.016)	-0.051*** (0.017)	-0.034** (0.016)	-0.050*** (0.016)
Filer Controls	✓	✓	✓	✓
Year FEs	✓		✓	✓
District FEs	✓		✓	✓
District \times Year FEs		✓		
Income \times Year Controls			✓	
Income Quintile Controls				✓
R^2	0.51	0.51	0.51	.51
Observations	28,348	28,348	28,348	28,348

Notes: Table reports regression results similar to those in Table 4, but limiting the sample to Florida, where the state minimum wage was higher than the federal minimum wage such that there is no direct income effect of the minimum wage change. Dependent variable is shadow debt, defined as the dollar difference between total unsecured debt discharged in bankruptcy and the total unsecured debt reported in credit-bureau data as a share of total debt reported on bankruptcy filing. Dependent variable mean is 0.05. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). All specifications control for main effects for treatment, garnishable wages, and treatment \times income. Filer controls include income, number of dependents, Vantage credit score, $\log(\text{total assets})$, and indicators for filing chapter, marital status, homeownership, business ownership, retired status, employment status, and disabled status. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A5: Effect of Wage Garnishing on Bankruptcy Filing Timing in Months - Florida Only Sample

	(1)	(2)	(3)	(4)
Treatment \times Garnishable Wages	-1.57*	-1.57*	-1.73	-1.62*
	(0.91)	(0.92)	(1.19)	(0.92)
Filer Controls	✓	✓	✓	✓
Year FEs	✓		✓	✓
District FEs	✓		✓	✓
District \times Year FEs		✓		
Income \times Year Controls			✓	
Income Quintile Controls				✓
R^2	0.63	0.64	0.63	0.63
Observations	28,348	28,348	28,348	28,348

Notes: Table reports regression results similar to those in Table 6, but limiting the sample to Florida, where the state minimum wage was higher than the federal minimum wage such that there is no direct income effect of the minimum wage change. Dependent variable is the number of months between the first 90-day delinquency and the bankruptcy filing date, defined as the number of days to file divided by 30. Dependent variable mean is 24.1. Garnishable wages are the dollar amount (measured in \$100s) of monthly income exposed to garnishing by creditors according to applicable state statute at the time of bankruptcy filing. Treatment is an indicator for the treated monthly income range (\$600 to \$1,300). All specifications control for main effects for treatment, garnishable wages, and treatment \times income. Filer controls include income, number of dependents, Vantage credit score, log(total assets), and indicators for filing chapter, marital status, homeownership, business ownership, retired status, employment status, and disabled status. Robust standard errors in parentheses are double clustered by filing month and 3-digit zip code. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$