Too Broke for Bankruptcy? Liquidity Constraints in Consumer Bankruptcy Filing Decisions

Matt Wohlleben

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Abstract

Filing for the most common form of consumer bankruptcy requires large upfront costs which may deter in-need debtors from obtaining relief. This paper explores whether these costs affect the timing and number of bankruptcy filings by analyzing whether exogenous increases in liquid wealth induce filing. First, I show that a thousand dollar increase in the size of annual tax refunds increases the yearly Spring rise in Chapter 7 bankruptcies by 36%. This spike in bankruptcies is also associated with a higher median debt of filers with no significant effect on median income or value of assets, suggesting that the effect is largest on in-need debtors. Then, I show that this increased liquidity affects aspects of credit markets other than seasonal patterns in bankruptcy. Finally, I provide further support for these results by showing that a thousand dollar increase in the size of Alaska Permanent Fund Dividend payments increases the number of Chapter 7 bankruptcies by 25-30% in the month of disbursement.

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1 Introduction

In response to an enormous increase in consumer bankruptcy filings in the United States from the 1980s to the early 2000s, Congress passed the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) in 2005. The reform, the most substantive to the bankruptcy system in several decades, increased eligibility requirements and costs of declaring bankruptcy by nearly 50% (Landry, 2016) in order to reduce moral hazard from marginal filers who are able pay their debts but choose not to. The law led to a substantial decrease in the number of bankruptcy filings (Albanesi and Nosal, 2018). Recent literature (Gross et al., 2014; Mann and Porter, 2010; Indarte, 2019) has highlighted that two theoretical mechanisms could explain this effect. The first is that middle-income, strategic filers with the ability to repay their debts but a financial incentive to file for bankruptcy are screened out of filing by these higher costs because they have less to gain from debt relief (i.e., a reduction in moral hazard). The second is that poorer, liquidity-constrained individuals are unable to afford the higher costs and therefore unable to reap the benefits of bankruptcy relief, instead being driven into continued debt delinquency. The empirical relevance of both of these stories is important for understanding the state of bankruptcy law and policy implications for incentive compatible debt relief for in-need filers.

Article I of the United States Constitution tasks Congress with enacting 'uniform laws on the subject of bankruptcies.' Since 1978, the system has operated as follows: most businesses that file declare Chapter 11 bankruptcy, while consumer cases are primarily divided among Chapter 7 and Chapter 13 bankruptcy, with some exceptions for wealthy individuals, farmers, and others (Tabb, 1995). All of these cases are overseen by a federal bankruptcy judge in one of 94 bankruptcy courts. Chapter 7, also known as 'liquidation', accounts for roughly two out of every three consumer filings. If successful, Chapter 7 cases involve the immediate discharge of most types of liabilities (notable exceptions include student loans and child support) and the liquidation of assets. Depending on state law, real property exemptions may allow a filer to keep some or all of their home equity. Recent scholarship has indicated that these state laws have a large bearing on filing decisions (Hynes and Pattison, 2019). Chapter 13 'reorganization' cases comprise most of the rest of consumer bankruptcies. These involve the creation of a 3-5 year repayment plan, whereby a federal judge oversees gradual repayment to creditors. Chapter 13 cases are much less likely to result in

the discharge of debts because of the continued requirement that debtors make their payments, but it may be the preferable option for filers with non-exempt property that they'd like to protect.

The 'fresh start' nature of Chapter 7 make it more attractive than Chapter 13 for most debtors, especially those with few non-exempt assets. In fact, Chapter 7 is considered among the most debtor-friendly bankruptcy schemes in the industrialized world (Hynes and Pattison, 2019). However, it also makes it considerably more difficult to obtain legal services, as legal fees incurred during the filing process are a form of dischargeable debt. Bankruptcy lawyers may be hesitant to accept cases when there is a small chance of successfully collecting fees. Some anecdotal evidence exists of attorneys accepting post-dated checks to circumvent this issue, but it seems that few are willing to provide legal services for a client unable to pay the associated costs upfront (ABI, 2019). These upfront attorney fees average around $1,000 with an additional $350 in court fees (Albanesi and Nosal, 2018). While Chapter 13 legal fees are roughly double that, they can be paid over the period of several years because of the structure of debt relief. As a result, debtors who are unable to pay these upfront costs face the following menu of choices:

1. Delay filing until the payment can be made
2. File Chapter 13, reducing the expected benefit from filing relative to Chapter 7
3. Choose not to file altogether
    (a) Manage to successfully pay off debt
    (b) Default on debt and face private collection

The impact of this decision making process is a central focus of the consumer bankruptcy literature. On point 3, researchers believe that so-called 'informal bankruptcy', the decision to neither pay off debts nor declare bankruptcy, is a relatively important part of the consumer credit market. For instance, Ausubel and Dawsey (2002) find that 50.7% of written-off accounts, representing 45.8% of credit losses in dollars, were outside of the formal bankruptcy system. This paper examines the impact of an increase in the budget constraint on the aggregate number of bankruptcies in the *formal* system in order to contribute to the literature on this decision, but it is also helpful for understanding the credit market as a whole to the degree that filing in court is a preferable policy outcome to private collection. I use multiple approaches related to exogenous increases in

liquid wealth that government programs provide to study this liquidity issue. Using the timing of tax refunds and variation in the state-level generosity of those refunds, I provide evidence that at the state level, larger tax refunds lead to a spike in bankruptcy filings in the period immediately following. At the same time, larger tax refunds cause an increase in the median debt of Chapter 7 bankruptcy filers. Then, using the timing and size of cash payments to Alaska residents, I find a similar spike in bankruptcies in the month after disbursement. Taken together, these results suggest that the up-front costs of filing bankruptcy have a large effect on the timing and overall number of filings. By making use of alternative empirical settings, I am able to strengthen similar findings in Mann and Porter (2010), Gross et al. (2014), and Albanesi and Nosal (2018). These findings serve to improve the body of knowledge on the characteristics of households that are screened out of the formal bankruptcy process by filing fees. In a broader sense, this research builds on literatures surrounding both breakdowns of the life cycle hypothesis and the nature of the American bankruptcy system.

2 Background

2.1 Consumer Bankruptcy

Access to consumer bankruptcy relief has long been a central aspect of the American social safety net, with well-documented spillovers in multiple markets. Previous research has found that bankruptcy protection helped to stabilize employment during the Great Recession (Auclert et al., 2019) and that bankruptcy serves as a form of implicit health insurance against unexpected medical bills (Mahoney, 2015). This paper will not attempt to contribute to this literature on the effects of bankruptcy, but will use these findings as motivation that bankruptcy policy that is both accessible and incentive compatible is important both for struggling households and for the economy as a whole.

Previous research indicates that filing for bankruptcy protection is financially beneficial for many households. While filing for bankruptcy is an alarming signal to potential creditors that negatively impacts consumer access to credit in the period after filing (Gross et al., 2016), researchers have found that Chapter 7 filings result in long term increases in household investment and financial performance (Parra, 2018). Of course, these findings pertain to those that file bankruptcy formally.

Ausubel and Dawsey (2002) define informal bankruptcy as 'non-repayment without seeking the formal protection of the bankruptcy', a substitute to formal bankruptcy and at least as prevalent. In these situations, creditors usually sell their bad debt or contract third party collections agencies. These firms attempt to collect from delinquent borrowers, competing against other lenders to obtain some return before the debtor is completely insolvent (Hunt, 2007). While many states have anti-harassment laws surrounding private collection, this process is often inefficient and painful for debtors and creditors alike. Sometimes creditors are able to recover a settlement through civil court proceedings, but assets are rarely seized and only a small fraction of debt is successfully collected through the informal bankruptcy process (Hynes, 2008). Alper (2007) identifies that theoretically, increased costs of formal filing are likely to further increase informal filings. Dawsey et al. (2013) confirms this finding empirically by showing that pro-debtor anti-harassment and wage garnishment laws increase the attractiveness and rate of informal bankruptcy.

Differences in procedure and collection lead to important differences in outcomes between formal and informal bankruptcy. As an example, Filer and Fisher (2005) finds an 8-13% increase in consumption in the year following formal bankruptcy while Pattison (2019) finds a 6% *decrease* in consumption following default in general, which includes formal and informal bankruptcy. Taken together, these findings indicate that policymakers ought to prefer delinquent borrowers to choose formal bankruptcy over informal.

2.2 Life cycle hypothesis and liquidity constraints

Economic theory predicts that capital markets should allow economic agents to borrow against future assets to make investment and consumption decisions in the present. Economists are interested in situations where this life cycle hypothesis does not hold. These situations are interesting because we expect that people maximize their utility by smoothing their consumption across periods of liquidity and illiquidity by saving and borrowing. Findings that show discrete increases and decreases around the time of cash flows indicate that this theory might be an incomplete way of describing real behavior.

Researchers have explored break downs of this life cycle hypothesis with a wide variety of approaches. Most relevant to this paper is evidence on a reduction in the liquidity constraint as a result of two annual phenomenon: receipt of tax refunds (including refundable Earned Income Tax

Credits) in the early Spring months and payments from the Alaska Permanent Fund in the early Fall. The Earned Income Tax Credit is a federal program that reduces the income tax burden on low and middle income families and can pay a positive credit in cases where the credit exceeds the total tax liability. Around 80% of recipients receive a lump-sum benefit in February and March of an average of $3,191 for families with children (Jones and Michelmore, 2019). Barrow and McGranahan (2000) find that EITC-eligible households spend three percent more during that month, when compared with non-eligible households. This effect is especially large for durable goods, with an increase in expenditure of nine percent for the treatment group. A second paper uses kink points in benefits from the EITC to study the effect of the benefit on university enrollment, and finds that the magnitude of benefit received in the spring of a high school student's senior year affects her likelihood of attending college (Manoli and Turner, 2018). These findings provide support for the theory that the EITC affects the timing and amount of consumption for low income households. EITC payments especially affect low income filers, but other research has found significant effects from refund variation more generally during the refund period (Souleles, 1999). For that reason, it may be preferable to study the tax system as a whole rather than be limited to a single program when exploring exogenous changes to consumer liquidity.

Other papers have tested consumption smoothing theory in a different setting: the Alaska Permanent Fund Dividend (PFD). The Fund was created in 1976 by popular referendum. Since 1982, the state has paid out around half of the dividend income to resident Alaskans in the form of a direct deposit lump sump payment, typically in early October. The magnitude of these payments varies somewhat from year to year and is decided by a formula based on oil revenue, the exact amount being announced about a month before the payment. Hsieh (2003) uses this annual variation, as well as variation in family size (each family member receives an equally sized check), to test for consumption smoothing. He finds that, while spending on durables is highly related to the size of tax refunds, the same pattern does not hold for PFDs. He reasons that the predictability of the timing and size of these payments allows households to better smooth their consumption throughout the year, though he notes that his finding is contradictory to other papers that study the payments. Kueng (2015), for instance, uses a different transactions dataset with sample years from 2010 to 2014, and finds a large and statistically significant increase in consumer spending in the period immediately involving dispersion of the dividends on the magnitude of 30%

for non-durables and 70% for total expenditures.

2.3 Liquidity constraints in consumer bankruptcy

Despite rich literatures on both liquidity constraints and consumer bankruptcy, the interaction between the two has only recently received attention. Empirical legal researchers Mann and Porter (2010) were the first to study the idea in a systematic way. While conventional wisdom had assigned responsibility for the annual increase in filings in February through April to holiday overspending (Sullivan et al., 1989), their field research indicates that the date of receipt of tax refunds is an important factor. Contributing to this theory of liquidity constraint, the authors find that the bump was much larger for Chapter 7 filings, which involve larger up-front fees than Chapter 13, and that many respondents indicate they had been considering filing for bankruptcy for several years, not just a few months since Christmas. The authors are not able to offer any causal evidence, but open up a theoretical framework for further inquiry. Other liquidity constraint research has noted the impact of tax benefit receipt in the early Spring months on the spending behavior of low-income households, including in the market for subprime mortgages (Adams et al., 2009). While this research relies largely on anecdotal evidence that the 'Spring bump' is a result of increased liquidity and not holiday spending, it creates motivation for economic research that can make the issue more salient for attorneys and policymakers.

Gross et al. (2014) treat two 'one-time' tax rebates in 2001 and 2008 as exogenous increases in household cash holdings in order to test whether the Mann and Porter (2010) finding is attributable to liquidity constraints. If there were no liquidity constraint prior to the implementation of these rebates, theory would expect that cash transfers would decrease bankruptcies because of an increased ability to pay debts. Instead, the authors find a short term increase in bankruptcies after the receipt of rebates. The evidence that this finding demonstrates liquidity constraints is further strengthened because the effect is entirely a result of Chapter 7, with the greatest up-front cost, and therefore the greatest liquidity constraint. Specifically, the authors find a two percent increase in filings following the 2001 rebate and a six percent increase following the 2008 rebate. Finally, the authors find that the median debt of filers increases after the reform, suggesting that the liquidity constraint has a stronger effect on debt-strapped households. The external validity of these findings is limited to recession periods, as these stimuli are a government response to poor

economic conditions.

Indarte (2019) uses a different empirical approach to understand the effect of an increased cash flow on bankruptcy filings. The author uses the spread in required payments between two popular Adjustable Rate Mortgage (ARM) indexes in an instrumental variable approach. Being assigned to a given index created a wide divergence from mortgage payments under the other index type, which the researcher regards as an exogenous cash flow change in the year that a mortgage becomes adjustable. The main finding is that a $1,000 decrease in mortgage payments results in a 12.6% decrease in annual consumer bankruptcy filings. The author identifies that this approach does not necessarily contradict Gross et al.'s findings because the sample is of homeowners, a less liquidity constrained population, and because the magnitude of average treatment is much larger: $2,000 vs. $200 in Gross et al. One could imagine that a small cash benefit would allow an individual to pay to file a bankruptcy, while a larger benefit might be sufficient to make debt payments and avoid filing bankruptcy altogether. This highlights that net changes in bankruptcy from changes in liquidity will contain two offsetting effects: the increased ability to pay debt which creates a decreased incentive for filing and the increased ability to pay bankruptcy fees which increases the ability to file.

Albanesi and Nosal (2018) more directly study the second effect (ability to pay) with the 2005 Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA), a large overhaul in the American bankruptcy system that increased the cost of filing and narrowed eligibility criteria in order to reduce abuse. They show that insolvencies increased in response to the policy, providing support for the idea that the policy did not only affect the filing decisions of marginal filers, but also of debtors who relied on the system. Insolvency involves an attempt for creditors to collect on their investments, which often involves large write-offs for the parties. Using geographic variation in changes in attorney fees after the policy change, the authors provide evidence that increased liquidity constraints are responsible for the decrease in bankruptcy filings and associated increase in insolvencies. In contrast to Gross et al. (2014), these authors are able to provide support for the notion that the liquidity constraint-related decrease in bankruptcies is permanent. The empirical methodology in this paper uses state variation in average attorney fees as a difference in the overall cost, which allows for a longer period of study than the Gross et al. (2014) tax rebates but with a less strong identification strategy.

While the body of work surrounding the liquidity problem in bankruptcy filing has received more attention in recent years, several holes exist in the literature to date. For instance, Gross et al. (2014) and Albanesi and Nosal (2018) both make use of one time exogenous changes to liquidity, which presents a constraint when applying their findings to policy. The former, for instance, cannot rule out the possibility that the observed spike in bankruptcies from increased liquidity is unique to the recession conditions that caused the cash rebates and that the same pattern might not hold in regular economic times. An empirical approach for bankruptcy filing patterns that exploits variation in normally implemented policy might be preferable if the effect it captures is plausibly causal in order to understand longer term policy ramifications around filing costs. This work will contribute to the literature on the sensitivity of bankruptcy filing to changes in liquidity and also the body of work on the credit market implications of cash disbursement programs.

3 Theoretical Approach

To model the financial benefit from declaring bankruptcy, I expand on Fay, et al. (2002) to model the household decision to file for bankruptcy, given the presence of liquidity constraints. Rather than consider the bankruptcy decision as dichotomous between default and repayment, I treat in-need debtors as facing the menu of options enumerated in Section 1: repaying debt, filing Chapter 7, filing Chapter 13, or informal bankruptcy. Note that this decision is only faced by those below their state of residence's median income, per legislative requirements for filing for Chapter 7. In general, the benefit of default of type t for debtor i is modelled in Equation 1 below.

$$FinancialBenefit_{it} = D_i - \alpha_{it}\{W_i - E_{it}\} - \delta_{it}FC_{it} - IC_{it} \tag{1}$$

where D_i is the unsecured liability of filers eliminated in any type of bankruptcy (which is a benefit from bankruptcy), W_i is total wealth of bankruptcy filers minus all secured debts, E_{it} represents bankruptcy exemptions available to filers, FC_{it} represents all the formal costs of filing for bankruptcy, brought to present value by δ, which indicates the time value of money, and IC_{it} represents the informal costs of bankruptcy, including social costs and inability to access future debt. t is the type of bankruptcy, either Chapter 7 or 13 in the formal system or informal outside of it.

The financial benefit of bankruptcy for an individual at a given time equals the total debts that would be discharged from filing, D_{it}, minus the share of assets that would be forfeited in the process, $\alpha\{W_i - E_{it}\}$, and the administrative and informal costs of filing, $IC_{it} + \delta FC_{it}$. According to this model, only those with $FinancialBenefit_{it} > 0$ have a financial motive for any type of bankruptcy, even if they can afford the upfront costs. I separate the filing costs into informal costs, IC_{it}, and the present value of formal costs, δFC_{it}, because it provides a helpful way of understanding the potential for liquidity constraint and differentiates Chapter 7, Chapter 13, and informal bankruptcy. In particular, in Chapter 7 all formal costs are accrued at the time of filing, so I set δ equal to one. Total formal costs are somewhat higher under Chapter 13 then Chapter 7, but are paid out over a period of three to five years. These costs include both the repayment of some debt and the court and attorney fees. For Chapter 7 filing, all non-exempt wealth,$W_i - E_{it}$, is liquidated, so $\alpha_{i7} = 1$, whereas a somewhat lower proportion of assets are discharged under Chapter 13 such that $0 < \alpha_{i13} < 1$. Finally, there is some evidence that the informal costs, IC_{it}, may be somewhat higher for Chapter 13 filers than Chapter 7 filers because of difficulty in accessing credit (Jagtiani and Li, 2014). The equation above can be simplified because debt, D_i, and dischargeable assets, W_i, do not vary with the type of bankruptcy. In sum, the decision between bankruptcy types 7 and 13 is modelled below.

$$min\{\{W_i - E_{i7}\} + FC_{i7} + IC_{i7}, \alpha_{i13}\{W_i - E_{i13}\} + \delta_{i13}FC_{i13} + IC_{i13}\} \tag{2}$$

where $FC_{i7} < FC_{i13}$ and $IC_{i7} < IC_{i13}$. That is to say, the debtor will choose the function that minimizes the cost for discharging their debt in order to decide which formal chapter is preferable, thereby maximizing the financial benefit.

To model informal bankruptcy, I set $\delta = 0$ because there are no formal costs of 'declaring' informal bankruptcy. As a result, I remove formal costs, FC_{iI}, of declaring informal bankruptcy. Informal costs, IC_{iI} are likely somewhat higher than for either Chapters 7 or 13, as creditors are weary to extend credit to consumers with a history of defaulting outside the formal collection process. α_{iI} here represents the share of assets that creditors are able to obtain through the private collection process which is unlikely to be all assets. As a result, debtors make decisions surrounding bankruptcy by minimizing among the costs from the most advantageous form of formal bankruptcy

(either Chapter 7 or 13) and informal bankruptcy. This decision is modelled below.

$$min\{\alpha_{iI}\{W_i - E_{iI}\} + IC_{iI}, min\{\{W_i - E_{i7}\} + FC_{i7} + IC_{i7}, \alpha_{i13}\{W_i - E_{i13}\} + \delta_{i13}FC_{i13} + IC_{i13}\}\} \quad (3)$$

where $IC_{i7} < IC_{i13} < IC_{iI}$. By taking into account the costs of each type of default, debtors can choose the option with the lowest total cost for discharging debt. Having done so, debtors decide among repayment of debt and the most advantageous form of default. In particular, the debtor with a financial incentive to default has $FinancialBenefit_{it} > 0$. In words, these expressions signify the following: by taking into account the costs associated with the various forms of bankruptcy, debtors must make three decisions: whether to default on their debts, whether to do so by declaring formal bankruptcy or simply facing the consequences of credit delinquency, and whether to choose Chapter 7 or 13 within the bankruptcy system.

The liquidity-constrained non-filer is one with $FinancialBenefit_{it} > 0$ and an incentive to file for Chapter 7 but with $LiquidWealth_i < FC_{i7}$. In other words, a constrained consumer has a financial incentive to file for bankruptcy but an inability to afford FC_{i7}, the upfront formal cost of bankruptcy. An increase in the liquid wealth of a household would increase W_i and therefore decrease the desirability of filing, while also increasing $LiquidWealth_i$ and therefore decreasing the liquidity constraint preventing households from filing for bankruptcy, creating an ambiguity in the expected effect from the change. Similarly, I define an unconstrained filer as one with a financial incentive for bankruptcy, $FinancialBenefit_{it} > 0$, and with $LiquidWealth_i > FC_{it}$. Because of the second condition, these consumers are capable of paying the costs of bankruptcy even absent the policy change, and I expect that an increase in liquid wealth will unambiguously reduce this group's total filings, as it increases W_i and thus decreases $FinancialBenefit_{it}$. This group includes marginal filers, who have little to gain from declaring bankruptcy. Marginal filers choose among the options above with no liquidity constraint. My research will consider whether the inability to pay up-front costs affects the decisions surrounding bankruptcy that debtors face.

4 Empirical Methodology

Multiple potential and heretofore unexploited changes in policy could be used as exogenous shocks to low-income consumer liquidity. I will discuss them, their relevance to the question of interest, and their feasibility below.

4.1 Endogeneity concerns from sources of increased liquidity

The expression below indicates the theoretical regression of liquidity changes on an individual's probability of bankruptcy, where β is the coefficient of interest.

$$P(Bankruptcy)_i = \alpha\{Wealth\}_i + \beta\{Liquidity\}_i + \epsilon_i \tag{4}$$

In this equation, I decompose an increase in liquid wealth into wealth and liquidity effects. I would expect α and β to be opposite-signed, with α soaking up the reduced probability of a given consumer filing bankruptcy from an increase in wealth so that β represents the true effect of increased liquidity on the bankruptcy decision, the coefficient of interest. Unfortunately, bankruptcy data only provides financial information on individuals who actually file, rather than those that face this decision. As a result, I look to the state and year level to provide information on this individual decision.

Of course, liquid wealth is highly influenced by economic factors that also influence the individual decision to file for bankruptcy. From the theoretical model laid out in Section 3 and depending on the source of change to liquidity, increases in liquid wealth could be related to wealth, W_i, debt, D_i, exemptions, E_{it}, the time value of money, δ, or all of the above. This threatens my ability to conclude causal inference from even state level data, as any relationship between changes in liquidity and bankruptcy might be explained by changes in income, changes in interest rates, payments made to creditors, or any of a number of financial shocks that cannot be observed. For that reason, I proceed with two plausibly exogenous sources of changes in liquidity. To the degree that the estimates obtained from these settings do not suffer from concerns of omitted variable bias or reverse causality, they provide suitable workarounds to the threat to these threats to causal inference.

4.2 Annual federal and state tax refunds

The size of income tax refunds provides one of these sources of change in liquidity. Income is withheld from wage earners by federal and state government throughout the year based on expected total tax liability. In the first several months of the calendar year, tax filers report their exact earnings to the Internal Revenue Service and the equivalent state agency. Nearly 80% of tax filers over-withhold throughout the year and receive a cash refund. These payments are usually paid out 4 to 6 weeks after filing and on average represent 7% of the filer's adjusted gross income

(Jones, 2012). In addition, many low income filers receive refundable tax credits contemporaneously. Through programs like Earned Income Tax Credits and Child Tax Credits at both the state and federal level, filers can receive positive refunds even if they have no net tax liability. As discussed in Section 2, these refunds are an important part of the financial planning of low and middle income filers and significantly increase certain types of household spending in the weeks after receipt.

Still, using the size of an individual's tax refund may be an inappropriate predictor of bankruptcy because it fails to address the endogeneity concerns raised in Section 4.1. At the individual level, tax refunds are determined by income, property holdings, number of dependent children, and other items that also influence the probability of filing for bankruptcy protection. Poor economic conditions may contribute to both increased bankruptcy (if more people become insolvent) and decreased tax refunds due to decreases in the tax base. Depending on the characteristics of tax filers in a region, poor economic conditions may instead increase tax refunds because of an increase in eligibility for tax credits. No matter the direction of effect, it seems clear that causal inference cannot be drawn from the relationship between total refunds and tax filing due to other factors that may simultaneously affect a given debtor's interaction with the tax system and decision making around the bankruptcy filing decision.

To avoid this issue, I instrument the average estimated tax liability of low income filers in each state and year on the average tax refund size, the treatment variable of interest. Tax liability at the state-year level is still related to economic and demographic characteristics which may also be correlated with bankruptcy, so I use a simulated instrumental variable approach as in Currie and Gruber (1996). This simulation ensures that the instrument varies only with the state and federal legislative environment, rather than other features of the state and year. To create this instrument, which I refer to as 'estimated tax liability', I first take a sample of 10,000 below median income households from each year from the American Community Survey. After some cleaning, discussed in Section 5, I calculate the estimated tax liability that each filer would have in each state for that year using the National Bureau of Economic Research's TAXSIM calculator. The differences between estimates for each state are wholly attributable to variation in tax policy because the sample used for each calculation is identical. The advantage of using a national sample is that it removes the concern that any effect is the result of state and year varying economic conditions which would affect both the financial characteristics of tax filers and the pattern of bankruptcy

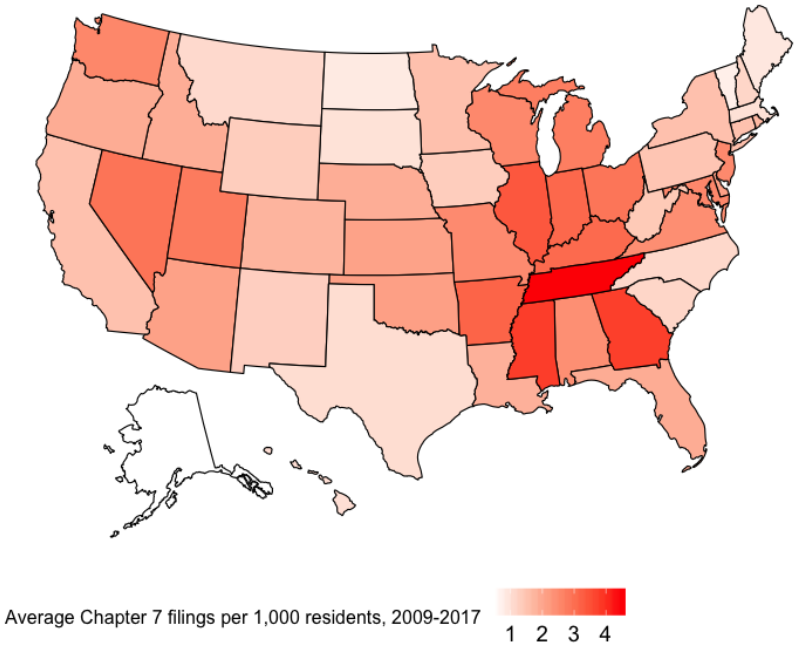
filings through channels other than the size of the tax refund.

A key identifying assumption of this approach is that legislative tax generosity to low income filers is uncorrelated with seasonal patterns, except through refunds. In Figure 1, I show that there is considerable variation in the rate of Chapter 7 bankruptcy filings per year. Lefgren and McIntyre (2009) note that these state differences persist even when economic, demographic, and policy differences are controlled for. Sullivan et al. (1989) attribute this discrepancy to 'local legal culture' informing the norms and social factors surrounding the filing decision. Though these norms seem unlikely to be related to changes in tax policy, I include state fixed effects so as to control for unobserved time-invariant characteristics of states. These fixed effects control for permanent state differences in the role of bankruptcy courts, for instance. Another concern is that economic conditions may influence the bankruptcy filing decision and also cause legislatures to consider changes to tax policy. To allay that concern, I include a set of economic controls that vary by state and year.

Ideally, this empirical framework would also include year fixed effects to control for nationwide trends that affect both tax policy and seasonal patterns in bankruptcy filings. Because a large portion in variation in the simulated estimated tax liability and tax refund size is due to changes in federal policy that varies only by year, including year fixed effects severely weakens the instrument and washes away statistical power. I show this empirically in Section 6. Still, the inclusion of the aforementioned economic characteristics should lessen this concern to the degree that they capture these nationwide trends.

In the two-stage least squares framework, the first stage regression (5) of the instrument on the treatment is the effect of this estimated tax liability (federal and state combined) in a state and year on the state average size of tax refund (federal and state combined). It should be noted that although it seems likely that there is some relationship between taxes paid and the refund received, it is not clear exactly what we should expect the shape of this relationship to be. For instance, an increase in taxes paid may be related to a larger refund for more wealthy filers while greater income for less wealthy filers might correspond with larger tax burdens but less generous tax refunds. Additionally, several features of the tax system do not increase linearly with income. The Earned Income Tax Credit, for instance, entails phase-in and phase-out periods, so a one dollar increase in income has a different effect on refund size at different points on the income distribution.

Figure 1: Chapter 7 filings per year per 1,000 residents



This is to say that the exact nature of this relationship may be dependent on the sample used, and I will use specifications with higher order terms for the interaction between tax liability and refund in order to ensure robust results.

$$\{RefundSize\}_{st} = \alpha_1 + \phi\{EstimatedLiability\}_{st} + S_s + X_{st} + \epsilon_{1st} \tag{5}$$

The reduced form (6) effect of the instrument on the outcome is the effect of the estimated tax liability on a measure of bankruptcies during the tax refund period.

$$\{Bankruptcies\}_{st} = \alpha_2 + \delta\{EstimatedLiability\}_{st} + S_s + X_{st} + \epsilon_{2st} \tag{6}$$

The 2SLS (7) coefficient of interest is β, which is equivalent to δ/ϕ, the ratio of the coefficient of interest from the reduced form and first stage equations. S_s and X_{st} denote state fixed effects and state-year economic characteristics, respectively. The economic characteristics are unemployment rate, poverty rate, and median income.

$$\{Bankruptcies\}_{st} = \alpha_3 + \beta\{\hat{RefundSize}\}_{2SLSst} + S_s + X_{st} + \epsilon_{3st} \tag{7}$$

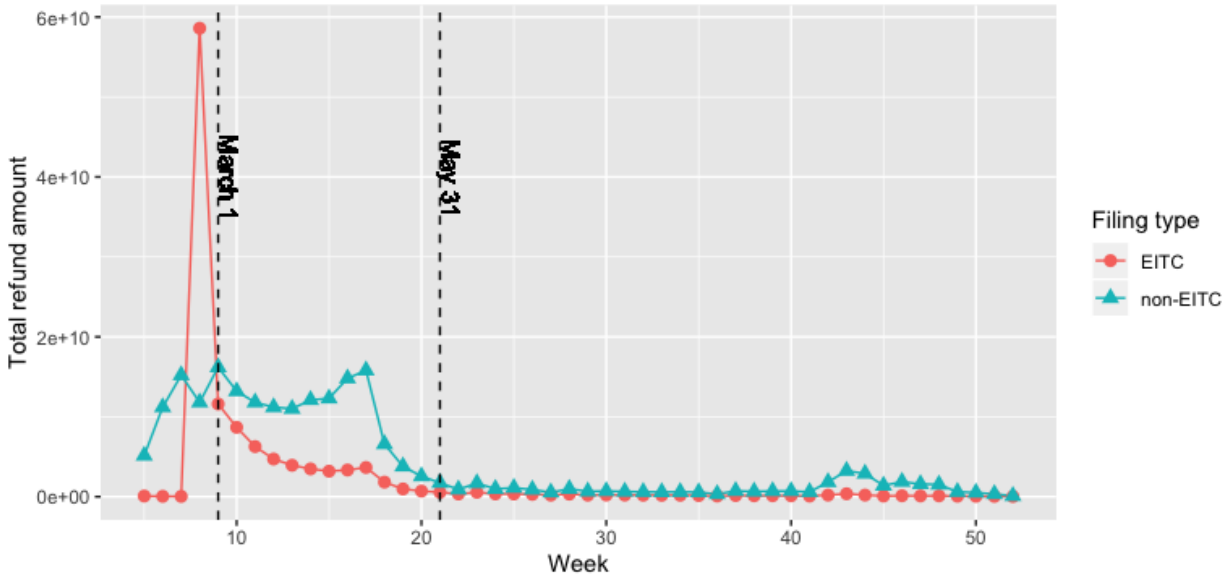
As in Gross et al. (2014) I will separately consider Chapter 7, Chapter 13, and total filings as left hand side variables. Filing Chapter 7 almost always requires paying all associated

fees at the beginning of the process, whereas Chapter 13 is sometimes offered for no money down and allows debtors the opportunity to pay fees over the three to five year repayment period. As a result, I expect to find that the liquidity constraint is larger for Chapter 7 filings than for Chapter 13. In fact, I expect that the coefficient on Chapter 13 may be negative because the increased wealth, W_i, reduces the desirability of bankruptcy, $FinancialBenefit$, and the ability to pay off debts, as in Section 3. As noted in Gross et al. (2014), a decrease in Chapter 13 filings and accompanying increase in Chapter 7 filings can also be interpreted as substitution between the two, i.e. that liquidity constraints may cause filers with a desire to file for Chapter 7 to file for Chapter 13 instead.

As stated before, we might think of a bankruptcy filed as 'socially good' (i.e. beneficial to the functioning of credit markets or in-line with policy aims) if the filer is truly unable to repay his or her debts and 'socially bad' if the filer is able to pay but makes a strategic decision to file for bankruptcy instead (I refer to this filer as 'marginal' and the situation as moral hazard). Although I cannot test this directly, I will replicate the IV approach from above with changes in the median debt, assets, and income of the filer being new left hand side variable. This approach uses the same first stage regression equation and the reduced form and 2sls reproduced below. With an increase in median debt of filers, I will strengthen the evidence from Gross et al. (2014) that the relative frequency of 'socially good' bankruptcies increased, as filers who are unable to pay will be less prosperous. If I find a negative effect, it seems more likely that more of the new filers are marginal.

Another remaining consideration is the degree to which increased liquidity affects the timing, as opposed to the overall quantity, of consumer bankruptcy filings. It seems possible that some potential bankruptcy filers with the means to pay attorney fees may choose to wait to file until they receive their benefit. If an increased tax benefit delays a bankruptcy from November to March, for example, it would be misleading to conclude that the filing in the refund season is a result of the policy. One way to test this idea is to artificially move the refund season indicator to other parts of the year. If there is a larger *drop* in bankruptcies in the months prior to the refund period after the policy change, it might indicate that strategic timing has an influence on my results. Altering the time treatment will also allow me to ensure that March, April, and May are the correct treatment period. Figure 2 shows the amount of tax refunds distributed in relation

Figure 2: Total federal refunds, by EITC recipient status and week of the year (2017)



This figure shows the amount of total federal tax refund per week in 2017 in relation to the three month treatment period, delineated between the vertical dotted lines. EITC filers have a greater ability and incentive to file early, as their returns are relatively simpler to fill out and they receive a higher proportion of their income from tax refunds than do non-EITC filers.

to this time treatment. These three months are selected on the theory that there is likely some delay between receiving the refund check and working with an attorney to file in the court system, and in Section 6 I show that there is support for this in the data.

A second way to test the effect on the overall quantity of bankruptcies. I expect that the increased liquidity will increase total bankruptcies in the months immediately after receipt, but past this there is little reason to think that any differences in filings would be due to a reduction in the liquidity constraint. I run a separate set of regressions using the same framework with the outcome variable being the total number of bankruptcies (Chapter 7 and 13) in a year and state. I expect that this coefficient will be negative, meaning that even if there is some spike in bankruptcies from increased liquidity in the short run, this will be washed out by reduced bankruptcy from an increased ability to pay off debt throughout the year.

To verify whether a change in the total number of bankruptcies for the whole year is the result of an increased ability to afford debt payments, an indicator of credit market health not directly related to bankruptcy is helpful. To that end, I implement a final set of regressions with this

framework, using the Spring spike in mortgage delinquencies from the National Mortgage Database as the left hand side variable. A drop in delinquencies during the previously defined treatment period provides evidence that larger tax refunds are associated with lower rates of mortgage default, suggesting that these larger payments allow consumers to pay off their debt. Note that these payments are not directly related to either Chapter 7 or Chapter 13 bankruptcy, as both of these forms of relief ease the burden of unsecured debt for borrowers; mortgage lenders typically reach settlements with homeowners *in arrears* through foreclosure, as the home is an asset that can be held against the value of the loan.

4.3 Alaska Permanent Fund Dividend

While a strong instrument greatly allays endogeneity concerns, the tax refund approach may not totally dismiss concerns that the Spring spike in bankruptcies is a result of holiday spending, as proposed in Sullivan et al. (1989). Defenders of that position may think that changes in tax policy are in some way related to holiday-related debt, even after controlling for state effects and economic trends. Additionally, more evidence is helpful to show that the observed relationship is externally valid to any increase in liquidity and not program specific to Spring tax refunds. To address this, I make use of the Alaska Permanent Fund program, a cash distribution that occurs outside the normal tax refund window.

Nearly all Alaskans receive their annual PFD on the same date by direct deposit (Hsieh, 2003). Some small portion of residents receive the check by mail, but the ability to identify the date of payment is quite strong, especially in comparison to tax refunds which are paid out over a much longer horizon. This fact, combined with the alternative time treatment that allows for greater generalizability, makes the Alaska PFD framework suitable as a companion to the tax refund approach in the previous section. The dividend amount also does not suffer from the same degree of endogeneity as tax refunds, as it is dependent on a several year running average of oil revenues, which has a relationship to the financial conditions of the state's residents but one that is less strong and immediately relevant. Between 2009 and 2015, the amount of this payment was determined as a simple share of the net income received from state oil and gas revenues from the previous five years. In 2016 and 2017, the size of the payment was lowered from the calculated amount by action of the state government. For these reasons, I will proceed with the assumption

Table 1: Alaska Permanent Fund Dividends, by year

Year	Direct deposit paid	Amount
2009	10/8/09	$1,305.00
2010	10/7/10	$1,281.00
2011	10/6/11	$1,174.00
2012	10/4/12	$ 878.00
2013	10/3/13	$ 900.00
2014	10/2/14	$1,884.00
2015	10/1/15	$2,072.00
2016	10/6/16	$1,022.00
2017	10/5/17	$1,100.00

that the size of payment is relatively uncorrelated with factors leading to increased bankruptcy filings in the period after the dividend is paid out, though I will include a vector of state and year economic variables to help allay these concerns. Below, I discuss two models that allow me to capture the causal effect of cash dividends on bankruptcy.

To assess the impact of the annual receipt of the PFD, I will make use of the yearly variation in the size of dividend, which varies between $878 and $2072 during the treatment period. In Figure 1, I include the exact amount and date of payment. First, I follow the difference-in-differences approach specified below.

$$\begin{aligned} Bankruptcies_{mt} = \alpha + \gamma * \{SizeofPFD\}_t + \delta * \{PaymentPeriod\}_m + \\ \beta * \{SizeofPFD\}_t * \{PaymentPeriod\}_m + X_t + \epsilon_{mt} \end{aligned} \tag{8}$$

The estimator of interest in this specification is β, the coefficient on the interaction between the size of payment and the time indicator. I also include the coefficients on the individual differences, γ and δ. The first of these is the relationship between a thousand dollars of dividend payment, $SizeofPFD$, and the number of bankruptcies in Alaska in year t, while the second is the relationship between being in the treatment month m and the number of bankruptcies, $PaymentPeriod$. The date of receipt of payment is much clearer and more condensed in this exercise than in the IV approach, so I expect the majority of the effect to be found in the first month after the payment, but I also check if there is any effect in the second and third months after the payment in separate specifications. I observe the filings at the day level and aggregate to the month to test this. Finally, Alaskans can largely anticipate the size of dividend, and it is officially announced a month before payment, so I check if there is any anticipation effect prior to payment. I again make use of data

on unemployment and poverty rates as well as median income to control for economic factors that may impact both the dividend size and the number of bankruptcies, and I again consider Chapter 7 and 13 filings both together and separate to ensure that the results are consistent with the liquidity constraint theory I've laid out.

In the difference-in-differences approach above I include only data from Alaska, with the key assumption being that each year would exhibit the same seasonal patterns in bankruptcy with equal sized dividend payments. This assumption could be threatened by omitted time trends or contemporaneous national changes that I am not accounting for (including, incidentally, changes in federal tax policy). In order to strengthen this model, I also include a triple differences estimator with a set of control states, using an indicator variable for residence in Alaska as the third difference.

$$\begin{aligned} Bankruptcies_{mst} = \alpha + \gamma * \{SizeofPFD\}_t + \delta * \{PaymentPeriod\}_m + \\ \beta * \{SizeofPFD\}_t * \{PaymentPeriod\}_m + \rho * \{Alaska\}_s * \{PaymentPeriod\}_m + \\ \mu * \{Alaska\}_s * \{SizeofPFD\}_s + \lambda * \{Alaska\}_s * \{PaymentPeriod\}_m * \{SizeofPFD\}_s + \\ S_s + T_t + X_{st} + \epsilon_{mst} \end{aligned} \tag{9}$$

In this set of regressions, I use North Dakota, Idaho, Vermont, Maine, and Montana as control states. These states are chosen for their similar low level of Chapter 7 bankruptcies (Alaska has the fewest filings of any state and the control states are all below the US average), demographic similarities, population density, and economic reliance on the energy sector. In Section 6, I present results for each of these states considered as a separate control and also for all of the controls together. The interpretation of the coefficients found in the difference-in-differences model is the same. ρ here is the coefficient on the interaction between an indicator for whether the filing is in Alaska and and indicator for whether the filing is during the payment period, defined the same here as previously. This takes a value of 1 for a filing in the month after dividend payment in Alaska and 0 for all other locations and filing dates. μ is the coefficient on the interaction between the indicator for Alaska and the dollar amount of the dividend. This takes the value of the dividend size for that year for filings in Alaska and 0 for all others. λ is the coefficient on the triple differences estimator, which takes the value of the current year's dividend size for filings in Alaska during the treatment period and 0 at all other times and states. I do not include the indicator for Alaska in my regression equation because it is collinear with state fixed effects, S_s. I am able to include year

fixed effects, T_t, because I include control states and the policy variation is at the state level.

The key advantage of the triple differences model is that it allows me to control for contemporaneous trends in similar states that do not receive the PFD in order to rule out the possibility that the effects from the difference-in-differences regressions are attributable to more general time trends. As long as there are not other factors contributing to a change in bankruptcies in October in Alaska, relative to other months and similar control states, λ will capture the true effect of these dividends on bankruptcy. The inclusion of North Dakota as a control state partyly addresses the oil-reliance endogeneity concern, as the two states have somewhat similar levels of reliance on energy extraction, as measured by the share of economic output (Morris, 2016). If changes in oil revenues affect both the number of bankruptcies and the size of the dividend, this relationship is likely to also exist in North Dakota, so this potential for omitted variable bias is removed.

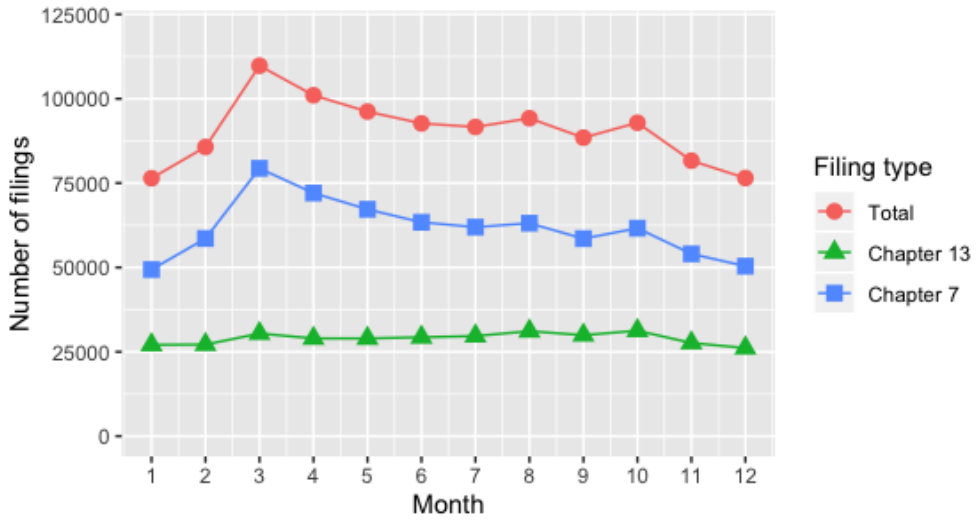
These regression equations will provide estimates for the number of bankruptcies induced by a thousand dollars in per person Alaska Permanent Fund Dividends in the period directly following the payment. If there is a liquidity constraint effect on bankruptcies that is more than enough to offset any reduction in bankruptcies caused by increased wealth, I expect that the coefficient of interest will be positive, as in the IV setting. For both empirical frameworks, a negative sign would indicate a decrease in bankruptcies from increased liquid wealth which would lend evidence that consumers are able to smooth their filings over the year and that tax refunds provide consumers the ability to escape bankruptcy. If the calculated coefficients are near zero, it could be that the increased ability to pay bills and the increased ability to declare bankruptcy largely offset in the aggregate.

5 Data

5.1 Integrated Bankruptcy Database

For information on consumer bankruptcy, I use the Integrated Database from the Federal Judicial Center, the federal court system's research division. The database contains anonymized case data on each of the approximately 10 million consumer bankruptcies filed between the 2008 and 2018 fiscal years. For the purpose of this analysis, the first and last years are excluded due to

Figure 3: Consumer bankruptcy filings per month, by filing type (2009-2017)



limitations from other data. Each observation contains information on the date filed, zip code of filer, chapter filed under, income and asset information, and date closed. The dataset also includes observations that were opened prior to the 2008 that had not yet been closed, mainly Chapter 13 cases still in the process of repayment. These observations are removed, as they are not relevant to the question of filings. I restrict the data to all Chapter 7 and Chapter 13 non-business filings.

In Figure 3 and Table 2, I show that the early Spring spike in filings is still relevant in the period of my data (2009 to 2017). This confirms that the phenomenon from Sullivan et al. (1989) and Mann and Porter (2010) exists in more recent years of data. We also see that the spike in total filings is totally a result of increases in Chapter 7 filings, which is consistent with the theories that Chapter 7 is both more suitable for postponement and more susceptible to liquidity constraints. This observation strengthens the hypothesis that there is likely to be a null or slightly negative result for Chapter 13 filings in my results even if there is an observable positive effect for Chapter 7 filings.

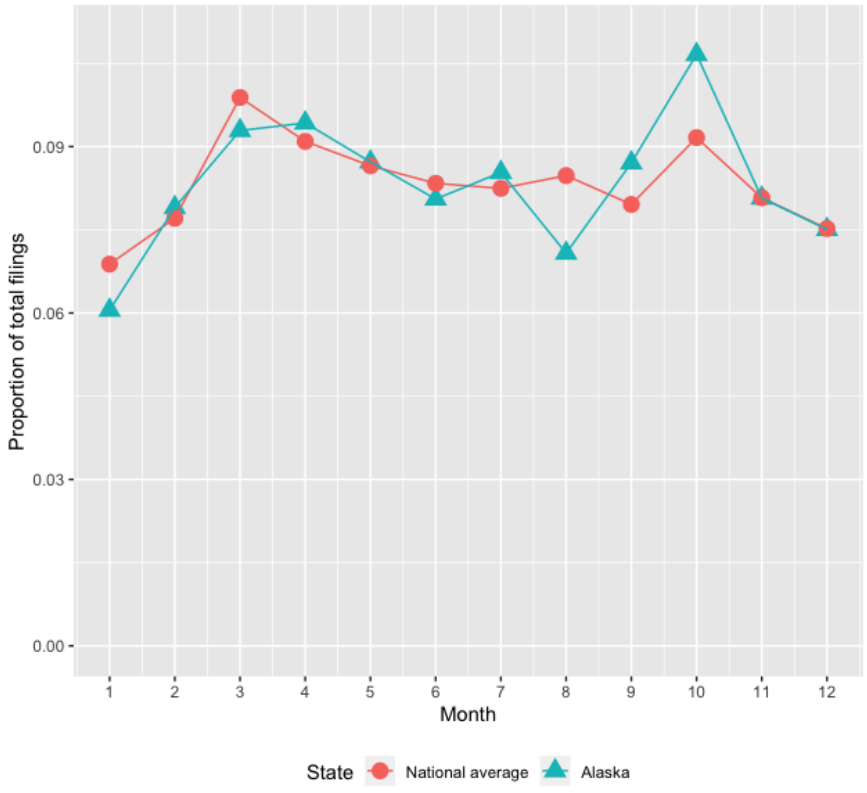
Figure 4 shows that this seasonal spike pattern in bankruptcies also occurs in October in Alaska, the month of that state's dividend payment. Alaska experiences an annual spike in total bankruptcies in October, whereas the spike experienced in the other 49 states is much smaller. If this spike is largest in years with the largest dividend, my empirical approach will pick up a positive effect and lend credence to the idea that the increased liquidity results in more bankruptcies during

Table 2: Spike in bankruptcies during tax refund season (March, April, May) by year and chapter

Year	Chapter 7	Chapter 13	Total Filings
2009	21.67	-1.02	14.83
2010	23.17	3.44	17.51
2011	22.73	0.33	15.99
2012	22.36	-0.27	15.24
2013	24.80	0.70	16.91
2014	27.48	1.54	18.57
2015	21.55	0.28	13.69
2016	23.69	-1.35	13.86
2017	29.18	5.81	19.93
Average	24.07	1.05	16.28

the period, especially if the same spike does not occur in my set of control states.

Figure 4: Proportion of annual bankruptcy filings, by month

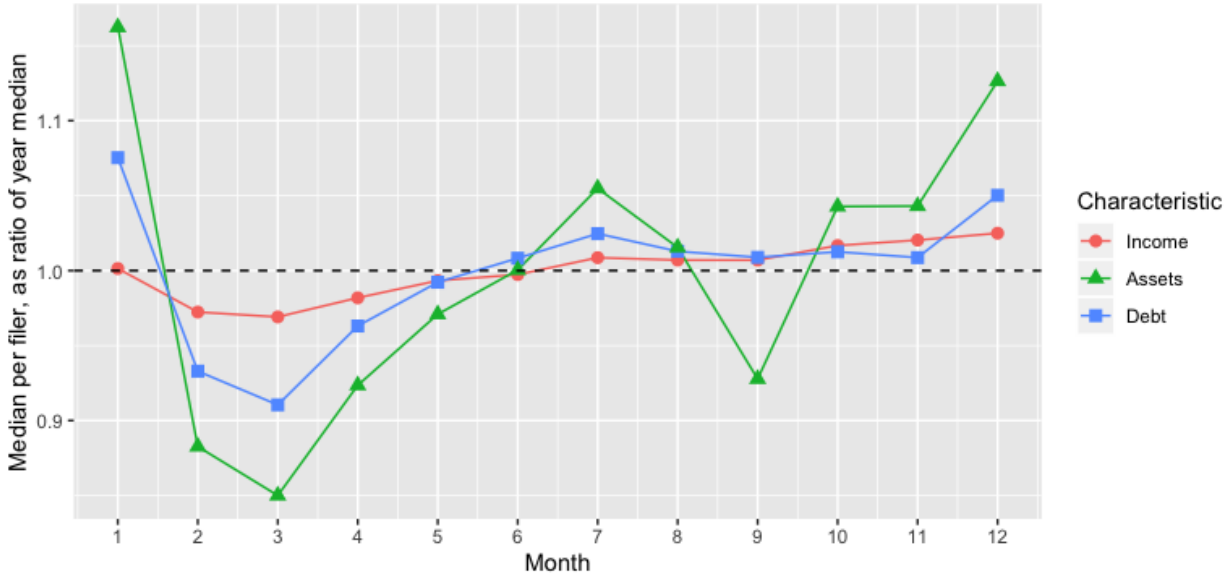


To normalize for state-level variation in bankruptcy filings, I define this seasonal spike in bankruptcies as the monthly average number of bankruptcies during the refund period minus the monthly average number of bankruptcies outside the refund period, divided by the monthly

average number of bankruptcies outside the refund period (see below). 80% of tax refunds are paid out in the months of March, April, and May nationally (Souleles, 1999), so my main regressions treat these three months as the refund period, but low income taxpayers may file earlier in order to receive their benefits sooner (Michelmore and Jones, 2019), so I will also show that my results are robust to changes in the time treatment.

$$BankruptcySpike_{st} = \frac{(Bankruptcies_{st}|RefundPeriod = 1) - (Bankruptcies_{st}|RefundPeriod = 0)}{(Bankruptcies_{st}|RefundPeriod = 0)} \tag{10}$$

Figure 5: Median monthly financial characteristics of Chapter 7 filers (2009-2017)



Median financial characteristics as a ratio of the year average. Data points on the dashed lane represent a month with median financial characteristics equal to the whole year average.

Figure 5 demonstrates the plausibility that Gross et al. (2014)'s finding that increased liquidity is associated with a decrease in the median financial characteristics of filers applies here. There is a marked decline in the February through April median income, assets, and debt, suggesting that the increase in filings during that period may be a result of an increase in low income debtors. In Section 6, I test this hypothesis within a plausibly causal empirical framework and also study changes in median debt and assets.

5.2 American Community Survey

In order to capture changes in average tax liability of low-income filers (as specified in Section 4.2), I use the American Community Survey Public Use Microdata Sample. The ACS provides data on variables previously only tracked by government statistics in the decennial census. The monthly survey is sent to 295,000 addresses, with the intention of providing good geographic range. To address non-response, households that do not answer the survey are often followed up on with phone calls or in-person interviews, and there is a financial penalty for households that decline to participate, though this is never enforced. The ACS is a rich data source in that it has information on many characteristics that can be helpful for understanding a household's likely tax burden and financial situation. From ACS data, I take a random sample of 10,000 low income households (defined as earning below the median in income in a given state, which is the same as the eligibility criteria for filing Chapter 7 bankruptcy) from each year. Using these households, I attempt to identify the 'filing unit' that make individual financial decisions. By 'filing unit', I refer to an economic actor that likely receives some tax refund and makes decisions surrounding bankruptcy (dependent children, for instance, would not meet this definition). For instance, I treat middle age siblings that live together as separate units rather than together as a household while a household with a single income earner and a minor dependent is regarded as one filing unit. With this data, I calculate the simulated tax liability that each filing unit would owe in each state based on marital status, age, number of dependents, wages, capital gains, federal government benefits, and property tax paid. Mean characteristics of some of these inputs used to calculate the simulated tax liability are provided in Table 3.

5.3 National Bureau of Economic Research TAXSIM

TAXSIM is a publicly available project of the National Bureau of Economic Research that calculates tax liability using state and federal policy from 1977 to the present (Coutts and Feenberg, 1993). Though the program accepts up to 27 inputs as factors for determining total liability, I am able to provide information on a subset of those listed above from the ACS. For each of the 50 states in the simulation, TAXSIM provides disaggregated estimates on the size of exemptions, credits, and liabilities that each filer from the simulation sample would expect. For a given filer the estimate on the total tax liability may be negative, as the total amount of refundable tax credits can exceed

Table 3: Characteristics of the low-income ACS sample

Year	Primary wages	Spouse wages	Interest received	Benefits from SSA	# dependents	Age	Property tax	n
2009	$19,014.98	$3,332.41	$735.25	$4,556.24	0.37	50.8	$1,032.93	12,750
2010	$18,119.87	$3,159.41	$592.78	$4,771.63	0.35	50.7	$1,011.82	12,925
2011	$17,183.37	$3,107.74	$552.20	$4,692.81	0.36	50.9	$979.19	13,069
2012	$17,674.53	$3,127.75	$560.91	$4,784.31	0.35	50.8	$981.13	13,115
2013	$18,492.12	$3,205.83	$661.03	$4,914.56	0.34	50.6	$1,003.05	13,177
2014	$18,952.38	$3,405.85	$664.71	$5,125.66	0.35	51.0	$993.69	12,143
2015	$20,064.56	$3,664.17	$753.73	$5,485.64	0.33	51.5	$1,074.62	13,029
2016	$20,462.77	$3,678.84	$673.97	$5,620.89	0.33	51.7	$1,144.26	13,051
2017	$21,073.80	$3,812.79	$716.10	$5,544.24	0.32	51.6	$1,154.13	13,044

Mean characteristics of input variables used for TAXSIM calculations. 'Benefits from SSA' refers to SSI, SSDI, and Social Security benefits received. While the selected sample size is 10,000 for each year, n varies by year because the number of individual filers living in the same household varies by year in the sample.

the income tax. To create the simulated instrument, I find the average tax liability calculated from TAXSIM for each state. Because I use a uniform sample, all variation between states in a given year is a result of differences in the tax generosity to low income residents.

5.4 Alaska Permanent Fund Dividends

For the Alaska Permanent Fund setting, I merge publicly available historical data on the size of refund onto the FJC Bankruptcy Database. To find the date of direct deposit payment in each year, I use newspaper archives to build a database of contemporary press releases. This information is displayed in Table 1. The date of payment is the beginning of the month-long treatment period for each year.

5.5 Internal Revenue Service Individual Income Tax Statistics

For data on the size of refunds in each state, which is the treatment in my instrumental variables regression, I use IRS state level data on the average federal and state refunds per filer in a state and year. This data is disaggregated to different levels of adjusted gross income, and to focus only on the low income population of interest I exclude data on filers with adjusted gross incomes of greater than $50,000 per year, which is slightly greater than the national median for the sample period. This data is available at the zip code level but I aggregate to the state based on the number of filers due to my inability to capture local tax policy in the instrument. This data includes comprehensive information on the financial characteristics of states and tax information

on the total and average amount collected, but the variables of interest to this analysis are the total amount of state and federal tax refunds in a given state and year, which is the treatment for the IV approach.

Figure 6: Average refund size for low-income filers, by state

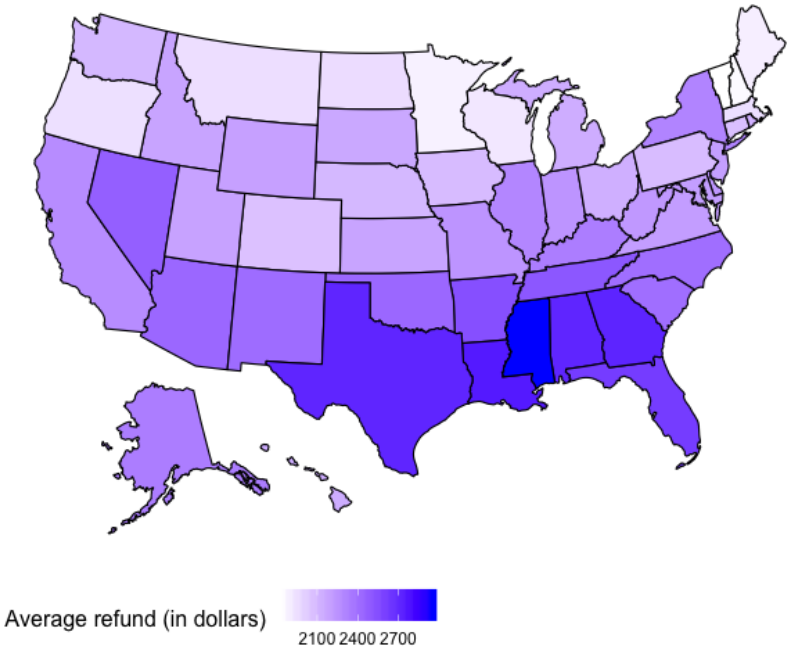


Figure 6 demonstrates the endogeneity issues discussed in Section 4.1 that undermine the causal interpretation of a regression of refund size for low income households on bankruptcies. Refunds are much larger in the Deep South than any other region, while they are especially small for states along the Canadian border. This matches the fact that the South leads the country in eligibility for the EITC as a proportion of the population (Barrow and McGranahan, 2001), supporting the idea that average refund size is affected by demographic and economic characteristics that likely also influence bankruptcy filing decisions.

Tables 4 and 5 show the mean characteristics for the states and years in the sample, respectively. Table 4 shows that there is considerable cross-state variation in the average number of annual bankruptcy filings and also that the TAXSIM-curated simulated tax liability picks up a fairly large degree of variation in tax generosity to the low income, from $821 in Minnesota to $2,128 in Oregon. There is also a fairly large range in average tax refunds from state to state, from $2,080 in New Hampshire to $3,285 in Mississippi. Crucially, these refunds are sufficiently

Table 4: Descriptive statistics by state (2009-2017)

State	Simulated tax liability	Average tax refund	Chapter 7	Chapter 13	Total filings	Median income	Unemployment rate	Poverty rate
AK	$ 1,008.05	$ 2,647.56	600	111	712	$ 73,536.67	7.16%	11.52%
AL	$ 1,760.95	$ 3,010.86	12628	16614	29242	$ 48,233.22	7.90%	16.58%
AR	$ 1,697.60	$ 2,911.56	7471	6094	13565	$ 45,660.11	6.56%	16.91%
AZ	$ 1,364.26	$ 2,761.01	25544	3974	29518	$ 55,457.78	7.80%	17.97%
CA	$ 1,279.00	$ 2,688.53	124911	37120	162031	$ 65,498.11	8.94%	15.06%
CO	$ 1,519.53	$ 2,340.65	21240	3922	25162	$ 69,193.22	6.12%	10.98%
CT	$ 1,285.31	$ 2,426.83	7428	1099	8527	$ 75,330.11	7.23%	9.63%
DC	$ 1,375.44	$ 2,857.68	732	182	914	$ 70,056.11	8.19%	18.27%
DE	$ 1,523.64	$ 2,550.13	2057	855	2912	$ 60,851.44	6.51%	11.76%
FL	$ 1,007.06	$ 3,006.65	56772	22611	79384	$ 51,823.56	7.73%	15.02%
GA	$ 1,719.41	$ 3,167.18	32340	29564	61904	$ 53,167.00	8.08%	17.31%
HI	$ 1,854.06	$ 2,634.69	1911	608	2519	$ 69,550.00	5.18%	11.41%
IA	$ 1,700.23	$ 2,401.96	7134	650	7784	$ 60,945.33	4.80%	10.50%
ID	$ 1,528.16	$ 2,522.25	6044	657	6701	$ 55,412.67	6.30%	13.06%
IL	$ 1,748.34	$ 2,520.83	51872	21104	72976	$ 60,701.22	8.11%	12.81%
IN	$ 1,595.03	$ 2,424.02	32145	9932	42077	$ 53,772.89	7.40%	14.56%
KS	$ 1,337.17	$ 2,420.30	6689	3228	9916	$ 55,144.44	5.39%	13.34%
KY	$ 1,848.98	$ 2,640.77	16333	5470	21803	$ 47,141.67	7.70%	17.74%
LA	$ 1,481.14	$ 3,045.89	6244	10284	16527	$ 46,620.44	6.76%	20.28%
MA	$ 1,647.49	$ 2,253.99	12550	3619	16169	$ 71,198.56	6.29%	11.22%
MD	$ 1,586.11	$ 2,741.32	18656	5738	24393	$ 77,801.00	6.19%	9.39%
ME	$ 1,459.84	$ 2,251.23	2649	435	3084	$ 55,153.78	6.34%	12.58%
MI	$ 1,082.38	$ 2,360.13	45961	8788	54749	$ 56,458.44	8.67%	13.61%
MN	$ 820.91	$ 2,194.64	14583	2448	17031	$ 68,605.44	5.40%	9.66%
MO	$ 1,481.83	$ 2,522.83	20891	7087	27977	$ 56,020.11	6.92%	13.66%
MS	$ 1,548.20	$ 3,284.90	7176	5712	12888	$ 41,525.44	8.13%	20.52%
MT	$ 1,684.62	$ 2,341.38	2210	308	2518	$ 51,495.56	5.61%	12.63%
NC	$ 1,883.12	$ 2,706.78	10224	10413	20636	$ 50,713.33	8.08%	15.79%
ND	$ 1,195.51	$ 2,122.39	1042	110	1152	$ 61,732.89	3.21%	11.20%
NE	$ 1,516.46	$ 2,397.61	4637	1694	6331	$ 60,895.78	3.77%	10.57%
NH	$ 1,027.67	$ 2,080.93	2945	763	3708	$ 76,687.44	4.67%	7.00%
NJ	$ 1,206.38	$ 2,466.41	25706	8229	33936	$ 71,853.44	7.57%	10.17%
NM	$ 1,338.80	$ 2,701.10	4601	408	5009	$ 48,433.44	6.96%	20.23%
NV	$ 1,007.08	$ 2,874.83	14829	4004	18833	$ 56,161.44	9.52%	14.36%
NY	$ 1,463.58	$ 2,714.65	36901	8116	45017	$ 58,410.33	7.03%	15.09%
OH	$ 1,380.17	$ 2,338.25	45835	12316	58150	$ 54,224.22	7.36%	14.41%
OK	$ 1,528.68	$ 2,729.97	11057	1967	13024	$ 51,904.00	5.29%	15.67%
OR	$ 2,128.44	$ 2,408.13	13062	3072	16135	$ 59,575.78	7.92%	13.10%
PA	$ 1,648.58	$ 2,222.45	21618	9585	31204	$ 59,302.33	6.83%	12.01%
RI	$ 1,411.96	$ 2,426.99	3524	646	4170	$ 61,103.89	8.69%	12.22%
SC	$ 1,406.21	$ 2,900.60	3747	4396	8143	$ 49,605.11	8.13%	16.23%
SD	$ 1,007.21	$ 2,484.87	1639	130	1769	$ 55,985.44	3.97%	13.32%
TN	$ 1,036.60	$ 2,813.17	21031	21388	42419	$ 48,918.89	7.46%	15.78%
TX	$ 1,007.00	$ 3,043.46	20437	22251	42688	$ 57,443.22	6.16%	16.14%
UT	$ 1,710.76	$ 2,490.65	11299	5384	16683	$ 67,291.22	5.23%	10.07%
VA	$ 1,617.44	$ 2,558.20	20953	10201	31155	$ 70,019.56	5.58%	10.67%
VT	$ 820.96	$ 2,096.94	864	216	1080	$ 63,556.00	4.69%	9.96%
WA	$ 1,006.96	$ 2,497.29	21440	5832	27272	$ 68,587.00	7.32%	11.54%
WI	$ 1,219.90	$ 2,296.88	22281	6060	28341	$ 59,834.89	6.37%	11.27%
WV	$ 1,549.08	$ 2,481.13	3861	506	4367	$ 46,643.22	7.00%	17.44%
WY	$ 1,007.42	$ 2,573.30	1241	156	1396	$ 62,648.33	5.13%	10.37%

All presented figures are averages across the sample period. Simulated tax liability is obtained by estimates from TAXSIM. Average tax refund is from IRS data. Bankruptcy information is from the FJC's Integrated Database. Economic characteristics from the BLS and FRED.

large to ease any liquidity constraint surrounding Chapter 7 filing costs, which average just above $1,000 (Gross et al., 2014). Median income, unemployment rate, and poverty rate are covariates included in the regression models and also listed as state averages. Table 5 demonstrates that both

simulated tax liability and average tax refund have increased since the Great Recession, with larger increases on the former. At the same time, there has been a marked fall in the total number of bankruptcies per year, with that change being led by a reduction in the number of Chapter 7 filings by nearly 50%.

Table 5: Descriptive statistics by year

Year	Simulated tax liability	Average tax refund	Chapter 7	Chapter 13	Total filings	Household income	Unemployment rate	Poverty rate
2009	$ 1,147.01	$ 2,333.95	1,090,448	382,512	1,472,960	$ 58,493.73	7.27%	13.59%
2010	$ 997.31	$ 2,348.04	1,280,676	433,080	1,713,756	$ 57,730.18	9.04%	14.26%
2011	$ 1,112.59	$ 2,242.54	1,157,420	407,004	1,564,424	$ 56,713.61	8.44%	14.31%
2012	$ 1,232.85	$ 2,212.75	975,248	364,752	1,340,000	$ 56,984.55	7.64%	14.30%
2013	$ 1,384.22	$ 2,778.67	853,876	335,584	1,189,460	$ 58,644.94	7.11%	14.17%
2014	$ 1,418.72	$ 2,793.11	738,248	307,556	1,045,804	$ 58,632.53	6.22%	14.06%
2015	$ 1,722.46	$ 2,819.50	610,284	295,100	905,384	$ 60,426.45	5.30%	12.94%
2016	$ 1,757.87	$ 2,817.80	557,816	287,552	845,368	$ 61,925.24	4.78%	12.45%
2017	$ 1,945.36	$ 2,834.23	561,904	301,360	863,264	$ 63,016.82	4.43%	12.13%

All presented figures are averages across the sample period, except bankruptcy numbers which are national totals.

5.6 Federal Housing Finance Agency National Mortgage Database

In order to test the effect of tax refunds on credit markets, I include evidence from the home loan industry, To do so, I use the National Mortgage Database from the Federal Housing Finance Agency to study changes in the 90 day delinquency rate at the state and month level between 2009 and 2017. The database is a nationally representative five percent sample of mortgages in the United States. For the sake of this project, I exclude data on individual enterprise mortgages and focus exclusively on non-enterprise mortgages, as my unit of interest is consumer borrowers and not business entities.

6 Results

This section presents my main empirical results. I first study the impact of tax refund liquidity on credit default and bankruptcy by implementing a simulated instrumental variable approach. I then use payments from the Alaska Permanent Fund to show that these findings are not program-specific and can be generalized to a broader class of positive liquidity shocks.

6.1 Instrumental variable approach

6.1.1 Effect of instrumented tax refunds on the seasonal spike in bankruptcies

Table 6 presents the results of the instrumental variables approach. The first stage regression of TAXSIM output on a low-income ACS sample suggests a strong positive relationship between the size of average state and federal tax liability and the size of average tax refund in the same state and year. The highly significant coefficient estimate suggests that the simulated tax liability instrument is strong. Specifically, a one dollar increase in tax liability calculated by TAXSIM is associated with a 55 cent increase in tax refund for this low income sample. Prior to testing this empirically, it was not clear what the expected sign of effect of the first stage would be, as the exact relationship between tax liability and refund size is dependent on the financial characteristics of the sample used. For example, lower income households might receive larger tax refunds than middle income households because of refundable tax credits, but higher income households might receive more than either group because of over-withholding on higher incomes. Such a large positive coefficient is likely largely attributable to Earned Income Tax Credits, which significantly increase the size of refund for each additional dollar earned until the phase-out period, in addition to over-withholding. The reduced form, the relationship between calculated tax liability and the spike in bankruptcies is also positive for Chapter 7 filings, though marginally significant. It does not seem likely that a state's statutory tax code for low income residents is systematically related to the intra-year spike in bankruptcies, but I include covariates in each regression on state and year unemployment rate, median income, and poverty rate to control for economic factors that may affect both. My results are robust to this inclusion. The regressions also include state fixed effects so as to control for state-level time invariant characteristics, as well as robust standard errors to allow for heterogeneity in variance. Year fixed effects are not included because a large share in the variation in tax refunds is due to changes in the federal tax code, which vary only by year and not by state. In Table 7, I show that including year fixed effects weakens the simulated instrument by reducing the variation in the model. In Table 6, I show that the inclusion of time-varying economic conditions does not seem to soak up omitted covariates that might affect the model.

As anticipated by the liquidity constraint theory laid out in this paper, as well as previous research by Gross et al. (2014), I expect the coefficient on Chapter 7 filings is more likely to be pos-

itive than Chapter 13 filings, and the results from Figure 6 strongly suggest this. By instrumenting TAXSIM estimated liability, I find that a thousand dollar increase in tax refunds leads to an 8.6 percentage point increase in the spike in bankruptcies in the months of March, April, and May relative to the rest of the year for a state, which is significant at the 95% confidence level. From an average spike in bankruptcies during that period of 24.07%, this is a 35.8% increase in the size of seasonal spike in Chapter 7 bankruptcy. Without liquidity constraints, I would expect that any increase in liquid wealth would unambiguously reduce the desirability of bankruptcy and therefore reduce the number of filings. Any positive finding suggests that the increased ability to pay for cash-strained debtors offsets this wealth effect. I find a positive but insignificant coefficient for the same equation when the outcome variable is the spike in Chapter 13 filings (which is consistent with the observation that the spike in Spring bankruptcies is wholly a result of Chapter 7), and the spike in total filings is significant at the 90% confidence level and equal to 6.3 percentage points. In some ways, the Chapter 13 regression is a placebo test because I do not expect these filers to be constrained by a lack of liquidity due to small up-front costs. Though we might expect some small negative effect from substitution to Chapter 7 or an increased ability to pay debts, a significant positive effect is not predicted by my model and would cast the framework in doubt. As predicted, the OLS regression of refund size on the spike of bankruptcy does not capture any effect, likely because the refund is correlated with other factors that also affect bankruptcy timing.

In order to assess the possibility that, due to the complexity of the tax system and the specific sample used, the relationship between calculated tax liability and tax refunds is not linear, I include Table 8, which includes squared and cubic polynomial terms. Both of these specifications yield significant first stage coefficients, suggesting non-linearity is present, but neither specification leads to large differences in the second stage least stages estimate, 'Refund size', (the coefficient on both of these regression closely mirrors the 8 percentage point increase in spike in Chapter 7 bankruptcies found with a linear first stage). The first stage relationship between TAXSIM calculated average tax liability and average tax refund at the state and year level is graphed in Figure 7 with the relevant models for the linear, quadratic, and cubic parameterizations. I omit regressions on Chapter 13 and total bankruptcies, as the finding is largely the same as in Table 6. Including these higher order terms is a useful check to ensure that my results from Table 6 are not dependent on a false linear constraint to a truly non-linear relationship. Because this

Table 6: Effect of tax refund size on the number of bankruptcies, by filing type (2009-2017)

		1st Stage	Reduced Form	2SLS	OLS
	Dependent Variable (y)	Refund size (thousand $)	Percent spike in bankruptcy	Percent spike in bankruptcy	Percent spike in bankruptcy
	Independent Variable (x)	Taxsim state avg. (thousand $)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)	Refunds (thousand $)
	Instrument	-	-	Taxsim state avg. (thousand $)	-
		[1]	[2]	[3]	[4]
Chapter 7	**x**	**0.5541*** **	**4.7755***	**8.6190****	**1.2471**
		[0.0512]	[2.4892]	[4.3417]	[1.4980]
	Median income (thousand $)	0.0039	0.0508	0.0039	0.0764
		[0.0512]	[0.1329]	[0.0512]	[0.1535]
	Unemployment rate	-0.0307**	0.1390	0.0171	-0.4436*
		[0.0127]	[0.4757]	[0.1418]	[0.2540]
	Poverty rate	-0.0307*	0.5616	0.4435	0.5415*
		[0.0127]	[0.3784]	[0.2819]	[0.3218]
	Mean (y)	2.5756	26.2094	26.2094	26.2094
	R-Squared	0.7974	0.6647	-	0.6598
	N	459	459	459	459
		[1]	[5]	[6]	[7]
Chapter 13	**x**	**0.5541*** **	**3.1091**	**5.6115**	**1.3618**
		[0.0512]	[3.9380]	[6.6576]	[3.0658]
	Median income (thousand $)	0.0039	0.1286	0.1066	0.1408
		[0.0512]	[0.2716]	[0.2587]	[0.2727]
	Unemployment rate	-0.0307**	0.1037	0.2758	-0.2125
		[0.0127]	[0.6160]	[0.7618]	[0.4493]
	Poverty rate	-0.0307*	0.3153	0.2384	0.2949
		[0.0127]	[0.5275]	[0.4773]	[0.5249]
	Mean (y)	2.5756	5.5419	5.5419	5.5419
	R-Squared	0.7974	0.2703	-	0.2693
	N	459	459	459	459
		[1]	[8]	[9]	[10]
Total filings	**x**	**0.5541*** **	**3.4740**	**6.2702***	**0.9316**
		[0.0512]	[2.1375]	[3.6912]	[1.3823]
	Median income (thousand $)	0.0039	0.0585	0.0340	0.0769
		[0.0512]	[0.1299]	[0.1236]	[0.1343]
	Unemployment rate	-0.0307**	0.2529	0.4453	-0.1686
		[0.0127]	[0.3512]	[0.4417]	[0.2354]
	Poverty rate	-0.0307*	0.5488**	0.4629**	0.5339**
		[0.0127]	[0.2530]	[0.2335]	[0.2596]
	Mean (y)	2.5756	19.7081	19.7081	19.7081
	R-Squared	0.7974	0.7446	-	0.7423
	N	459	459	459	459

This table reports estimates of the effect of $1,000 in tax refunds on the Spring spike in bankruptcies. 'Taxsim state avg.' denotes the simulated tax liability, the instrument. Refund size includes both state and federal refunds. The model and previous research indicate that Chp. 7 filings are likely to have the largest positive coefficient in the two-stage least squares regression of interest. These estimates are shown in specification [3]. From an average spike in bankruptcies during that period of 24.07%, this is a 35.8% increase in the size of seasonal spike in Chapter 7 bankruptcy. Mean(y) denotes the outcome variable averaged across all observations. All regressions include state-year economic controls (unemployment rate, median household income, and poverty rate), state fixed effects, and robust standard errors. 'x' refers to the independent variable for each regression. Significance levels: *=.1, **=.05 and ***=.01

set of regressions does not seem to fundamentally improve my understanding of the first stage relationship, I choose to exclude them for the remaining analysis.

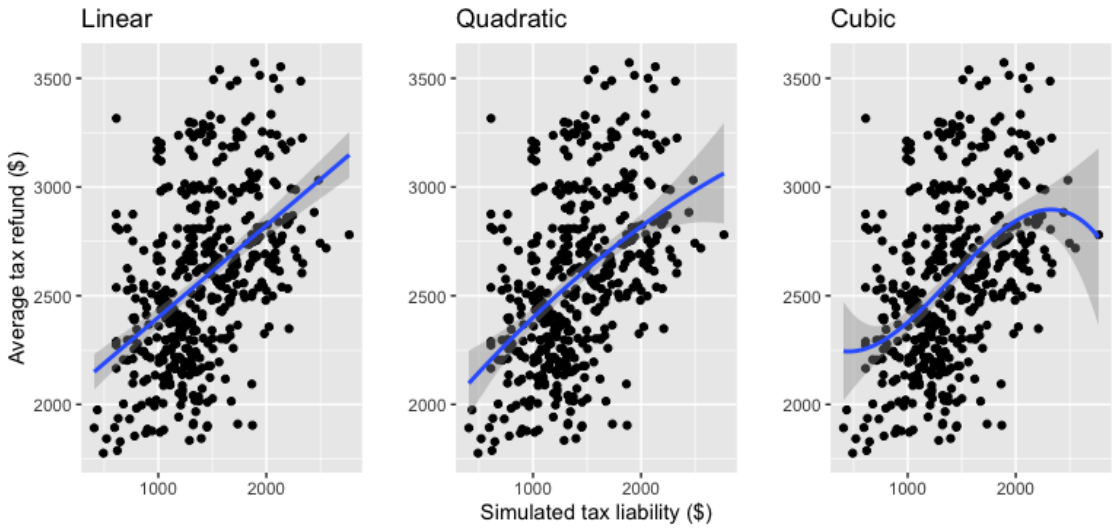
Next, I examine whether treating March, April, and May as the refund period where the tax refund is relevant is appropriate. As mentioned earlier, a large majority of filers receive their

Table 7: Effect of tax refund size on the number of bankruptcies with year fixed effects included, by filing type (2009-2017)

	1st Stage	Reduced Form	2SLS
Dependent Variable (y)	Refund size (thousand $)	Percent spike in bankruptcy	Percent spike in bankruptcy
Independent Variable (x)	Taxsim state avg. (thousand $)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)
Instrument	-	-	Taxsim state avg. (thousand $)
	[1]	[2] **Chapter 7 filings**	[3]
x	**-0.0836**	**-2.6571**	**31.7959**
	[0.1149]	[5.8708]	[83.8371]
R-Squared	0.9366	0.7206	-
	[1]	[4] **Chapter 13 filings**	[5]
x	**-0.0836**	**8.6555**	**-103.5738**
	[0.1149]	[13.3479]	[207.1879]
R-Squared	0.9366	0.2892	-
	[1]	[6] **Total filings**	[7]
x	**-0.0836**	**-3.1620**	**37.8374**
	[0.1149]	[5.0405]	[80.0124]
R-Squared	0.9366	0.7818	-

This table reports estimates of the effect of $1,000 in tax refunds on the Spring spike in bankruptcies when I include year fixed effects. 'Taxsim state avg.' denotes the simulated tax liability, the instrument. Refund size includes both state and federal refunds. The model and previous research indicate that Chp. 7 filings are likely to have the largest positive coefficient in the two-stage least squares regression of interest. As in the previous table, regressions include state-year economic controls (unemployment rate, median household income, and poverty rate), state fixed effects, and robust standard errors. 'x' refers to the independent variable for each regression. Sample size is identical in each IV regression, so it is omitted here. Significance levels: *=.1, **=.05 and ***=.01

Figure 7: Effect of simulated tax liability on average refund (first stage)



These graphs depict the relationship between the average simulated state and federal tax liability in a state and year and the average state and federal tax refunds received in the state. The quadratic and cubic specifications include polynomial terms to allow for the possibility that the relationship is not strictly linear. This modification does not have a strong effect on the model of best fit.

Table 8: Effect of tax refund size on Chapter 7 bankruptcies, with squared and cubic terms (2009-2017)

	Dependent Variable (y) / Treatment (x)	Refund size (thousand $) Taxsim state avg. (thousand $)	Percent spike in Chp. 7 Taxsim state avg. (thousand $)	Percent spike in Chp. 7 Instrumented refunds (thousand $)
		1st Stage [1]	Reduced Form [2]	2SLS [3]
Squared	**Tax liability**	**0.8420*****	**4.5550**	-
		[0.1539]	[6.8794]	-
	Tax liability squared	**-0.0936****	**0.0717***	-
		[0.0438]	[1.8293]	-
	Refund size	-	-	**8.2018***
		-	-	[4.4872]
		1st Stage [4]	Reduced Form [5]	2SLS [6]
Cubic	**Tax liability**	**-0.0898**	**-6.0038**	**-**
		[0.4945]	[18.9891]	-
	Tax liability squared	**0.5715***	**7.6093**	**-**
		[0.3299]	[12.0261]	-
	Tax liability cubed	**-0.1489*****	**-1.6879**	**-**
		[0.0730]	[2.5803]	-
	Refund size	-	-	**8.3403****
		-	-	[4.1811]

This table reports estimates of the effect of $1,000 in tax refunds on the Spring spike in Chapter 7 bankruptcies with a squared and cubic term included to pick up non-linearities in the first stage relationship between simulated taxes and tax refund size. 'Taxsim state avg.' denotes the simulated tax liability, the instrument. Refund size includes both state and federal refunds. The model and previous research indicate that Chp. 7 filings are likely to have the largest positive coefficient in the two-stage least squares regression of interest. All regressions include state-year economic controls (unemployment rate, median household income, and poverty rate), state fixed effects, and robust standard errors. 'Refund size' is the variable of interest. Significance levels: *=.1, **=.05 and ***=.01

refunds during those months, but low income filers might receive theirs earlier in order to take advantage of refundable tax credits. In Table 9, I treat each month as the refund period. In other words, I calculate the spike in bankruptcies for each month relative to the rest of the year. If only March, April, and May exhibit positive coefficients, I will conclude that time treatment is correct. I do find positive coefficients for those months and negative and significant coefficients for the months of July, September, and December. One possible explanation for this finding is that the extra liquidity provides some near-bankruptcy households to continue making payments in the Summer, even as it drives other households into Chapter 7 during the Spring. These are not the liquidity constrained debtors of interest to this paper; if they faced borrowing constraints that prevented them from filing, they would likely have followed in the Spring with the increased liquidity. However, it is possible that the larger average refunds induce people to file earlier, leading to a decline in the state total of bankruptcies in the Summer months. This possibility is explored in the next set of regressions. I also find a positive effect for the month of November of 9.5 percentage

points, which is a surprising result. One explanation of this effect is tax refunds as a result of IRS Form 4868, which allows for late filings due by October 15. The IRS reports that 14.6 million taxpayers chose this option in 2019, which provides some evidence that this effect might still be related to the tax refund system, but there is no strong theoretical reason why I would expect a large number of low income filers to delay until that period. It is surprising that filers with an expected federal tax refund would wait for six months after the initial filing deadline in April to file and receive their benefit, but Figure 2 provides evidence that there is an uptick in refunds in late October and November which may explain this finding. With that caveat in mind, I proceed by treating March, April, and May as the appropriate treatment period.

Table 9: Verification of proper time treatment, Chapter 7 bankruptcies

	Jan [1]	Feb [2]	March [3]	April [4]
Instrumented refunds (thousand $)	**1.4968**	**2.4460**	**6.7994****	**2.7898***
	[1.2935]	[2.0078]	[2.2283]	[1.5559]
	May [5]	June [6]	July [7]	August [8]
Instrumented refunds (thousand $)	**6.2694*****	**-1.7020**	**-5.1228****	**-0.7829**
	[1.8921]	[1.7886]	[2.03774]	[1.8697]
	September [9]	October [10]	November [11]	December [12]
Instrumented refunds (thousand $)	**-4.2319***	**2.6627**	**9.5149*****	**-8.7295*****
	[2.2912]	[2.6117]	[2.2158]	[1.6037]

This table reports the 2sls estimates of $1,000 in tax refunds on the spike in Chp. 7 bankruptcies by using alternate time treatments as a test of the March-May treatment period. A positive coefficient indicates that the model finds that an increase in liquidity causes a spike in bankruptcy in that month. All regressions include state-year economic controls (unemployment rate, median household income, and poverty rate), state fixed effects, and robust standard errors. 'x' refers to the independent variable for each regression. Significance levels: *=.1, **=.05 and ***=.01

6.1.2 Effect of instrumented tax refunds on the annual rate of bankruptcy

Based on the results from Table 9 that show a decline in Chapter 7 bankruptcies outside of the treatment period, I explore the net effect of the variation on the *total* number of Chapter 7 bankruptcies in a state and year. In Table 10, I show that a thousand dollar increase in the average instrumented tax refund at the state and year level leads to a decline in Chapter 7 filings of around 150 filings per 100,000 state residents and a decline in Chapter 13 filings of nearly 25 filings per 100,000. Relative to the average rate of filings, these represent a decline in the total rate of formal bankruptcy filing of 54%. These results prompt several remarks. While the main results in Table 6 suggest that for many filers β (the coefficient on the liquidity effect) in Equation 4 is a relevant

factor in the bankruptcy decision, α, the wealth effect of increased liquidity, is very meaningful in the aggregate. While I cannot rule out that this decrease in annual formal bankruptcy is associated with an increase in informal bankruptcy, the theoretical approach laid out in Equation 3 does not suggest any reason why there would be substitution along this margin from an increase in wealth. More likely, this result suggests that a modest size increase in lump sum payments maps to a decline in overall bankruptcy. It is not clear whether this is because the over-withholding / refund system creates a *de facto* escrow for paying off debt or if larger tax credits decrease the need for default.

Table 10: Effect of tax refund size on annual rate of bankruptcies per 100,000 residents

	Reduced Form	**2SLS**
Dependent Variable (y)	Filings per 100,000	Filings per 100,000
Independent Variable (x)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)
Instrument	-	Taxsim state avg. (thousand $)
	[1] **Chapter 7 filings**	[2]
x	**-83.4044*****	**-150.5334*****
	[13.2142]	[23.2917]
Mean(y)	226.3692	226.3692
	[3] **Chapter 13 filings**	[4]
x	**-13.6778****	**-24.6865****
	[6.1361]	[10.0783]
Mean(y)	96.9785	96.9785
	[5] **Total filings**	[6]
x	**-97.0822*****	**-175.2199*****
	[18.1565]	[30.8873]
Mean(y)	323.3477	323.3477

This table reports the 2sls estimates of $1,000 in tax refunds on the rate of bankruptcy for the whole year. A negative coefficient indicates that the model finds that larger simulated tax refunds reduce the number of bankruptcies in a state and year. The first stage is excluded here because it is the same model as in previous tables. Mean(y) denotes the outcome variable averaged across all observations. All regressions include state-year economic controls (unemployment rate, median household income, and poverty rate), state fixed effects, and robust standard errors. 'x' refers to the independent variable for each regression. Significance levels: *=.1, **=.05 and ***=.01

6.1.3 Effect of instrumented tax refunds on the financial characteristics of bankruptcy filers

Gross et al. (2014) find an increase in the median debt of Chapter 7 filers as a result of the 2001 and 2008 tax rebates with no significant effect on income or assets, suggesting that the increase in filings is driven by liquidity-strapped filers rather than strategic, wealthier filers. The distinction here is important because an increase in filings among in-need, marginal filers is likely to move the debtors away from informal bankruptcy and therefore improve social welfare while an increase among strategic filers is likely to increase default rates and reduce social welfare. To test

this, I modify my regression equation to define the spike in median assets, debt, and income as new outcome variables. This spike is defined similarly as the spike in bankruptcies: the percentage change in the treatment months of March, April, and May relative to the control months. If the increase in Chapter 7 bankruptcies is driven by the most in-need debtors, I would expect a decrease in median assets and income and an increase in debt. In Table 11 I show that there is an increase in median debt but no significant effect on either assets or income. The 32.6 percentage point increase in the Spring spike in median debt is economically significant; it represents a 120% increase in the spike over the median of 27.23 percentage points. The effect of a thousand dollars in tax refunds for low-income filers, therefore, is a more than doubling in the median debt of filers. Each of these findings has the same sign as in Gross et al. (2014), and there is reason to believe that relatively in-debt filers are especially likely to be induced into Chapter 7 by an increase in liquidity. An alternate explanation for this finding is that it is caused by a moral hazard effect that incentives debtors to take on debt with the knowledge that they will be able to afford bankruptcy with their refund checks. This story is unlikely because (1) previous studies of bankruptcy filers have found that they are likely to struggle to pay debt for long periods of time before filing (Mann and Porter, 2010) and (2) this mechanism requires debtors to be highly aware of the size of their refund many months before actual payment.

Table 11: Change in financial characteristics among Chapter 7 filers

		Chapter 7 filings		Chapter 13 filings	
		Reduced Form	2SLS	Reduced Form	2SLS
Median assets		[1]	[2]	[3]	[4]
	Dependent Variable (y)	Percent spike in assets for Chp 7	Percent spike in assets for Chp 7	Percent spike in assets for Chp 13	Percent spike in assets for Chp 13
	Independent Variable (x)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)
	Instrument	-	Taxsim state avg. (thousand $)	-	Taxsim state avg. (thousand $)
	x	**-0.8489**	**-1.5321**	**-2.9658**	**-5.3528**
		[4.6813]	[7.9273]	[6.0534]	[10.2573]
	Mean(y)	-3.7900	-3.7900	2.0747	2.0747
	R-Squared	0.1106	-	0.1211	-
Median debt		[5]	[6]	[7]	[8]
	Dependent Variable (y)	Percent spike in debt for Chp 7	Percent spike in debt for Chp 7	Percent spike in debt for Chp 13	Percent spike in debt for Chp 13
	Independent Variable (x)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)
	Instrument	-	Taxsim state avg. (thousand $)	-	Taxsim state avg. (thousand $)
	x	**18.0495*****	**32.5769*****	**2.4160**	**4.3606**
		[6.7089]	[11.5054]	[4.0241]	[6.8495]
	Mean(y)	27.6459	27.6459	0.2189	0.2189
	R-Squared	0.7551	-	0.1204	-
Median monthly income		[9]	[10]	[11]	[12]
	Dependent Variable (y)	Percent spike in income for Chp 7	Percent spike in income for Chp 7	Percent spike in income for Chp 13	Percent spike in income for Chp 13
	Independent Variable (x)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)
	Instrument	-	Taxsim state avg. (thousand $)	-	Taxsim state avg. (thousand $)
	x	**0.1254**	**0.2264**	**1.8683**	**3.3721**
		[1.1781]	[1.9933]	[2.0932]	[3.5881]
	Mean(y)	-1.5457	-1.5457	-0.1524	-0.1524
	R-Squared	0.1480	-	0.2042	-

This table reports the 2sls estimates of $1,000 in tax refunds on the spike in median financial characteristics of Chp. 7 filers. A positive coefficient indicates that the model finds that an increase in liquidity causes a spike in the financial metric in the refund period of March, April, and May. The first stage is not shown because it is identical to previous specifications. Mean(y) is the outcome variable averaged across observations. All regressions include state-year economic controls (unemployment rate, median household income, and poverty rate), state fixed effects, and robust standard errors. 'x' refers to the independent variable for each regression. Significance levels: *=.1, **=.05 and ***=.01

6.1.4 Effect of instrumented tax refunds on the rate of mortgage delinquencies

I test the effect of instrumented tax refund size on the treatment period spike in mortgage delinquencies in order to determine whether increased liquidity has an effect on credit markets outside of bankruptcy. Home mortgages are collateralized loans, so debt collection for delinquency results in foreclosure rather than discharge through bankruptcy. For this reason, changes in monthly mortgages, and specifically differences in these changes based on variation in liquidity at the state and year level, provide an opportunity to test for the effects of increased liquidity on debt repayment not directly related to formal bankruptcy. I show in Table 12 that, while there is not a large seasonal pattern in mortgage delinquency rate overall, there is a very large decline in this rate associated with increased tax refunds. This suggests that in the months of March, April, and May, high refund jurisdictions provide their cash-strapped residents with the ability to make mortgage payments. I find in the 2sls framework that a thousand dollar increase in tax refunds causes a 31 percentage

point decline in the rate of 90 day delinquencies, a large sum considering that the average, cross year and state change in delinquencies in the treatment period is near zero. This result suggests that while increased liquidity increases bankruptcies in the Spring, there is not an decrease in debt repayment. This finding, combined with the increased debt load of filers during the treatment period and the overall decline in bankruptcies from larger tax refunds, provides evidence that the increased ability to afford bankruptcy costs increases the propensity to file among the liquidity constrained population, while other debtors benefit from an increased liquidity in a way that encourages debt repayment.

Table 12: Effect of size of average tax refund (in thousand dollars) on the mortgage delinquency rate (2009-2017)

	Reduced Form	**2SLS**	**OLS**
Dependent Variable (y)	% change in mortgage delinquencies	% change in mortgage delinquencies	% change in mortgage delinquencies
Independent Variable (x)	Taxsim state avg. (thousand $)	Instrumented refunds (thousand $)	Average refunds (thousand $)
Instrument	-	Taxsim state avg. (thousand $)	-
x	**-17.3306*****	**-31.2794*****	**-16.7195*****
	[3.2818]	[5.3029]	[2.1396]
Mean(y)	0.5834	0.5834	0.5834

This table reports estimates of the effect of $1,000 in tax refunds on the Spring change in mortgage delinquencies. Spring is defined as March, April, and May. 'Taxsim state avg.' denotes the simulated tax liability, the instrument. Refund size includes both state and federal refunds. The first stage is not included because it is identical to previous specifications. Mean(y) denotes the outcome variable averaged across all observations. All regressions include state-year economic controls (unemployment rate, median household income, and poverty rate), state fixed effects, and robust standard errors. 'Instrumented refund size' is the variable of interest. The first stage is excluded here because it is redundant. Significance levels: *=.1, **=.05 and ***=.01

6.2 Alaska Permanent Fund Dividend

Figure 13 provides results for the difference-in-differences model using the Alaska PFD. This framework provides further support for the idea that an increase in liquidity induces Chapter 7 filings in the period directly after by using an unrelated source of variation and a treatment time that can ease concerns that the results from the previous section are due to some condition of early Spring patterns. I find that a thousand dollar increase in the size of the dividend results in an 18.9 filing increase in the number of Chapter 7 bankruptcies in the month after the dividend is received. Note that this coefficient is interpreted in number of bankruptcies, as opposed to percentage spike in the previous subsection. The 18 filing increase is relative to an October average of 73 Chapter 7 filings, or a 24.7% increase. All of the increase in Chapter 7 bankruptcies appears to occur in

the month immediately following the date the dividend is paid. There is no significant coefficient for Chapter 13 or total filings, and the effect seems to be largely concentrated in the first month after the dividend is paid. Interestingly, there is an insignificant but fairly large increase of 11 bankruptcies in the month prior to payment of the dividend, suggesting the possibility that there may be some expectation effect in the month between the announcement of the size of dividend and the actual date of payment. This does seem more plausible than in the tax refund setting because the payment size is announced around a month before the direct deposit date.

Table 13: Effect of size of Alaska PFD (in thousand dollars) on the number of bankruptcies, difference-in-differences

		-2 months	-1 month	+1 month	+2 months	+3 months
Chapter 7	Size of payment	-0.6155	-1.5567	-2.2062	-0.7915	-0.7529
		[3.8468]	[3.8760]	[3.6559]	[3.9031]	[3.6892]
	Treatment period	-6.9311	-10.4773	-15.2034	-7.4755	-9.6646
		[10.5595]	[11.0714]	[11.1590]	[9.0350]	[16.3104]
	Diff-in-diff	**-0.2334**	**11.0604**	**18.8544****	**1.8789**	**1.4150**
		[8.1782]	[8.3583]	[9.2211]	[7.4721]	[12.0568]
Chapter 13	Size of payment	-0.1839	-0.0360	0.2306	0.2112	-0.0983
		[1.0489]	[1.0382]	[1.0437]	[1.0233]	[1.0187]
	Treatment period	-5.4379**	-2.6632	1.4672	-0.7739	-4.5973
		[2.3837]	[3.3802]	[3.2834]	[3.1478]	[3.9401]
	Diff-in-diff	**2.1584**	**2.3843**	**-0.8159**	**-0.5821**	**3.1315**
		[1.6734]	[3.3380]	[2.1782]	[2.5221]	[3.3616]
Total filings	Size of payment	-0.8142	-1.6075	-1.9903	-0.5951	-0.8660
		[4.1590]	[4.1312]	[3.9620]	[4.1415]	[3.9379]
	Treatment period	-12.3779	-13.1494	-13.7452	-8.2583	-14.2708
		[9.8731]	[13.0598]	[13.7200]	[11.4898]	[16.9685]
	Diff-in-diff	**3.9241**	**13.4437**	**18.0376**	**1.2958**	**4.5455**
		[7.3506]	[9.8590]	[10.9950]	[9.5797]	[11.7339]

This table reports estimates of the effect of $1,000 in dividends on the increase in bankruptcies in Alaska. Size of payment denotes the dollar amount of the dividend and the treatment period is unique to each column, with the preferred specification being the four weeks immediately following receipt of the dividend and the negative months being placebo tests for the months before the payment. The difference-in-differences estimator of interest is the interaction between the size of payment and the treatment period dummy. For reference, the average number of Chapter 7 filings in October is 73. All regressions include state-year economic controls (unemployment rate, median household income, and poverty rate) and robust standard errors. Significance levels: *=.1, **=.05 and ***=.01

In order to ensure that this positive effect is not a result of omitted trends, I include the results from the triple differences model in Table 14. Though there is some variation in the size of effect, these regressions show a consistently positive effect of the dividend size on the number of Chapter 7 filings in the month after payment relative to the control period and states, with a magnitude similar to the 24.7% increase found in the difference-in-differences results in Table 4. Also similar to the difference-in-differences model, I find small and largely insignificant estimates for the effect on Chapter 13 and marginally significant results for total filings. For this reason, I

Table 14: Effect of size of Alaska PFD (in thousand dollars) on the number of Chapter 7 bankruptcies, triple differences model

	[1]	[2]	[3]	[4]	[5]	[6]
Control state	All controls	North Dakota	Idaho	Vermont	Maine	Montana
DDD	**23.3090****	**13.8592****	**19.6793**	**26.4455*****	**40.8514***	**12.0961**
	[11.0343]	[7.0129]	[20.2556]	[7.3131]	[21.0170]	[16.0772]
Treatment period * Dividend size	-4.4546	4.9952	-0.8249	-7.5911	-21.9997	6.7583
	[8.5878]	[5.3296]	[19.9086]	[6.1453]	[20.5006]	[15.7572]
Treatment period * Alaska	-18.8569	-7.1401	-7.7933	-22.1525**	-52.4665	3.5698
	[16.4260]	[11.0419]	[30.3979]	[10.9908]	[34.4728]	[23.2677]
Dividend size * Alaska	0.0179	0.7594	-14.554	-4.3155	-23.6458*	-12.1036
	[5.1226]	[3.6932]	[25.8892]	[4.2342]	[13.4748]	[11.1144]
Treatment period	3.6535	-8.0633	-7.4101	6.9491	37.263	-18.7732
	[12.1893]	[8.5546]	[29.7513]	[9.1203]	[33.6887]	[22.6579]
Dividend size	-18.8569	157.0709***	45.4223	137.5596	97.2284	88.0108
	[16.4260]	[24.5376]	[220.9112]	[38.1878]	[99.7153]	[56.2826]

This table reports estimates of the effect of $1,000 in dividends on the increase in Chapter 7 bankruptcies in Alaska using a set of similar control states. Size of payment denotes the dollar amount of the dividend and the treatment period is one month after the dividend is paid. The triple differences estimator of interest is the interaction between the size of payment and dummies that equal one if in the month following the dividend and if the state of filing is Alaska. For reference, the average number of Chapter 7 filings in October is 73. All regressions include state-year economic controls (unemployment rate, median household income, and poverty rate), year and state fixed effects and robust standard errors. Significance levels: *=.1, **=.05 and ***=.01

choose to omit them here. It is notable that I find significantly positive results when using only North Dakota as a control state, as the similar levels of dependence on fossil fuel for the states suggest that oil market factors are not creating an omitted variable bias problem.

Finally, it's worth noting that Alaska has the fewest number of total bankruptcies, as well as the lowest per 100,000 residents, of any state in the country. While the evidence from this model seems to be complementary to the IV results, it is worth mentioning that the relatively small absolute number of filings should caution against over-extrapolation. Still, this set of regressions indicates that the finding that liquidity induces Chapter 7 bankruptcy filings among those on the margin between formal and informal bankruptcy is not unique to the tax refund setting that the IV approach utilizes.

7 Discussion

Although the preferred form of bankruptcy for most filers, the laws surrounding Chapter 7 filings sometimes put debtors in the paradoxical position of needing to save up in order to file without any ability to borrow against future debt relief (Mann and Porter, 2010). One potential

outcome of this liquidity constraint is that it forces debtors from formal in informal bankruptcy, with the later being a relatively inefficient process with little prospect of recovery for creditors and extended difficulty for debtors (Hunt, 2007 and Hynes, 2008). In this paper, I reveal substantial substitution towards Chapter 7 formal bankruptcy as a result of increased liquidity. First, using a simulated instrument for the average size of tax refunds, I find that $1,000 in tax refunds leads to an increase in the Spring spike in Chapter 7 bankruptcies of 36%. I then show that this result appears to be driven by high-debt but average income filers, suggesting that the effect may be largest among debtors with a true inability to pay back their debts. While this effect is large in the months immediately after receipt, larger tax refunds are associated with an overall decline in the year total of bankruptcies at the state level. That fact, along with an accompanying decline in mortgage delinquencies associated with the payments, suggests that modest increases in liquidity have important effects on the ability and propensity of borrowers to repay their debts. Finally, I run two empirical models to show that $1,000 in benefits from the Alaska Permanent Fund Dividend leads to a one month increase in Chapter 7 bankruptcies of 24.7-31.5%.

These results support the conclusion that the results found in Gross et al. (2014) and Alabanesi and Nosal (2018) are not unique to economic recessions or policy overhauls, but that binding liquidity constraints are a constant constraint in the bankruptcy system and affect the timing and the overall quantity of bankruptcies. This study does not offer a complete view of the bankruptcy system. For instance, while it appears that a reduction in the cost of formal bankruptcy may be welfare-enhancing by moving in-need debtors from informal to formal bankruptcy, I am not able to calculate moral hazard costs from such a policy change. Additionally, my findings are interpreted in the light of literature that suggests formal bankruptcy causes fewer distortions to the credit market than informal, but I also do not test this. Any claim that reducing costs of Chapter 7 bankruptcy would be a welfare improvement likely relies on the assumption that a reduction in the relative frequency of informal bankruptcy is desirable.

Further work is required to determine the welfare implications of this liquidity constraint. For instance, what is the social loss from delaying Chapter 7 filing for several months? Conversely, what is the expected social gain, if any, from filing Chapter 7 as opposed to entering the private collection process? Future work might also address the moral hazard concerns from more affordable bankruptcy by studying changes in debt following exogenous changes to expected or real liquidity.

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