Debtor Protections and the Great Recession*

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Abstract

We use 1.2 million individual credit reports and exogenous variation in state laws to assess the impact of debtor protections on household balance sheets and the macroeconomy during the Great Recession. We study bankruptcy homestead exemptions and non-recourse mortgage protections, which respectively protect homeowners from unsecured and secured creditors. At the individual level, we find that both policies helped homeowners reduce their debt between 2008 and 2010. However, while bankruptcy homestead protections raised regional consumption and employment, non-recourse protections lowered both. These contrasting aggregate results can be explained by non-recourse laws exacerbating house price declines through an increase in foreclosures, leading to lower regional consumption and employment. We find no similar spillover effects on house prices from bankruptcy homestead exemptions.

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I. Introduction

Debtor protections are a common feature of consumer credit markets. A typical justification for these protections is that they insure borrowers against negative idiosyncratic shocks. However, this insurance comes at the cost of more expensive borrowing and as a result, a less efficient allocation of capital. In this paper, we explore another way in which debtor protections affect economic efficiency, building on the literature examining the adverse consequences of corporate and household debt when there are negative aggregate shocks. These adverse consequences include fire sales of collateral (Shleifer and Vishny 1992) and depressed economic activity (Fisher 1933, Eggertson and Krugman 2012) when firms and consumers deleverage in response to the negative shock. We show empirically that debtor protections can mitigate these adverse consequences, but they can also exacerbate them.

The recent recession provides an ideal environment to assess the impact of debtor protections following an aggregate shock. House prices declined dramatically just prior to the downturn, significantly decreasing household wealth. There is evidence that households in the hardest hit regions reduced their consumption in response to this wealth shock, leading to lower local employment in non-tradable sectors (Mian and Sufi 2010, 2011, 2014, Mian, Rao, and Sufi 2013). In theory, debtor protections can mitigate the fall in consumption and employment following this kind of house price shock by helping households delever without cutting consumption. However, it is also possible that debtor protections can exacerbate the adverse consequences of a house price collapse by encouraging mortgage defaults and foreclosures.

In this paper, we use state variation in non-recourse mortgages and bankruptcy homestead exemptions to estimate the effect of debtor protections on household balance sheets and the regional economy during the Great Recession. Both policies protect homeowners. Non-recourse mortgages allow debtors to default on underwater mortgages without any liability for the remaining mortgage balance, while bankruptcy homestead exemptions protect debtors' home equity from non-mortgage creditors in bankruptcy. Each policy protects different subsets of homeowners, with non-recourse mortgages protecting households with negative equity and bankruptcy homestead exemptions covering homeowners with positive equity. Theoretically, these debtor protections can provide protection even when households do not formally declare bankruptcy or go into foreclosure, by either improving the threat point for debtors during renegotiations or dissuading creditors from pursuing costly collection efforts (Dawsey and Ausubel 2009, Mahoney forthcoming).

We study non-recourse and bankruptcy homestead protections to contrast the effect of protection from secured versus unsecured creditors. The distinction between the two types of creditors may be important when designing debtor protections as the effect of default on

secured loans can have a significant impact on the value of collateral. If a debtor defaults on a mortgage, the forced sale of the house through foreclosure can depress the value of homes nearby (Campbell, Giglio and Pathak 2011, Mian, Sufi and Trebbi 2011). In contrast, unsecured loans like credit cards have no collateral and defaulting on them is not likely to cause any fire sales. Crucially, a sizable fraction of the homeownership population were eligible for both protections. Estimates of the fraction of underwater homeowners in 2010 range from 20 to 30 percent, and roughly 35 percent of positive equity homeowners were completely protected by bankruptcy homestead exemptions.

The key difficulty in estimating the effects of these debtor protections is the endogeneity of protection status. Concretely, it could be the case that states with default-prone residents also have more lenient debtor protection laws. Our identification strategy relies on exogeneity of the cross-state distribution of debtor protections. We assume that there is no systematic difference between states that is both correlated with our outcomes of interest and debtor protection laws. We support this assumption in a variety of ways. First, we argue that the historical origins of the debtor protection laws supports the idea that they were not put in place in response to the current aggregate shock. Second, we run a battery of correlation checks with possible confounding characteristics. Third, we verify the robustness of our results by controlling for additional characteristics and omitting certain states. Finally, we perform several placebo tests that support our interpretation of the results. See Section V.C for further details.

Another concern for identification is that individuals may respond to the protections by manipulating their home equity to ensure protection. Specifically, homeowners may borrow less from home equity and more from unsecured creditors in states with strong home equity protections compared to homeowners in states with weak home equity protections. To address this concern, we generate an instrument that is a measure of each protection that captures state differences in the generosity of the laws, and avoids potential manipulation of home equity. We create our measure of protections using the simulated instruments technique introduced in Currie and Gruber (1996) and extended in Mahoney (forthcoming). We take a national sample of individuals and for each state, estimate the extent to which the individuals in the national sample are protected under that state's bankruptcy and non-recourse laws. We then average these protections by state, age, and pre-recession credit score. By leaving out the individuals in the national sample who are from the measured state, our instrument avoids the local endogenous response to state laws, and we control non-parametrically for age and credit score to account for the direct effects of these characteristics on our outcomes.

Our analysis proceeds in two steps. We first analyze the effect of debtor protections on households. We then turn to the regional consequences. Using data from 1.2 million

individual-level credit reports, we find that both bankruptcy homestead exemptions and non-recourse protections reduced homeowners' debt from 2007 to 2010. Compared to those without non-recourse protection, underwater homeowners with non-recourse protection were 15.5 percentage points more likely to default on their mortgages, 9.4 percentage points more likely to experience foreclosures, and had their mortgage balances fall by 39,000 dollars more from 2008 to 2010. Similarly, homeowners with home equity completely protected under bankruptcy homestead exemptions were 2.5 percentage points more likely to default on non-mortgage debt, 3.3 percentage points more likely to have a non-mortgage debt charge-off and had credit card debt drop an average of 387 dollars. Moreover, we find no statistically significant effect of bankruptcy homestead protections on mortgage debt, and no statistically significant effect of non-recourse protections on non-mortgage debt. We interpret this response as homeowners using both protections to reduce their debt balances through defaults.

We next turn to the regional consequences. While both protections lead to higher defaults and lower debt during the crisis, the regional economic effects of each were very different. For bankruptcy homestead protections, increasing the fraction of homeowners protected raised county employment and state non-durable goods consumption growth from 2008 to 2011. A one standard deviation (roughly 30 percentage points) increase in the fraction of individuals in a county with home equity completely protected increased non-tradable employment growth by 1.17 percentage points, and had no statistically significant effect on employment in the tradable sector. Consistent with local consumption changes driving the employment differences, we find that a one standard deviation increase in the fraction of individuals in a state with home equity completely protected is associated with consumption gains of 1.44 percentage points in non-durable goods consumption growth.

In contrast, we find that non-recourse laws are associated with lower county-level employment and state-level consumption growth from 2008 to 2011. A one standard deviation increase (roughly ten percent) in the fraction of underwater individuals in a county with no liability in a foreclosure is associated with 1.37 percentage points lower employment growth. Moreover, a one standard deviation increase in the fraction of individuals in a state with no liability in foreclosure decreases non-durable goods consumption by 0.88 percentage points. What drives this collapse? We find evidence that areas with higher non-recourse protections had a larger decline in regional house prices from 2007 to 2011, consistent with foreclosures sales depressing local house prices. A ten percent increase in the fraction of underwater homeowners with non-recourse protections at the zip code level is associated with a 4.69 percentage point decline in house prices from 2007 to 2011. We find no statistically significant effect of bankruptcy homestead protections on house prices over this period. This evidence is consistent with housing wealth declines leading to a fall in consumption and employment, as areas

with non-recourse protections suffered a larger fall in house prices and higher foreclosures.

Taken together, our findings are consistent with the idea that while some forms of debtor protections can lessen the adverse consequences of debt after a negative aggregate shock, others can worsen the effects of the aggregate shock. Protections from both secured and unsecured creditors appear to increase the probability of default and decrease debt loads after an aggregate shock. However, while greater levels of protection from unsecured creditors increases local consumption and employment, protection from secured mortgage creditors can amplify the effects of a negative house price shock by further decreasing housing wealth. These negative spillovers of protections from secured creditors on housing wealth appear to outweigh the benefits for the protected debtors. This suggests careful attention should be paid to the effects on the collateral asset market for debtor protections associated with secured loans, particularly mortgages. In contrast, bankruptcy homestead protections avoided this negative effect on surrounding homeowners and demonstrated the consumption and employment benefits of debt relief policies on the macroeconomy.

Our results provide new evidence that at least some forms of debtor protections can improve economic efficiency following a negative aggregate shock. However, a potentially important caveat of our analysis is that we do not account for the ex-ante effect of debtor protections in the run-up to the crisis. It is possible that the high levels of borrowing observed before the recession were partially the result of the debtor protections examined in this paper. We are also not able to estimate the impact of non-recourse mortgage and bankruptcy homestead protections for individuals experiencing an idiosyncratic shock. As a result, we are not able to conduct a full welfare analysis of these debtor protection policies. Combining our estimates of the ex-post impact of debtor protections when there is a negative aggregate shock with a better understanding of these other potential effects of debtor protections remains an important area for future work.

This paper is related to an important literature showing how household balance sheet distress can amplify an economic downturn. Recent theoretical work suggests that demand shocks driven by household debt can affect the real economy due to nominal or labor market rigidities (e.g. Guerrieri and Lorenzoni 2011, Hall 2011, Midrigan and Philippon 2011, Eggertson and Krugman 2012, Farhi and Werning 2013). Empirically, Mian and Sufi (2010, 2011) and Mian, Rao, and Sufi (2013) find evidence consistent with indebted households dropping their debt by reducing consumption following the fall in house prices. Mian and Sufi (2014) also find that regional house price shocks lower employment in non-tradable sectors of the economy, and Mian, Sufi, and Trebbi (2014) use variation in state foreclosure laws to show that foreclosures led to a large decline in house prices, residential investment, and consumer demand from 2007 to 2009. Finally, Chodorow-Reich (2014) shows that lender balance sheet

health also had an economically and statistically significant impact on employment at small and medium size firms during the financial crisis.

Our paper is also related to a large literature estimating the effect of debtor protections on financial markets. Pence (2006) finds that mortgage origination amounts are three to seven percent smaller in states with more debtor friendly foreclosure laws. Ghent and Kudlyak (2011) find that borrowers are more likely to default in non-recourse states, but find no effect of non-recourse laws on mortgage interest rates. Gropp et al. (1997) and Lin and White (2001) examine the cross-sectional relationship between bankruptcy laws and borrowing costs, while Severino, Brown, and Coates (2014) use within-state variation in bankruptcy law to show that that an increase in Chapter 7 exemptions levels increases unsecured borrowing. Kuchler and Stroebel (2009) and Li et al. (2011) examine how bankruptcy laws affect mortgage default and foreclosure rates. Finally, Davila (2014) presents an analytic solution to the optimal bankruptcy asset exemption levels as a function of different elasticities, but focuses on the case of strictly idiosyncratic risk. Finally, Athreya (2002), Li and Sarte (2006), Livshits, MacGee, and Tertilt (2007), Chatterjee and Gordon (2012), and Mitman (2014) measure the welfare consequences of consumer bankruptcy laws using quantitative models of the credit market.

The remainder of the paper is structured as follows. Section II provides a brief overview of the relevant debtor protections and outlines our conceptual framework. Section III formalizes our testable empirical hypotheses. Section IV describes our data and provides summary statistics. Section V details our empirical strategy. Section VI presents estimates of the impact of debtor protections on household balance sheets, employment, consumption, and house prices. Section VII concludes.

II. Background and Conceptual Framework

We now describe the non-recourse mortgage and bankruptcy homestead protections in more detail. We focus on non-recourse and bankruptcy homestead protections for three reasons. First, they were pre-existing, broadly applicable and not designed in response to the recessions. Second, they protected the homeowner subpopulation most affected by the collapse in house prices from 2006 to 2010. Finally, they allow us to contrast the effects of policies targeted at similar individuals but with protections from different creditors.

Non-recourse mortgage laws protect homeowners with home prices that are less than the remaining balance on their mortgage, also known as “underwater” homeowners. Typically, underwater homeowners cannot simply sell their home and make the creditor whole. For example, if the mortgage balance is 100,000 dollars and the house is only worth 80,000,

the debtor still owes 20,000 dollars to the mortgagor after the sale. In states with recourse mortgage policy, the creditor can sue a debtor for the remaining balance on the mortgage. Conversely, debtors can walk away from the remaining 20,000 dollars with no additional liability in non-recourse states. Thus, non-recourse laws allow homeowners with negative equity to default on their mortgage with no additional liability, essentially forcing a transfer from their creditors.

Bankruptcy homestead laws instead protect homeowners with positive home equity.[1] Individuals granted bankruptcy are required to partially repay their creditors through the sale of their assets. However, the bankruptcy system allows certain assets to be protected from creditors, including home equity up to a state-specified amount. Moreover, there is significant variation in these state home equity protections. For example, consider a homeowner in 2007 with 100,000 dollars of home equity. If he files for bankruptcy in Massachusetts, which has a homestead exemption of 500,000 dollars, this home equity would be completely protected in bankruptcy from creditors attempting to recover on outstanding balances, such as credit card debt. Alternatively, if he filed for bankruptcy in Louisiana where the exemption is 25,000 dollars, the remaining 75,000 dollars of equity would be unprotected and seizable by creditors.

As our above discussion makes clear, both non-recourse mortgage laws and bankruptcy homestead exemption laws protect debtors by not allowing creditors to pursue assets after default. Instead, creditors are forced to write-off the debt, thereby transferring wealth from creditors to debtors. The benefits of these transfers can be substantial. In the case of non-recourse mortgages, the policy removes a large debt on the balance sheet of those with significantly underwater homes. For those homeowners with positive equity, bankruptcy exemptions allow homeowners to readjust their unsecured debt balances, which can be many thousands of dollars.

Both non-recourse and homestead exemption laws also increase the threat point for consumers against creditors. The effect of this increased bargaining power can be realized in several ways. Consumers may default as we have described above, knowing that they are protected from creditors seeking the remaining debt balance. Alternatively, debtors may renegotiate with their creditors using this threat as a negotiating tool. For example, Mahoney (forthcoming) uses variation in the amount of protected assets in bankruptcy to identify the effect of bankruptcy exemptions as a form of a health insurance. He finds that hospitals will

[1]The U.S. bankruptcy system allows debtors to choose between Chapter 7 bankruptcy that provides debt relief and protection from wage garnishment in exchange for a debtor's non-exempt assets, and Chapter 13 bankruptcy that adds the protection of most assets in exchange for a partial repayment of debt. Homestead exemptions only directly apply to Chapter 7 filers, which make up approximately 75 percent of all bankruptcy filings. Homestead exemptions also indirectly apply to Chapter 13 filers, as the amount that these filers are required to repay is linked to the amount they would have given up under Chapter 7. Throughout the paper, we use "bankruptcy" to refer to Chapter 7 bankruptcy protection.

renegotiate their bills down to the amount available to the hospitals in the case of bankruptcy. However, lenders may be hesitant to engage in renegotiation. There has been concern in housing markets that renegotiation may create a form of adverse selection as those individuals who would not otherwise default would threaten default in order to reduce their mortgage debts. Moreover, the costs of renegotiation may be relatively high, especially in unsecured credit card markets. As a result, creditors may choose to write off the debts after a default if the debtors are protected by these policies. Both scenarios should lead to a lower outstanding debt balance for the debtor.

However, our above discussion also makes clear that non-recourse and bankruptcy homestead protections differ in at least two important ways. First, non-recourse and bankruptcy exemption laws protect different types of assets for different populations of homeowners. Non-recourse protects the non-housing assets of homeowners whose home equity is completely eliminated. Conversely, homestead exemptions protect the housing wealth of homeowners with positive equity.

A second important distinction between non-recourse and homestead protections is the effect on housing. Since mortgages are collateralized, a default on mortgages leads to a very different outcome in house prices than a default on unsecured debt. With non-recourse mortgages, debt relief occurs when the asset, the house, is relinquished to the creditor. Typically this will happen in the form of a foreclosure, and the house will be auctioned. Campbell, Giglio and Pathak (2011) and Mian, Sufi and Trebbi (2011) show that these foreclosures can have a significant negative effect on surrounding home prices. Consequentially, forced sales have the adverse effect of lowering other homeowners' house prices, and potentially encouraging more mortgage defaults. In contrast, the bankruptcy homestead exemptions are unlikely to have this kind of spillover effect. The transfer from creditors to debtors will typically not entail any forced sale of collateral, and consequentially not generate any externalities in the housing market.

III. Hypothesis Development

A. Household Debt Hypotheses

In this section, we formalize the testable implications from our conceptual framework using simple balance sheet terms. Let A_H be a homeowner's house price value and D_H be the home's mortgage debt. Let A_{NH} be non-housing assets and let D_{NH} be non-housing debt. Thus, the homeowner's assets are A_H and A_{NH}, and liabilities are D_H and D_{NH}. Figure A.1 in the Appendix lays out these terms in a simple balance sheet framework without any form of protection.

For homeowners with negative home equity, or $E_H = A_H - D_H < 0$, non-recourse mortgages

give homeowners the ability to default on their mortgages without the mortgage lender having any legal ability to recover the remaining balance on D_H. This turns the mortgage into a limited liability contract, since for all values of A_H greater than D_H, the homeowner has claim on the residual equity, but for values $A_H - D_H < 0$, the homeowner owes nothing. This implies that in states with non-recourse, homeowners with negative equity should be more likely to default on their mortgages than homeowners in states with recourse.[2]

In contrast, when the debtor has positive home equity, he does not need to default on his mortgage debt and can instead sell the asset. However, the debtor may still choose to default on non-mortgage (unsecured) debt, D_{NH}. Let E_S^* be the home equity protection in an individual's state, such that if a debtor defaults on non-mortgage debt, a creditor may seize up to $\max\{E_H - E_S^*, 0\}$ of home equity. For every dollar of home equity that is seizable by the non-mortgage creditor, the value of defaulting on non-mortgage debt decreases. Therefore, a debtor with fully protected home equity should be more likely to default on non-mortgage debt than a debtor with unprotected home equity.

With the presence of protections, the standard balance sheet from Figure A.1 separates into two different balance sheets, similar to Figure A.2. Since debtors cannot claim other assets, this lack of cross-collateralization makes the decision to default a function of the value of default within a particular balance sheet. This leads to two predictions regarding default probabilities: first, when $A_H < D_H$, those with non-recourse protections have higher mortgage default and foreclosure probabilities than recourse states. Second, if $A_H - D_H > 0$, those with $E_H < E_s^*$ have a higher probability to default on non-mortgage debt than those with $E_H > E_s^*$.

B. Predictions for Macroeconomic Outcomes

The debt relief provided by these protection policies involves a transfer from creditors to debtors. In a zero-frictions model, the transfers from creditors to debtors should not have any macroeconomic benefits, as the benefit to the debtors should be offset by the costs borne by the creditors. However, a prominent feature of the recession was the significant debt burden that consumers carried into the downturn. Given a readjustment of income prospects and these debts, consumers without a default option would be forced to pay down their debts and reduce their consumption. If the marginal propensity to consume is higher for these indebted individuals receiving relief, transfers from creditors to debtors may stimulate consumer demand and potentially alleviate an aggregate demand shortfall.

[2]The effects of limited liability are slightly richer than this, as non-recourse laws turn the mortgage into an option on house prices. Depending on the expectation of house price changes, at small negative values of home equity the option value in the mortgage may encourage less default. On average, however, the limited liability should encourage a broader default behavior as home equity values become more negative. See Deng et al. (2000).

Additionally, if changes in local consumption demand affect local non-tradable employment, debt relief may stimulate non-tradable employment as well. In the spirit of Mian and Sufi (2014), this mechanism works through wage rigidities in the local labor markets. As housing wealth falls and consumption declines in an area, demand for both tradables and non-tradables falls. However, while consumption of both tradables and non-tradables will fall, only non-tradables employment should fall significantly, as tradable employment is cushioned by other markets to sell in. To the extent that these debt protection policies can alleviate the local consumption demand shortfall, the protections should cause an increase in non-tradable employment, but have no effect on employment in the tradable sector.

There are two potential negative effects that could counter the positive consumption benefits of deleveraging. The first is that default losses may cause creditors to tighten their lending to debtors. As a result, consumption may become more expensive and fall. This should be particularly true for consumption of goods that are typically funded using credit, such as automobile loans. Second, as discussed in the introduction, the foreclosure on housing collateral may lead to significant adverse effects on the housing market. As described in Campbell, Giglio and Pathak (2011), the illiquid and heterogeneous nature of housing markets makes the forced sale of a foreclosed home likely to either create "an imbalance of demand and supply in an illiquid housing market" or directly impact surrounding housing values through degradations or vandalism. Hence, the effect of debtor protections on secured debt may have a negative effect on surrounding house prices as foreclosed homes depress local housing values.

This reduction in local house prices can be important for regional consumption. As outlined in Mian, Rao and Sufi (2013), the fall in house prices lead to a substantial decline in housing wealth and consumption. Hence, the spillovers from foreclosed homes could have a substantial externality on local consumption as foreclosed homes depressed prices.

This leads to two macroeconomic predictions. First, debtor protections on unsecured debt should lead to increased consumption in goods that does not require financing, and has an ambiguous effect on consumption that requires financing. Moreover, this should lead to a higher level of employment in non-tradable sectors, and no effect in tradable sectors. Second, debtor protections on secured debt has an ambiguous effect on consumption, with the reduction in debt potentially increasing consumption, but the fall in house prices depressing regional consumption. This will be reflected in non-tradable employment as well, but not tradable employment.

IV. Data

Our empirical analysis uses information from individual-level credit reports and aggregate employment, consumption, and house price data. This section details each data source and presents summary statistics for our analysis sample.

A. Individual Credit Reports

Information on household balance sheets come from TransUnion, one of the major consumer credit bureaus in the United States. The TransUnion data include information on account details for the near-universe of revolving credit accounts, mortgages, and installment loans, as well as demographic information, including zip code, age and credit score. These data are derived from public records, collections agencies, and trade lines data from lending institutions.

The trade line data make up the vast majority of the TransUnion records. These data include nearly all credit provided by banks, finance companies, credit unions, and other institutions. Each record includes the account opening date, outstanding balances, credit limit, and payment history for revolving credit, mortgages, and installment loans. These trade lines data are considered a near comprehensive set of information on the credit available to the general population. However, these data do not include any information on the approximately 22 million adults (nine percent of adults) in the United States without credit files, or information on non-traditional forms of credit such as payday lending, pawn shops, and borrowing from relatives. As a result, the data are likely to be less representative on the behaviors and outcomes of very poor populations.

We construct several measures of default and deleveraging using the TransUnion data. For mortgage debt, we construct an indicator measure of default that is equal to one if a line of mortgage credit is sixty days or more delinquent in the past year in either 2008, 2009 or 2010. Our measure of foreclosure is an indicator that is equal to one if there is a foreclosure in the past year in either 2008, 2009, or 2010. Our change in mortgage debt is the total change between 2008 and 2010 of both mortgage and home equity debt. For non-mortgage debt, we construct an indicator measure of default that is equal to one if a line of non-mortgage credit is sixty days or more delinquent in the past year in either 2008, 2009, or 2010. We measure charge-offs in a similar fashion with an indicator variable.[3] Finally, we examine change in credit card debt as the total change in bank card debt between 2008 and 2010.

The TransUnion data also contain an ordinal credit score calculated by TransUnion to measure credit risk. This measure is similar to the FICO score commonly referenced in the con-

[3]Charge-offs indicate that the creditor does not expect to collect the balance and chooses write the debt off as a loss or sell at a discount to a credit collection agency.

sumer finance literature. Finally, the data include geographic location at the zip code level and age. No other demographic information is available at the individual level. See Avery et al. (2003) and Finkelstein et al. (2012) for additional details on the TransUnion data.

Our sample of homeowners is drawn from a broader random sample of TransUnion credit reports. Our initial credit report sample consists of a random sample of four million credit reports. These data are an approximately two percent random sample of the population of credit users in the TransUnion database. The full random sample samples four million individuals from the TransUnion database in 2010 and pulls their full credit records annually using TransUnion's matched records across time. Our credit report data is pulled in June of each year.[4]

This sample is restricted to 2007 homeowners credit report data over the period of 2007 to 2010, located in zip codes with house price data. We define homeownership using the presence of mortgage or home equity line on an individual's credit report. In our data, approximately 46 percent of individuals are marked as homeowners in 2007, which compares to a 68 percent homeownership rate in the U.S. Census for the same time period. This difference is not surprising, as recent data released by Zillow estimates that almost 29 percent of homeowners in 2014 had no mortgage. While we cannot adjust for joint homeownership, we note that the gap between 46 percent and 68 percent is likely covered by the combination of homeowners without mortgages and joint homeownership.[5] Of this 46 percent, roughly 74 percent of homeowners have the necessary zip code house price data, leaving us with approximately 1.2 million homeowners.

B. County Employment Records

County by industry employment and payroll data are from the County Business Patterns (CBP) data set published by the U.S. Census Bureau. CBP data are recorded in March each year. The data contain the number of employees and total payroll bill within a county for every four-digit industry. Following Mian and Sufi (2014), we define each four-digit industry as tradable or non-tradable. An industry is defined as a tradable sector if it has imports plus exports equal to at least 10,000 dollars per worker, or if total exports plus imports for the industry exceeds 500 million dollars. Non-tradable industries are defined as the retail sector and restaurants. See

[4]While TransUnion database is linked over time, the database is not perfectly matched across time periods. For our sample of four million individuals in 2010, we have 3,550,696 individuals in 2007. The reasons for this are twofold. First, there were new individuals with credit reports between 2007 and 2010. Second, TransUnion does not have a perfect match across time periods in its sample. Individuals are not dropped from TransUnion's database if they stop using credit, so there should not be any panel attrition concerns.

[5]The Census measure captures the fraction of housing stock that is owner-occupied, which would undercount the number of individuals with a mortgage.

Appendix Table 1 of Mian and Sufi (2014) for a complete list of all NAICS four-digit industry codes in each category.

C. State Consumption Data

State consumption expenditures come from the Personal Consumption Expenditures by State dataset published by the U.S. Bureau of Economic Analysis (BEA). Data from the Economic Census and other sources are used to create an initial set of annual nominal expenditure estimates for 77 detailed spending categories. These initial estimates are then balanced across states to match BEA's national consumption expenditure totals in each category.[6] The data are then aggregated to the 16 expenditure categories that correspond to the national expenditure categories published by BEA. There are eight categories of goods, seven categories of services, and the net expenditures of nonprofit institutions serving households. The consumption levels are reported in current dollars, and reflect variation in both prices and quantities. See the BEA website for additional information on the construction of the data.

D. House Prices

Information on house prices at the zip code-by-year level are from Zillow.com, an online real estate site. See Guerrieri et al. (2010) for a description of the differences and similarities between Fiserv Case Shiller Weiss and the Zillow.com data.

E. Summary Statistics

Table 1 presents summary statistics for our sample. Individual Data reports the summary statistics for our individual-level analysis. Column 1 reports the mean, column 2 reports standard deviation and column 3 reports the number of observations available for the variable. There are high levels of financial distress in our sample period. Between 2008 and 2010, 14.5 percent of our sample were 60 days or more delinquent on a mortgage debt, 4.2 percent experienced a home foreclosure, 14.4 were 60 days or more delinquent on a non-mortgage debt, and 13.5 experienced a non-mortgage credit line charged off. Credit card debt for the average homeowner fell by 1,346 dollars between 2008 and 2010.

[6] State-level Economic Census receipts are used for approximately 60 percent of the data in Economic Census years. For other years, where state-level Economic Census receipts are not available, annual data from the Quarterly Census of Employment and Wages are used to interpolate and extrapolate expenditures. In these cases, the wages are those of the workers employed in the establishments within the state providing the goods and services to consumers. For the remaining approximately 40 percent of the data, other annual state-level data sources are used to estimate expenditures. These include the subcategories within housing and utilities and health care, as well as education services, food furnished to employees, railway transportation, air transportation, and net foreign travel.

County Data reports the summary statistics for our county-level employment regressions. For both sub-categories of employment we examine, employment fell significantly. Tradable employment collapsed from 2008 to 2011, falling roughly 10.3 percent. By comparison, non-tradable employment growth was negative, but smaller in magnitude, falling about 4.46 percent.

State Data reports the summary statistics for our state-level consumption regressions. Non-durable goods consumption grew by 8.75 percent between 2008 and 2011, and retail and restaurant consumption grew by 6.98 percent over this period.

Finally, Zip Code Data reports the summary statistics from the zip code level house price regression. Between 2007 and 2011, house prices fell almost 19 percent.

V. Research Design

We begin this section by outlining our strategy for estimating the impact of debtor protections on individual-level outcomes. We then extend our approach to outcomes measured at the zip code, county, and state levels. Finally, we present a series of specification checks to partially test our identifying assumptions.

A. Empirical Specification for Individual-Level Outcomes

We measure non-recourse and homestead protections using individual-level indicators variables defined as follows:

$$\begin{aligned} \text{NonRecourseProtected}_{is} &= \mathbb{1}(E_{H,i} < 0) \times \text{NonRecourse}_s \\ \text{HomesteadProtected}_{is} &= \mathbb{1}(E_{H,i} < \text{H}^*_s), \end{aligned}$$

where $\text{NonRecourseProtected}_{is}$ is an indicator variable for whether an individual i has negative equity and lives in a state s with non-recourse mortgages, and $\text{HomesteadProtected}_{is}$ is an indicator variable for whether an individual's home equity is completely protected by the state's bankruptcy homestead exemption amounts.

Now, consider the empirical model that relates the individual outcomes such as default to these two measures of protection:

$$\text{Default}_{is} = \alpha + \beta \text{NonRecourseProtected}_{is} + \gamma \text{HomesteadProtected}_{is} + \epsilon_{is} \tag{1}$$

where i denotes individuals, s denotes the state of residence, and ε_{is} is noise. Estimating equation (1) directly using OLS may lead to biased estimates of debtor protections for at least

three reasons. First, equation (1) does not control for an individual's home equity, which is likely to be correlated with both the default decision and our measures of debtor protection. This would be easy to address by controlling for home equity in a sufficiently flexible way. A second, and more important concern, is that state debtor protection laws may influence an individual's choice of home equity in such a way that creates a correlation between home equity and future outcomes. For example, more strategic households may keep their home equity just below the amount protected under a state's laws, and these more strategic households may also be more likely to default following an aggregate shock. In this scenario, OLS estimates of equation (1) would be positively biased. Conversely, it is possible that more risk averse households make keep their home equity fully protected, creating a negative bias in OLS estimates of equation (1). A final concern is that we are likely to measure home equity with error, potentially biasing our estimates of equation (1).

To address these two problems, we generate a pair of exogeneous instruments that exploit the variation in the laws across states. Intuitively, the simplest instrument would to be to use whether a state is non-recourse and the level of bankruptcy homestead exemption as our instruments. However, there are two simple extensions we can make. First, we recognize that these laws can have very different effects for different demographic groups. For example, a young subprime borrower is much more likely to have a highly levered mortgage that has become underwater due to the house price shock. As a result, we can interact these debtor protection laws with pre-crisis demographic characteristics to exploit this differential response to protections. To avoid having this instrument picking up effects due to different demographic effects, such as subprime borrowers defaulting more, we can control directly for the demographic effects and exploit exclusively the interaction between the laws and individuals' demographics. Second, while we want to avoid using the individuals' home equity values due to endogeneity concerns, we can use the national distribution of home equity for each demographic group to identify the benefit of each states' law on a particular demographic.

Formally, we instrument for debtor protections using a version of the simulated instrument approach developed by Currie and Gruber (1996) and extended by Mahoney (forthcoming). Our simulated instrument isolates variation in state bankruptcy homestead exemptions and non-recourse protections that is purged of variation due to the characteristics of each state's residents. To construct each instrument, we first divide the sample into $g = 1, \ldots, G$ demographic groups based on the full interaction of four-year age bins and 50 point baseline credit score bins.[7] We divide the sample using a baseline year of 2007, and define the level of protection for group g in state s as the fraction of group g from the national sample (excluding own state) that would be protected if they were subject to the state laws in s. Formally, we

[7] Our age bucket cuts are from 16 to 80 in four year intervals, as well as a category for missing age.

define the bankruptcy homestead protection instrument as:

$$\widehat{\text{HomesteadProtected}}_{gs} = |I_{g,-s}|^{-1} \sum_{j \in I_{g,-s}} \text{HomesteadProtected}_{js} \quad \text{for } g = 1, ..., G$$

where $I_{g,-s}$ is the entire set of individuals in group g in all states excluding state s, and $\text{HomesteadProtected}_{js}$ is an indicator for individual j having all home equity protected by bankruptcy homestead exemptions if they were subject to the state laws in s. Following the same notation, the corresponding measure for non-recourse protections is:

$$\widehat{\text{NonRecourseProtected}}_{gs} = |I_{g,-s}|^{-1} \sum_{j \in I_{g,-s}} \text{NonRecourseProtected}_{js} \quad \text{for } g = 1, ..., G$$

where $\text{NonRecourseProtected}_{js}$ is an indicator for individual j with negative equity and the state s being non-recourse. These measures of debtor protection differ for each state by demographic group. We control for demographic group effects with fixed effects, X_g, in all specifications to partial out cross-group variation in protection levels.

Using our estimates of $\widehat{\text{HomesteadProtected}}_{gs}$ and $\widehat{\text{NonRecourseProtected}}_{gs}$ as instruments, we estimate the following two-stage least squares equation:

$$\text{Default}_{igs} = \beta_2 X_g + \gamma_2 \text{HomesteadProtected}_{igs} + \eta_2 \text{NonRecourseProtected}_{igs} + \varepsilon_{igs} \tag{2}$$

$$\text{HomesteadProtected}_{igs} = \beta_3 X_g + \gamma_3 \widehat{\text{HomesteadProtected}}_{gs} + \eta_3 \widehat{\text{NonRecourseProtected}}_{gs} + u_{1igs} \tag{3}$$

$$\text{NonRecourseProtected}_{igs} = \beta_4 X_g + \gamma_4 \widehat{\text{HomesteadProtected}}_{gs} + \eta_4 \widehat{\text{NonRecourseProtected}}_{gs} + u_{2igs} \tag{4}$$

where X_g includes the demographic group fixed effects. We cluster standard errors at the state level throughout to account for both unobserved random shocks at the state level, as well as the within-state correlation in bankruptcy homestead and non-recourse laws. Note that this estimation procedure addresses our two concerns regarding the non-recourse and bankruptcy homestead exemptions, namely that there will be unobservables driving both protections and the outcomes. As described by Currie and Gruber (1996), this instrument gives a convenient parameterization of the protection from the law. States with high protections will give the national sample a large amount of protection compared to a state with low protections, and this will be independent of any local individual's tendency to manipulate their balance sheet. This identification strategy rests on conditional exogeneity of the laws, which we will discuss in Section VC.

B. Empirical Specification for Regional Outcomes

We estimate equation (2) at the individual level for the debtor outcomes, such as mortgage default, foreclosure, non-mortgage default and credit card borrowing. Information on house price growth, consumption and employment is only available at the zip code, state and county level, respectively. In order to estimate the effect of the population in a location being more or less protected, we aggregate our individual protection measures and create aggregated versions of our instrument. We first residualize our demographic-level instruments by running the following regressions:

$$\widehat{\text{HomesteadProtected}}_{igs} = \tau_5 X_{ig} + \varepsilon_{igs} \tag{5}$$

$$\widehat{\text{NonRecourseProtected}}_{igs} = \tau_6 X_{ig} + \varepsilon_{igs} \tag{6}$$

and defining

$$\widehat{\text{HomesteadProtected}}^{\perp}_{igs} = \widehat{\text{HomesteadProtected}}_{igs} - \hat{\tau}_5 X_{ig}$$
$$\widehat{\text{NonRecourseProtected}}^{\perp}_{igs} = \widehat{\text{NonRecourseProtected}}_{igs} - \hat{\tau}_6 X_{ig}.$$

Residualized of demographic characteristics in X_{gs}, we then average both these measures as well as the individual outcomes across the relevant geographic level to estimate the average measure of bankruptcy and foreclosure protection in each location. We denote the average of the individual outcomes as $\overline{\text{NonRecourseProtected}}_{ls}$ and $\overline{\text{HomesteadProtected}}_{ls}$, and the average of the instruments as $\widehat{\text{HomesteadProtected}}^{\perp}_{ls}$ and $\widehat{\text{NonRecourseProtected}}^{\perp}_{ls}$.

Then, at the aggregate location level, we estimate the effect of these measures of debtor protections using the following two-stage least squares specification:

$$y_{ls} = \alpha_7 + \gamma_7 \overline{\text{HomesteadProtected}}_{ls} + \eta_7 \overline{\text{NonRecourseProtected}}_{ls} + \varepsilon_{ls} \tag{7}$$

$$\overline{\text{HomesteadProtected}}_{ls} = \alpha_8 + \gamma_8 \widehat{\text{HomesteadProtected}}^{\perp}_{ls} + \eta_8 \widehat{\text{NonRecourseProtected}}^{\perp}_{ls} + u_{1ls} \tag{8}$$

$$\overline{\text{NonRecourseProtected}}_{ls} = \alpha_9 + \gamma_9 \widehat{\text{HomesteadProtected}}^{\perp}_{ls} + \eta_9 \widehat{\text{NonRecourseProtected}}^{\perp}_{ls} + u_{2ls} \tag{9}$$

where subscript l denotes either zip code, county or state and s denotes the state.

C. Specification Checks

Our empirical analysis rests on the assumption that the variation in state debtor protection laws captured by our simulated instruments is not related to other factors that might independently impact household balance sheets, such as human capital, local credit markets, and

consumer preferences. We provide four forms of evidence to support this view. First, we outline the legislative origins of the laws and argue that their legislative history makes them uncorrelated with the current recession. Second, we regress our measures of protection on state demographic and policy measures to partially test for possible confounders. Third, we estimate our main results including controls for possible confounders and excluding potentially anomalous states such as Florida and the "sand states" of California, Nevada, New Mexico and Arizona. Fourth and finally, we conduct several placebo tests to see if our simulated instruments are correlated with unrelated outcomes.

We begin by considering the legislative origins of state bankruptcy and foreclosure laws, which we argue lend credibility to the exogeneity of bankruptcy exemption levels. Homestead exemption levels emerged over the second half of the nineteenth century as a result of idiosyncratic state circumstances that are plausibly unrelated to current state characteristics (Goodman 1993). Although most changes to the homestead exemptions have been to correct for inflation (Skeel 2001), one potential concern is that there may be contemporaneous reasons why some states have higher homestead protections than others. To address this concern, we follow Mahoney (forthcoming) and present robustness tests of our results using inflation-adjusted 1920 bankruptcy homestead exemptions to calculate the simulated instrument described in Section V. Appendix Table A.2, Panel A replicates our main results using historical 1920 bankruptcy homestead exemptions from Mahoney (forthcoming) and finds broadly consistent results. Further evidence comes from Mahoney (forthcoming), who finds a nearly one-to-one relationship between a simulated instrument created using current homestead exemptions and one created using inflation adjusted 1920 homestead exemptions. For our main results, we use current measure of protections for two reasons. The first is that historical exemptions are not available for several of the states in our sample, and are missing disproportionately from non-recourse states. Second, the measurement error introduced from the historical bankruptcy exemption measure is substantial. Both of these issues limit our ability to analyze both laws concurrently and weaken the strength of the overall analysis.

Ghent (2012) similarly finds that there is tremendous path-dependence in state non-recourse and foreclosure laws. Non-recourse laws, which we focus on, were set during the Great Depression, and much of the driving factor during this period for these laws was the foreclosure rate on farms. Ghent (2012) finds that "...there is no evidence that the foreclosure rate on urban mortgages affected the likelihood that a state would enact a sweeping anti-deficiency statute." These non-recourse mortgage laws have significantly not changed since the Great Depression. Similarly, most foreclosure procedures were set "very early in state histories, typically before the U.S. Civil War." The existing variation in state foreclosure laws is therefore "the result of path-dependent quirks in the wording of various proposed statutes and decisions

of individual judges," with "[no] clear economic reasons for why states adopted different procedures for the remedies they offer lenders."

Our second piece of evidence in support of our identifying assumption comes from regressions our debtor protection measures on state demographic and policy measures. We report these results in Appendix Table A.1. These tests fall into three categories. We first test the hypothesis that areas with higher levels of protections are more likely to be debtor friendly or liberal in their policies more generally. We find no significant effect of either protection on Democrat vote share in 2006. Next, we examine the demographic breakdown by age and education, and find a small correlation between age and non-recourse protections, but no effect of education or any effect of bankruptcy homestead protections. Finally, we examine the effects of the protections on economic growth, as measured by income. We find no evidence of correlation in the pre-boom period between income levels and income growth from 1998 to 2002.

To further test the robustness of our results, we also estimate our main regional results results including controls for possible confounders and excluding potentially anomalous states such as Florida and the "sand states" of California, Nevada, New Mexico and Arizona. These results are presented in Section VI. The point estimates on non-recourse and bankruptcy homestead protections remain economically and statistically significant in all specifications, and none of the results suggest that our identifying assumption is violated.

Our final piece of evidence in support of our identifying assumption comes from several placebo tests to see if our simulated instruments are correlated with other unrelated outcomes. If there were an underlying force driving stronger or weaker debtor protections, we would expect that these forces influence both protections equally. To the extent that these laws directly affect their corresponding debt (i.e. non-recourse affecting mortgage defaults, and exemptions affecting non-mortgage defaults), and we estimate both simultaneously in our empirical specification, we should not expect that they each affect the laws independently. These tests allow for a tight placebo test of the direct mechanism we expect. Any plausible unobservables that we would expect to drive defaults would be economic factors correlated with financial distress, which should affect both mortgage and non-mortgage default. These results are again presented in Section VI, with none of the estimates suggesting that our identifying assumption is violated.

VI. Results

We begin by looking at the effect of bankruptcy homestead exemptions and non-recourse protections on mortgage default and non-mortgage defaults. For both policies, we find strong

responses consistent with consumers defaulting in response to the protections. Moreover, the default behavior is only correlated with the appropriate protection. We next examine the effect of these protections on economic outcomes at the regional level. We find that bankruptcy homestead protections had significant positive effects on non-tradable employment and non-durable consumption, and non-recourse protections had the opposite effect. We finally show that house prices were strongly negatively correlated with non-recourse protections and not homestead protections.

A. Individual Defaults and Debt

Figures 1 and 2 outline the main default effects that we find. In both figures, the x-axis denotes home equity values projected forward into 2010.[8] In Figure 1, the y-axis represents mortgage defaults, as defined as having a mortgage loan 60 days or more delinquent between 2008 and 2010. We note that mortgage defaults are significantly higher in non-recourse states, specifically for those home owners who have negative home equity. Figure 2 presents positive equity home owners with non-mortgage defaults on the x-axis, where non-mortgage default is defined as having a non-mortgage loan 60 days or more delinquent between 2008 and 2010. In both cases, we see that protected individuals default more than unprotected.

Table 2 presents the instrumental variable estimates from Equation 2, which regress the individual-level outcomes on whether a homeowner is protected from recourse, and whether a homeowner's home equity is protected by homestead exemptions. The first three columns represent outcomes associated with mortgage credit, where default is defined as having a mortgage loan that has been delinquent by 60 days or more reported between 2008 and 2010, foreclosure is defined as having a foreclosure reported between 2008 and 2010, and Δ ($000) is the change in total mortgage and home equity debt between 2008 and 2010. The next three columns represent outcomes with non-mortgage credit. Non-mortgage default is defined as having a non-mortgage line of credit that has been delinquent by 60 days or more reported between 2008 and 2010, charge-offs is defined as having a non-mortgage line of credit charge-off reported between 2008 and 2010, and Δ ($000) is the change in total mortgage and home equity debt between 2008 and 2010. All specifications are estimated at the individual-level using our estimation sample of credit reports described in Section IV. All specifications control for age-baseline credit score fixed effects and cluster standard errors at the state level.

We first focus on mortgage credit outcomes. Column 1 reports results for mortgage default. There is a large and precisely estimated impact of non-recourse protection on mortgage

[8] We project home equity values by taking homeowners' mortgage debt and zip code location as of 2007, and estimate their projected home equity in 2010 as the house price value in 2010 less the homeowner's mortgage debt in 2007.

default rates. Non-recourse protection increases mortgage default probabilities by 15.5 percentage points, doubling the average rate of default of 14.6 percent among homeowners, and is statistically significant at the five percent level. In column 2, foreclosure rates are also significantly higher, with non-recourse protections increasing foreclosures by 9.4 percent. Lastly, in column 3, non-recourse protections caused significant declines in outstanding mortgage debt, with mortgage and home equity debt totals declining by roughly 39,700 dollars from 2008 to 2010. In all three columns, bankruptcy homestead protections have no statistically significant effects on the propensity to default or decrease mortgage credit.

Next, we turn to non-mortgage credit outcomes. Column 4 reports the effect on non-mortgage defaults. There is a 2.6 percentage point increase in the probability of a non-mortgage default for individuals whose home equity is completely protected, compared to an average default rate over this period of 14.4 percent, almost a 20 percent increase in the probability of default. In column 5, we see that bankruptcy homestead protection increased the probability of having a charged-off line of credit by 3.3 percentage points. Lastly, in column 6, we see that homestead protections were associated with a decline of 387 dollars, compared to an average change over this period of 1,348 dollars. All three results are significant at the one percent level. In addition, we find no significant effect of non-recourse protection on any of the non-mortgage credit outcomes.

B. County Employment

We next examine the effects of the protections on employment. To directly show the effect of local demand, we examine county employment growth in non-tradable and tradable sectors, as defined by Mian and Sufi (2014). These categories roughly divide themselves into retail and restaurants as the non-tradable sectors, and industries like manufacturing in tradables. This split allows us to examine industries whose demand should be completely driven by local consumption versus those whose demand should be driven by global markets. If debtor protections alleviate debt and hence raise consumption, this should translate into higher employment in non-tradables, but no notable effects in tradables. See Mian and Sufi (2014) for more details on the distinction between tradable and non-tradable employment.

Figures 3 and 4 show the main effect of bankruptcy exemptions and non-recourse protections on employment. In all figures, employment is normalized to 100 in 2007, and each protection is split into population-weighted bins by the median protection. In each graph, the effect of the other protection is controlled for by first residualizing using a regression of year dummies interacted with the protection measure, and then taking the residuals and adding back in the year means. As we noted previously, with labor market rigidities, non-tradable sectors should be affected by local demand shocks. Hence, we should expect that local debtor

protections affect employment in non-tradable industries, but not employment in tradable industries.

Figure 3 demonstrates a strong negative effect of non-recourse protection on non-tradable employment, with no effect on tradable employment. In comparison, in Figure 4, non-tradable employment is positively affected by bankruptcy homestead protections, with no effects found in tradable employment. It is worth noting that the effect is immediate and sharp for non-recourse protection, while the effect is greater during the recovery period for bankruptcy homestead protections.

Table 3 presents the instrumental variables regression analysis of Figures 3 and 4. This table reports the results of the protections on growth rates between 2008 and 2011 for both non-tradable and tradable employment. Column 1 and 4 show the main results from Figures 3 and 4. In column 1, we see a substantial negative effect on non-tradable employment growth from non-recourse protections and a positive significant effect of bankruptcy homestead protections. A one standard deviation increase (roughly ten percent) in the fraction of individuals benefiting from non-recourse protection leads to a 1.37 percent point decline in non-tradable employment growth. A one standard deviation increase (roughly 30 percentage points) in the fraction protected by homestead protections leads to a 1.17 percentage point increase in non-tradable employment growth from 2008 to 2011. In contrast, we see no significant effect on tradable employment growth in column 4.

The remaining columns in Table 3 perform additional robustness tests to confirm our results. In columns 2 and 5, we control for MSA supply elasticity from Saiz (2008), using a dummy to control for counties where the measure is missing. In columns 3 and 6, we exclude California, Nevada, New Mexico, Arizona, and Florida. We find no significant difference in our effects.

These results are consistent with increases in local consumption due to debtor protections. By identifying a channel through non-tradables and not tradables, this underlines the mechanism that only local demand has been affected. While this does not directly demonstrate changes in consumption due to these policies, it provides strong evidence that there are both positive and negative effects from debtor protections policies.

C. State Consumption

To provide additional support for the changes in local consumption hypothesis, we present evidence using state-level consumption data. While this data is significantly more aggregated than the county-level employment data, it lets us directly examine the consumption mechanism. Table 4 presents instrumental variable estimates of the impact of bankruptcy exemption and non-recourse protections on state consumption growth. Columns 1 to 3 report the results

on non-durable goods consumption, while columns 4 to 6 report the results on Retail and Restaurant consumption. All specifications are estimated at the state-code level weighted by the number of credit reports observed in each state.

We find evidence consistent with declines in consumption in areas with higher fractions of individuals with non-recourse protections. A ten percent increase in the fraction of non-recourse homeowners leads to a decline of -0.88 percentage points in non-durable goods consumption from 2008 to 2011, and a 1.22 percentage point decline in retail and restaurant consumption growth. In contrast, a one standard deviation in homestead protection leads to a 1.34 percentage point increase in non-durable goods consumption growth and a 1.2 percentage point increase in retail and restaurant consumption. This suggests that the local consumption channel is driving the employment in non-tradables.

Similar to Table 4, the remaining columns in Table 3 perform additional robustness tests to confirm our results. In columns 2 and 5, we control for MSA supply elasticity from Saiz (2008), controlling for the fraction of the state where the measure is missing. In columns 3 and 6, we exclude California, Nevada, New Mexico, Arizona, and Florida from our regression. We find no significant difference in our effects in columns 2 and 5, while in column 3 and 6 much of the main effect in non-recourse protections is too noisy to precisely measure.

These results are broadly consistent with the debtor protections leading to higher consumption. Similar to the employment results, we find that bankruptcy homestead exemptions lead to higher consumption growth, while non-recourse protections decrease consumption. We interpret this evidence as supporting our county-level hypothesis that employment in non-tradables is influenced by local consumption due to debtor protections.

D. House Price Growth

One possible explanation for the negative effects of non-recourse protections on consumption and employment is that the forced sales from foreclosures driven by non-recourse protections lead to declines in local housing prices. This drop in housing wealth could cause a significant decline in consumption and employment as well, following the work of Mian, Rao and Sufi (2013) and Mian and Sufi (2014). We test this mechanism by examining the effect of debtor protections on house prices growth. Table 5 presents instrumental variable estimates of the impact of non-recourse and bankruptcy home equity protections on house price growth from 2007 to 2011. Column 1 present results for the full sample of zip codes. Column 2 to 4 present results for those zip codes where the Saiz (2008) measure is available. All specifications are estimated at the zip code level weighted by the number of credit reports observed in each zip code. Standard errors are clustered at the state level.

There is an economically and statistically significant impact of foreclosure non-recourse

protection on house price growth during the financial crisis. Using the estimates from column 1, we see that a ten percentage point increase in the fraction of individuals with no liability in a foreclosure decreased house prices by 4.7 percentage points, compared to an overall decline of 22 percent during this period. These results are consistent with foreclosure protections increasing the number of foreclosures in a zip code, which in turn decreases area house prices. This collateral channel had a tremendous impact on house prices, and likely exacerbated an already significant downturn. Moreover, the impact of homestead protections on house prices is statistically insignificant.

In order to control for areas with a possible "boom-bust" cycle, in columns 2 to 4 we compare the effects of the protections with the Saiz (2008) supply elasticity measure. Several authors have used this measure successfully to predict the house price run-up and decline observed during the housing bubble. We note that this result holds in our data, even when controlling for our two measures of debtor protections. We note that in column 4, a one standard deviation increase in supply inelasticity is associated with a 6.8 percentage point decline in house price growth, compared to a one standard deviation effect of non-recourse protections of -3.63 percentage points.

VII. Conclusion

We estimate the impact of state bankruptcy homestead exemption and non-recourse mortgage laws on household balance sheets, consumption, and employment during the Great Recession. We find that both bankruptcy homestead protections and non-recourse protections reduced homeowners' debt from 2007 to 2010. Higher levels of bankruptcy protection are also associated with increased county employment growth from 2008 to 2010 in non-tradable sectors and increased state non-durable consumption growth over the same time period. In contrast, higher levels of non-recourse protection are associated with lower county employment growth and lower state consumption growth from 2008 to 2010. We find evidence consistent with these contrasting results being due to non-recourse protections increasing foreclosures and decreasing area house prices, with no similar effects from bankruptcy homestead protections.

Our results provide new evidence on the effects of debtor protections during a financial crisis. These findings are particularly important given the recent debate on the use of debt relief and debt modification programs to stimulate the economy during the Great Recession. Our findings are consistent with the view that debtor protections allow financially distressed households to relax their debt constraints following an aggregate financial shock, and therefore have the potential to mitigate the kind of fall in household consumption and regional employment observed during the recent downturn. However, our results are also consistent

debtor protections having the potential to exacerbate economic distress when they encourage collateral fire sales.

The main limitation of our analysis is that we do not account for the impact of debtor protections on ex-ante borrowing costs or behavior. There may also be important ex-post impacts of debtor protections on outcomes such as interest rates or labor market outcomes that we are unable to measure with our data. It is therefore not possible to derive the optimal level or structure of debtor protections using the estimates from our analysis. These issues remain an important area for future research.

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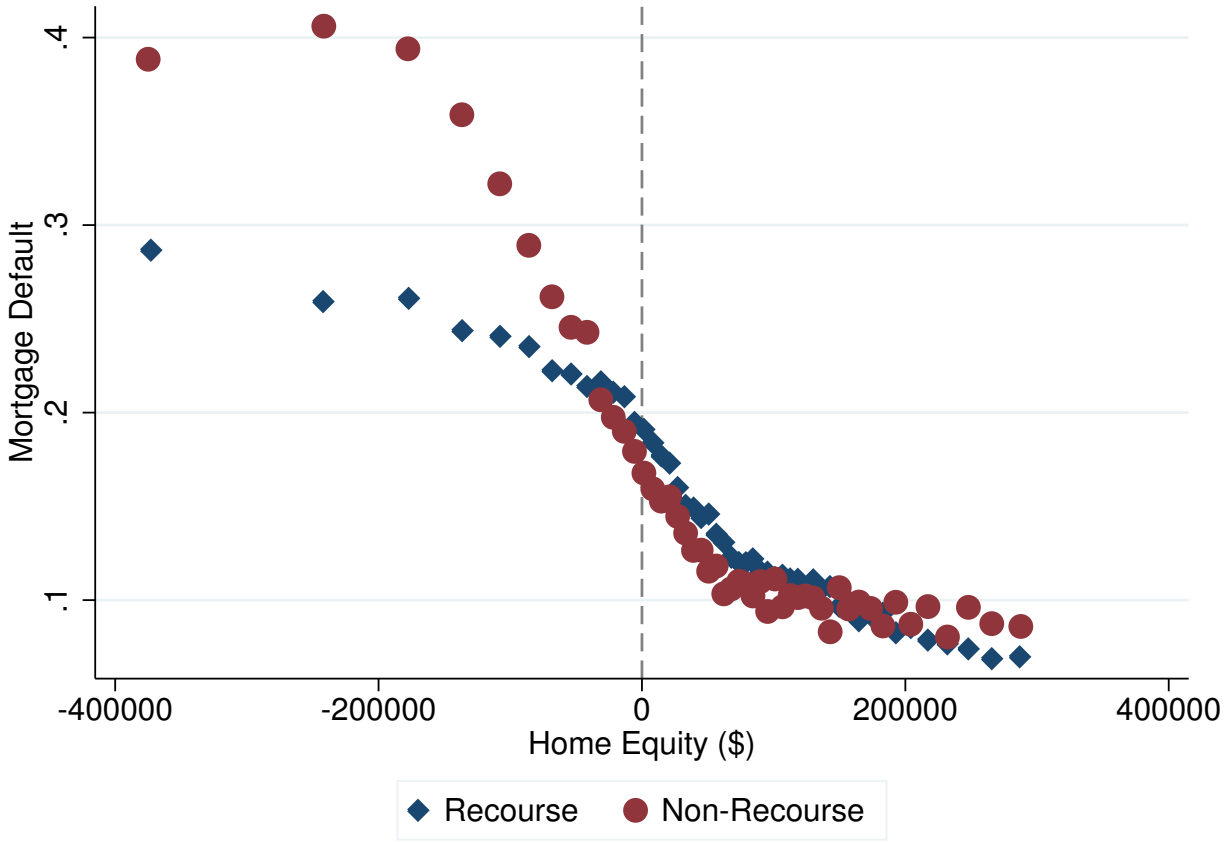
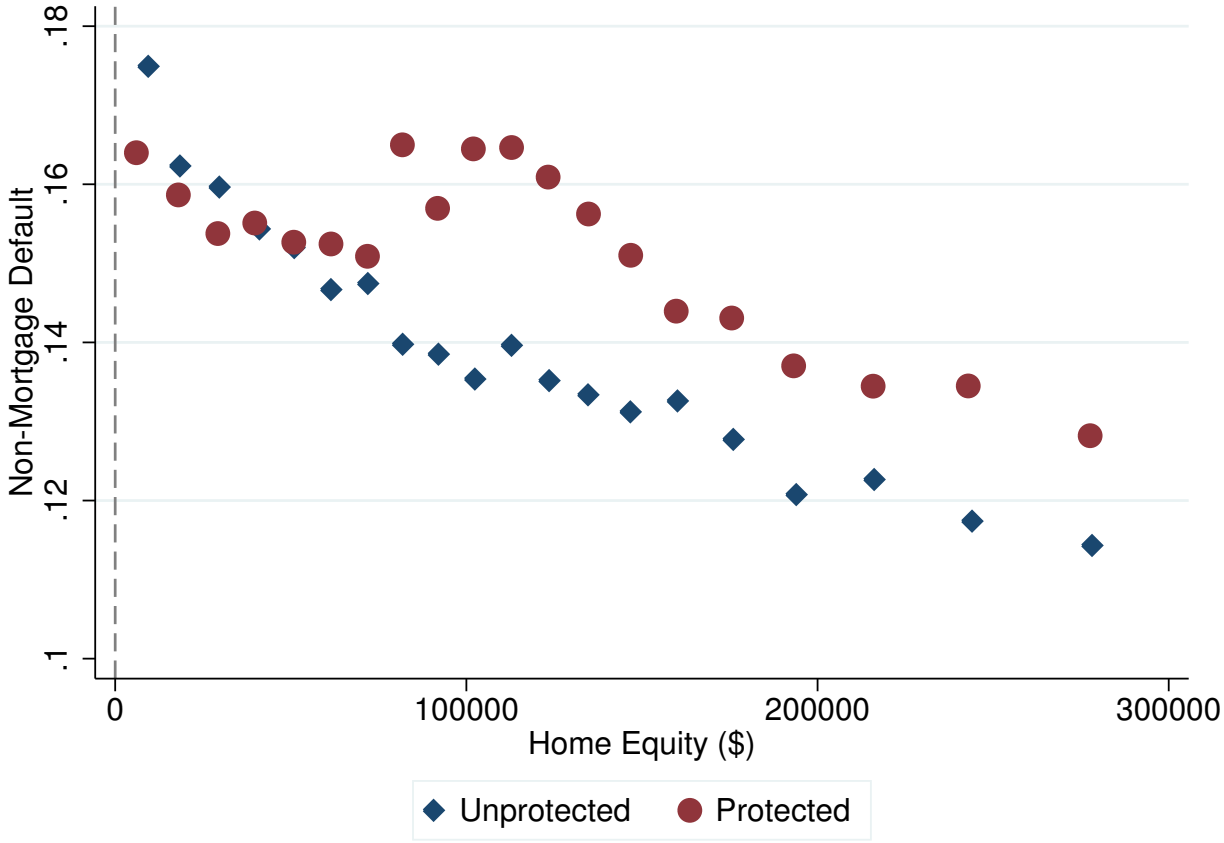
Figure 1
Non-Recourse Protections and Mortgage Defaults



Notes: This figure plots mortgage defaults against home equity values for 2007 homeowners. Mortgage default is defined as having a mortgage 60 days or more delinquent sometime between 2008 and 2010. Home Equity is defined as the 2010 house price in the 2007 zip code of residence, and subtracting the outstanding mortgage and home equity balances from 2007. Non-Recourse and Recourse are defined by state of residence in 2007. This sample restricts to home equity values between -500,000 and 500,000 dollars. Each dot represents two percent of the the subsample.

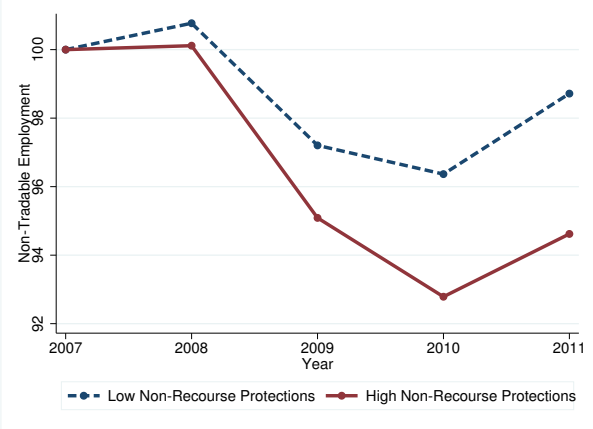
Figure 2
Bankruptcy Exemption Protections and Non-Mortgage Defaults



Notes: This figure plots non-mortgage defaults against home equity values for 2007 homeowners. Non-mortgage default is defined as having a non-mortgage line of credit 60 days or more delinquent sometime between 2008 and 2010. Home Equity is defined as the 2010 house price in the 2007 zip code of residence, and subtracting the outstanding mortgage and home equity balances from 2007. Protected is defined by whether home equity values are less than the 2007 state of residence's homestead exemption value. This sample restricts to home equity values between 0 and 300,000 dollars. Each dot represents five percent of the the subsample.

Figure 3
Non-Recourse Protection and Employment Growth

(a) Non-Tradable Employment



(b) Placebo: Tradable Employment

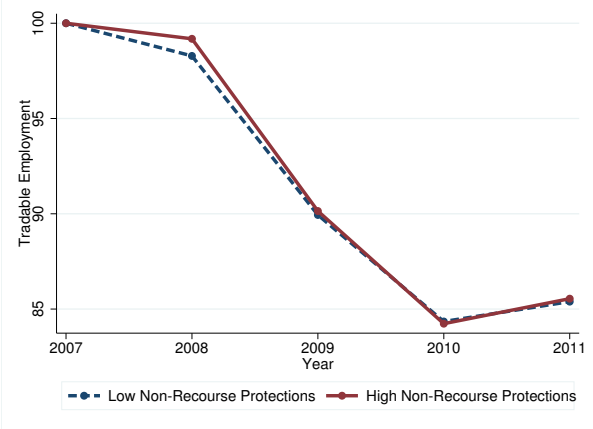
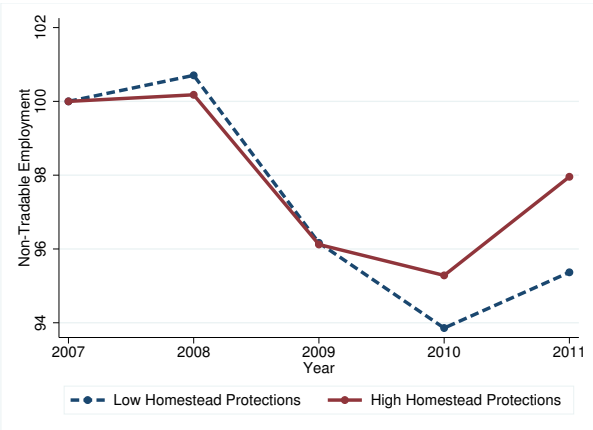
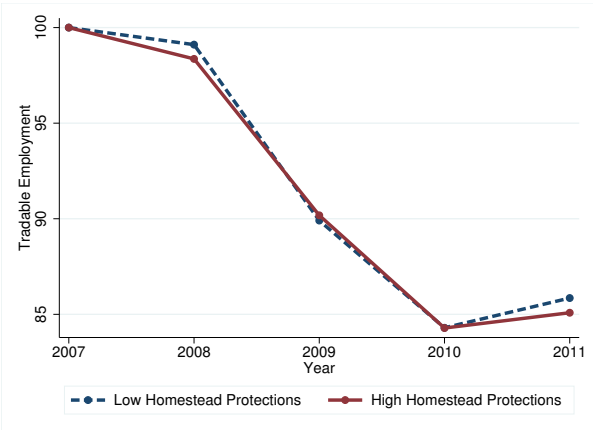


Figure 4
Homestead Protection and Employment Growth

(a) Non-Tradable Employment



(b) Placebo: Tradable Employment



Notes: These figures plot county employment by year for areas with high and low non-recourse and homestead protections. Figure 3 splits by the median population weighted value of the non-recourse protection instrument described in the text. Employment is residualized by regressing on year dummies interacted with the county homestead protection instrument. Figure 4 splits by the median population weighted value of the homestead protection instrument described in the text. Employment is residualized by regressing on year dummies interacted with the county non-recourse instrument. Non-tradable and tradable sectors are defined following Mian and Sufi (2014) in both graphs. See the text for additional details.

Table 1
Summary Statistics

	Mean	Std. Dev.	Observations
Individual Data:	(1)	(2)	(3)
Mortgage Default	0.145	0.352	1,244,136
Foreclosure	0.042	0.200	1,244,136
Mortgage Debt Change ($000)	-13.628	130.773	1,244,136
Non-Mortgage Default	0.144	0.351	1,244,136
Non-Foreclosure Charge-off	0.135	0.342	1,244,136
Credit Card Debt Change ($000)	-1.346	10.071	1,244,136
Non-Recourse Protected	0.068	0.251	1,244,136
Homestead Protected	0.504	0.500	1,244,136
Non-Recourse Protected Inst.	0.029	0.058	1,238,855
Homestead Protected Inst.	0.634	0.249	1,238,855
State Data:			
Non-Durable Consumption Growth (2008-2011)	8.756	3.660	49
Retail and Restaurant Cons. Growth (2008-2011)	6.980	3.584	49
Non-Recourse Protected	0.046	0.097	49
Homestead Protected	0.512	0.288	49
Non-Recourse Protected Inst.	0.023	0.046	49
Homestead Protected Inst.	0.635	0.183	49
County Data:			
Tradable Employment Growth (2008-2011)	-10.328	31.897	1,327
Non-Tradable Employment Growth (2008-2011)	-4.466	10.836	1,330
Non-Recourse Protected	0.041	0.104	1,326
Homestead Protected	0.510	0.316	1,326
Non-Recourse Protected Inst.	0.020	0.043	1,330
Homestead Protected Inst.	0.617	0.187	1,330
Zip Code Data:			
House Price Growth (2007-2011)	-18.895	16.729	11,782
Non-Recourse Protected	0.055	0.122	11,688
Homestead Protected	0.498	0.313	11,688
Non-Recourse Protected Inst.	0.025	0.047	11,689
Homestead Protected Inst.	0.635	0.186	11,689

Notes: This table reports summary statistics at the four levels of aggregation used in the analysis. Individual Data lists the summary statistics for variables used in the individual-level regressions. Mortgage Default is an indicator for having a mortgage being 60 days or more delinquent reported sometime between 2008 and 2010. Foreclosure is an indicator for having a foreclosure reported sometime between 2008 and 2010. Mortgage Debt Change is the thousand dollar change in home equity and mortgage lines of credit between 2008 and 2010. Non-Mortgage Default is an indicator for having a non-mortgage line of credit 60 days or more delinquent reported sometime between 2008 and 2010. Non-Foreclosure Charge-offs is an indicator for having a non-foreclosure charge-off of a credit line reported between 2008 and 2010. Credit Card Debt Change is the dollar change, in thousands, of the balance of credit card debt between 2008 and 2010. Non-Recourse Protected is an indicator for having negative equity and living in 2007 in a state that is non-recourse. Homestead Protected is an indicator for having home equity less than the bankruptcy homestead protection for the individual's state of residence in 2007. Non-Recourse Protected Inst. and Homestead Protected Inst. are the two simulated instruments described in Section V. State Data lists the summary statistics for the outcome measures used in the consumption regressions. Non-Durable Consumption Growth is the percentage change in Non-Durable Goods from 2008 to 2011. Retail and Restaurant Cons. Growth is the percentage change in the total of retail and restaurant consumption from 2008 to 2011. These averages are weighted by population. Non-Recourse Protected is the fraction of individuals with negative equity if the state is non-recourse. Homestead Protected is the fraction of individuals with home equity less than the state's bankruptcy homestead exemption. Both measures are as of 2007. Non-Recourse Protected Inst. and Homestead Protected Inst. are the two simulated instruments described in Section V. County Data lists the summary statistics for variables used in the county-level regressions. Tradable Employment Growth is the percentage change in employment from 2008 to 2011 in industries marked as tradable by Mian and Sufi (2014). Non-Tradable Employment Growth is the percentage change in employment from 2008 to 2011 in industries marked as non-tradable by Mian and Sufi (2014). Zip Code Data lists the summary statistics for variables used in the zip code-level regressions. House Price Growth is the percentage change in median house prices at the zip code, as measured by the Zillow house price index.

Table 2
Debtor Protections and Individual Debt Reductions

	Mortgage Credit			Non-Mortgage Credit		
	Default	Foreclosure	Δ ($000)	Default	Charge-offs	Δ ($000)
	(1)	(2)	(3)	(4)	(5)	(6)
Non-Recourse Protected	0.155**	0.094**	−39.786**	0.010	0.048	−0.684
	(0.063)	(0.038)	(18.760)	(0.032)	(0.044)	(0.689)
Homestead Protected	0.027	0.022	−3.892	0.025***	0.033***	−0.387***
	(0.023)	(0.017)	(3.945)	(0.007)	(0.010)	(0.129)
Dep. Var. Mean	0.146	0.042	-13.657	0.144	0.135	-1.348
Clusters	49	49	49	49	49	49
Observations	1,238,855	1,238,855	1,238,855	1,238,855	1,238,855	1,238,855

Notes: This table reports two-stage least squares estimates of the effect of non-recourse and bankruptcy homestead exemption protections on individual-level outcomes. The dependent variable in column 1 is an indicator for having a mortgage 60 or more days delinquent reported on credit reports between 2008 to 2010. The dependent variable in column 2 is an indicator for having a foreclosure reported on credit reports between 2008 to 2010. The dependent variable in column 3 is the dollar change (in thousands) of mortgage debt from 2008 to 2010. The dependent variable in column 4 is an indicator for having a non-mortgage line of credit 60 or more days delinquent reported on credit reports between 2008 to 2010. The dependent variable in column 5 is the total number of non-mortgage charge-offs reported on credit reports between 2008 to 2010. The dependent variable in column 6 is the dollar change (in thousands) of credit card debt from 2008 to 2010. Homeownership status is defined as the presence of a mortgage or home equity trade line of credit on an individual's credit report. Non-Recourse Protected is an indicator for whether an individual is protected from recourse in the event of foreclosure. Homestead Protected is an indicator for whether an individual's home equity is completely protected by bankruptcy homestead exemptions. All regressions are estimated using 2007 homeowners from a random sample of individual-level credit reports. All regressions also control for age-credit score demographic bucket fixed effects and cluster standard errors at the state level. *** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

Table 3
Debtor Protections and County Employment Growth

	Non-Tradable Sector (2008-2011)			Tradable Sector (2008-2011)		
	(1)	(2)	(3)	(4)	(5)	(6)
Non-Recourse Protected	-13.733^{***}	-14.281^{***}	-17.442^{***}	4.057	5.298	19.833
	(3.651)	(5.159)	(5.039)	(6.856)	(5.979)	(12.173)
Homestead Protected	3.907^{**}	3.709^{*}	6.872^{***}	1.524	1.792	3.497
	(1.922)	(2.061)	(1.073)	(2.554)	(2.276)	(2.279)
Mean Dep. Var.	-3.729	-3.729	-2.973	-13.271	-13.271	-12.784
Observations	1,323	1,323	1,188	1,323	1,323	1,188
Clusters	49	49	44	49	49	44

Notes: This table reports two-stage least squares estimates of the effect of bankruptcy homestead and non-recourse protections on county employment growth. The dependent variable in each column is the percentage growth in employment from 2008 to 2011 for the indicated industry. In columns 1 and 4, we estimate the growth without any additional controls. In columns 2 and 5, we control for MSA supply elasticity following Saiz (2008), and use a dummy to control for missing supply elasticity measures. In columns 3 and 6, we exclude Florida and the "sand states" of California, Nevada, New Mexico and Arizona. Tradable and Non-Tradable industries are defined following Mian and Sufi (2014). The Non-Recourse Protected measure is the fraction of individuals in an age-credit score bin who have no liability in the event of a foreclosure residualized in age-credit score regression at the individual level. The Homestead Protected measure is the fraction of individuals in an age-credit score bin who have their home equity completely protected by bankruptcy homestead exemptions, residualized in age-credit score regression at the individual level. We then take the county-level weighted average of each instrument. All regressions are estimated using a county-level dataset of NAICS four-digit industry-level employment and are weighted by county population. Standard errors are clustered at the state-level. *** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

Table 4
Debtor Protections and State Consumption Growth

	Non-Durable Goods (2008-2011)			Retail and Rest. Sector (2008-2011)		
	(1)	(2)	(3)	(4)	(5)	(6)
Non-Recourse Protected	-8.851^{***}	-6.790^{*}	-2.026	-12.229^{***}	-10.346^{*}	-3.849
	(2.953)	(3.601)	(5.784)	(4.283)	(5.423)	(7.184)
Homestead Protected	4.826^{***}	4.849^{***}	6.364^{***}	4.317^{*}	4.307^{**}	5.967^{**}
	(1.796)	(1.370)	(1.752)	(2.233)	(1.835)	(2.230)
Mean Dep. Var.	8.722	8.722	9.292	6.967	6.967	7.788
Observations	49	49	44	49	49	44

Notes: This table reports two-stage least squares estimates of the effect of bankruptcy homestead and non-recourse protections on state consumption growth. The dependent variable in each column is the percentage growth in consumption from 2008 to 2011 in the indicated category. In columns 1 and 4, we estimate consumption growth without any additional controls. In columns 2 and 5, we control for average MSA supply elasticity from Saiz (2008), and control for the fraction of the state that does not have a measure for supply elasticity. In columns 3 and 6, we exclude Florida and the "sand states" of California, Nevada, New Mexico and Arizona. The Non-Recourse Protected measure is the fraction of individuals in an age-credit score bin who have no liability in the event of a foreclosure residualized in age-credit score regression at the individual level. The Homestead Protected measure is the fraction of individuals in an age-credit score bin who have their home equity completely protected by bankruptcy homestead exemptions, residualized in age-credit score regression at the individual level. We then take the state-level weighted average of each instrument. The regressions are estimated using a state-level dataset of BEA consumption figures and are weighted by state population. Standard errors are robust. *** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

Table 5
Debtor Protections and House Price Growth

	House Price Growth (2007-2011)			
	(1)	(2)	(3)	(4)
Non-Recourse Protected	-46.996^{***}	-54.347^{***}		-36.311^{**}
	(15.243)	(11.118)		(13.607)
Homestead Protected	-12.308	-10.101		-8.190
	(13.610)	(14.050)		(10.348)
Supply Inelasticity			-8.078^{***}	-6.812^{**}
			(1.881)	(2.575)
Mean Dep. Var.	-22.190	-23.635	-23.635	-23.635
Observations	11,688	6,728	6,728	6,728
Clusters	49	39	39	39

Notes: This table reports two-stage least squares estimates of the effect of bankruptcy homestead and non-recourse protections on house price growth at the zip code level. The dependent variable in each column is the percentage growth in house prices, from 2007 to 2011. In column 1, we estimate the effect of Non-Recourse Protected and Homestead Protected without any additional controls. In column 2, we limit the sample to zip codes with an MSA supply elasticity measure from Saiz (2008). In column 3, we regress on MSA supply elasticity from Saiz (2008), multiplied by negative one and standardized to mean zero with standard deviation one. In column 4, we control for all three measures. The Non-Recourse Protected measure is the fraction of individuals in an age-credit score bin who have no liability in the event of a foreclosure residualized in age-credit score regression at the individual level. The Homestead Protected measure is the fraction of individuals in an age-credit score bin who have their home equity completely protected by bankruptcy homestead exemptions, residualized in age-credit score regression at the individual level. We then take the zip code-level weighted average of each instrument. The regressions are estimated using a zip code-level dataset of house price data from Zillow and are weighted by the zip code population. Standard errors are clustered at the state-level. *** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

A. Exogeneity Tests and Robustness Results

Table A.1: Debtor Protections and State Characteristics

	Non-Recourse Protections	Homestead Protections
	(1)	(2)
Democrat Vote Share	0.402	−0.038
	(0.279)	(0.128)
College Educ Share	−0.105	−0.055
	(0.130)	(0.052)
Share Under Age 44	0.288**	−0.020
	(0.135)	(0.068)
Income Ch. (1998-2002)	0.329	−0.018
	(0.306)	(0.040)
Income Level (2002)	21.529	−0.507
	(23.222)	(7.181)
Observations	49	

Notes: This table reports OLS estimates of state characteristics on non-recourse and bankruptcy homestead exemption laws. Democratic Vote Share is measured in the Federal 2006 Elections at the state-level. College Educated Fraction is the fraction of individuals with a college or graduate degree in 2006. Fraction Under 44 is the population fraction under the age of 44. Income (2002) is the income level in 2002. Income Ch. (1998-2002) is the percentage change in income from 1998 to 2002. Each row reports estimates from a single regression on our non-recourse and bankruptcy homestead protection measures. The Non-Recourse Protected measure is the fraction of individuals in an age-credit score bin who have no liability in the event of a foreclosure residualized in age-credit score regression at the individual level. The Homestead Protected measure is the fraction of individuals in an age-credit score bin who have their home equity completely protected by bankruptcy homestead exemptions, residualized in age-credit score regression at the individual level. We then take the state-level weighted average of each instrument. All regressions are weighted by state population with robust standard errors. *** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

Table A.2: Assessing Robustness of Results to Alternative Instruments

	Mortgage Default	Non-Mortgage. Default	Non-Tradable Employment	Non-Durable Consumption	House Prices
	(1)	(2)	(3)	(4)	(5)
	Panel A: Historical Bankruptcy Homestead Exemptions				
Non-Recourse Protected	0.231***	0.042*	−14.804***	−10.339***	−69.160***
	(0.034)	(0.024)	(4.149)	(3.114)	(6.574)
Homestead Protected	0.040	0.057**	4.415	6.750*	−5.334
	(0.068)	(0.024)	(2.997)	(3.354)	(17.882)
	Panel B: Age-Only Instrument				
Non-Recourse Protected	0.062	−0.064	−13.574***	−8.873***	−46.486***
	(0.069)	(0.042)	(3.595)	(2.953)	(15.549)
Homestead Protected	0.040	0.039**	3.885**	4.913***	−12.615
	(0.028)	(0.016)	(1.906)	(1.814)	(13.918)
	Panel C: Cross-State Instrument				
Non-Recourse Protected	0.057	−0.075	−13.655***	−8.899***	−46.695***
	(0.063)	(0.040)	(3.632)	(2.948)	(15.749)
Homestead Protected	0.041	0.038	3.942**	4.965***	−12.600
	(0.026)	(0.015)	(1.903)	(1.819)	(14.059)

Notes: This table presents the main results from Tables 2-5 using alternative instruments for non-recourse and bankruptcy homestead protection. The dependent variable for column 1 is Mortgage Default as reported in column 1 of Table 2. The dependent variable for column 2 is Non-Mortgage Default as reported in column 4 of Table 2. The dependent variable for column 3 is Non-Tradable Employment Growth as reported in column 1 of Table 3. The dependent variable for column 4 is Non-Durable Consumption Growth as reported in column 1 of Table 4. The dependent variable for column 5 is House Price Growth as reported in column 1 of Table 5. Panel A uses the inflation-adjusted 1920 Homestead amounts from Mahoney (forthcoming) as the bankruptcy homestead exemption amount. Panel B uses only age demographics in the estimation of the simulated instrument. Panel C does not use any demographics in the estimation of the simulated instrument to isolate the cross-state variation in the laws. See the notes for Tables 2-5 for additional details. *** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

B. First Stage Results

Table A.3: First Stage Results

	Non-Recourse Instrument	Homestead Instrument	F-Test
Individual Regressions:	(1)	(2)	(3)
Non-Recourse Protected	2.177***	0.015	177.181
	(0.117)	(0.011)	0.000
Homestead Protected	−0.112	1.272***	597.001
	(0.253)	(0.042)	0.000
County Regressions:			
Non-Recourse Protected	2.302***	0.008	376.55
	(0.120)	(0.011)	0.000
Homestead Protected	−0.213	1.428***	882.34
	(0.381)	(0.052)	0.000
State Regressions:			
Non-Recourse Protected	2.339***	0.007	346.12
	(0.126)	(0.011)	0.000
Homestead Protected	−0.161	1.417***	1203.96
	(0.362)	(0.043)	0.000
Zip Code Regressions:			
Non-Recourse Protected	2.354***	0.014	316.44
	(0.133)	(0.014)	0.000
Homestead Protected	−0.176	1.414***	856.14
	(0.363)	(0.052)	0.000

Notes: This table reports representative first stage results for the two-stage least squares results reported in Tables 2-5. Individual Regressions correspond to the individual-level balance sheet results reported in Table 2. County Regressions correspond to the county-level employment results reported in Table 3. State Regressions correspond to the state-level consumption results reported in Table 4. Zip Code Regressions correspond to the zip code-level house price results reported in Table 5. See the notes for Tables 2-5 for additional details. *** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

C. Stylized Balance Sheet

Figure A.1
Unprotected Homeowner Balance Sheet

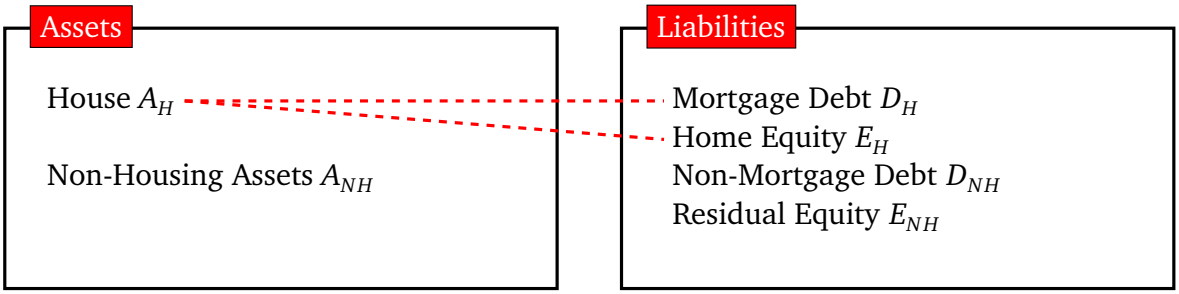
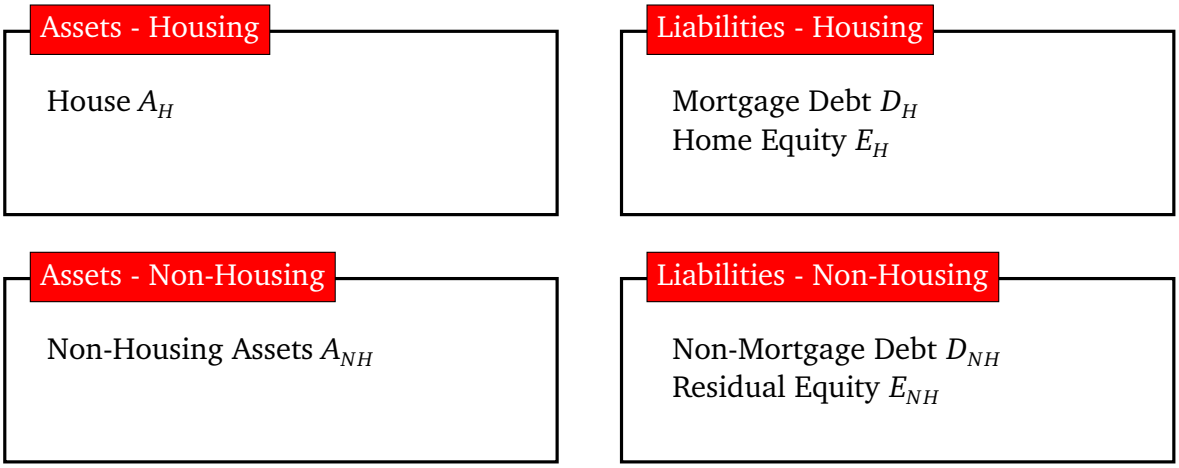


Figure A.2
Protected Homeowner Balance Sheet

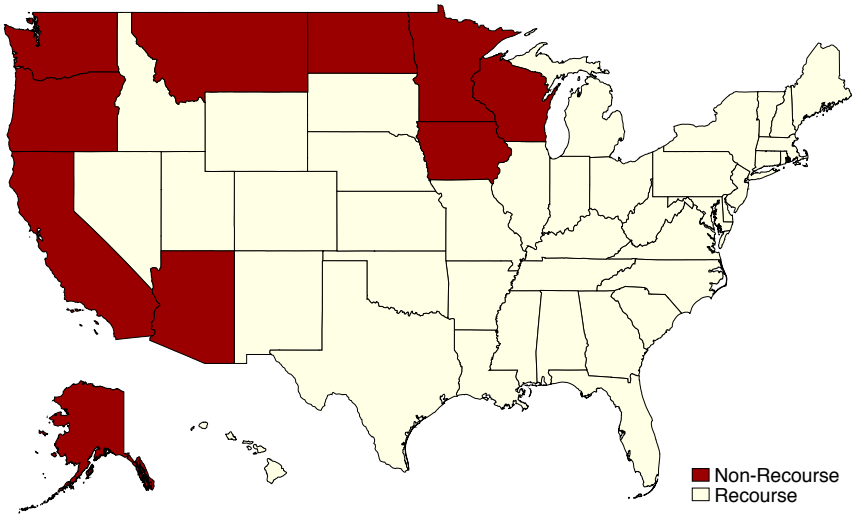


Notes: Figure A.1 illustrates a simple balance sheet for a homeowner with no debtor protections. Mortgage Debt D_H is secured by the house, A_H, which non-mortgage debt is unsecured. In Figure A.2, the same balance sheet is presented with protections. With either non-recourse protection in the case of negative equity, or complete homestead protection in the case of positive equity and $E_H < E_S^*$, homeowner balance sheet can be treated as two separate balance sheets, with no cross-collateralization.

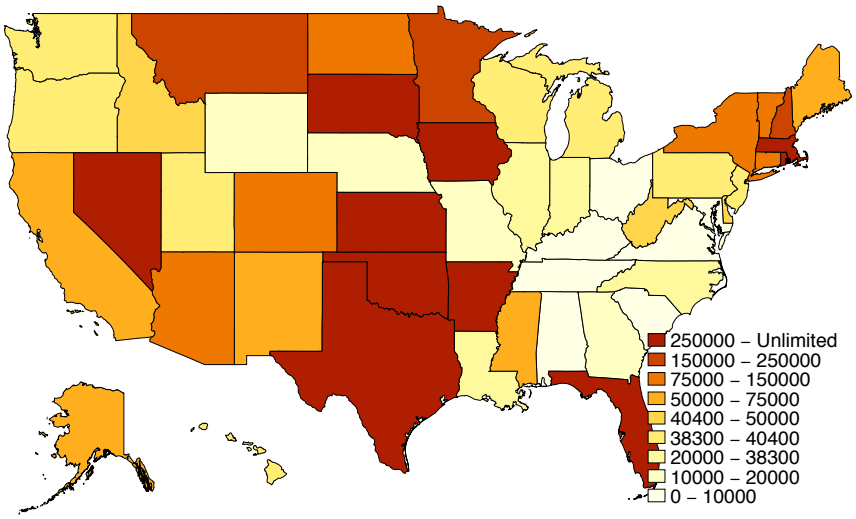
D. Debtor Protection Laws by State

Figure A.3
Distribution of Protections by State

(a) Non-Recourse Protections

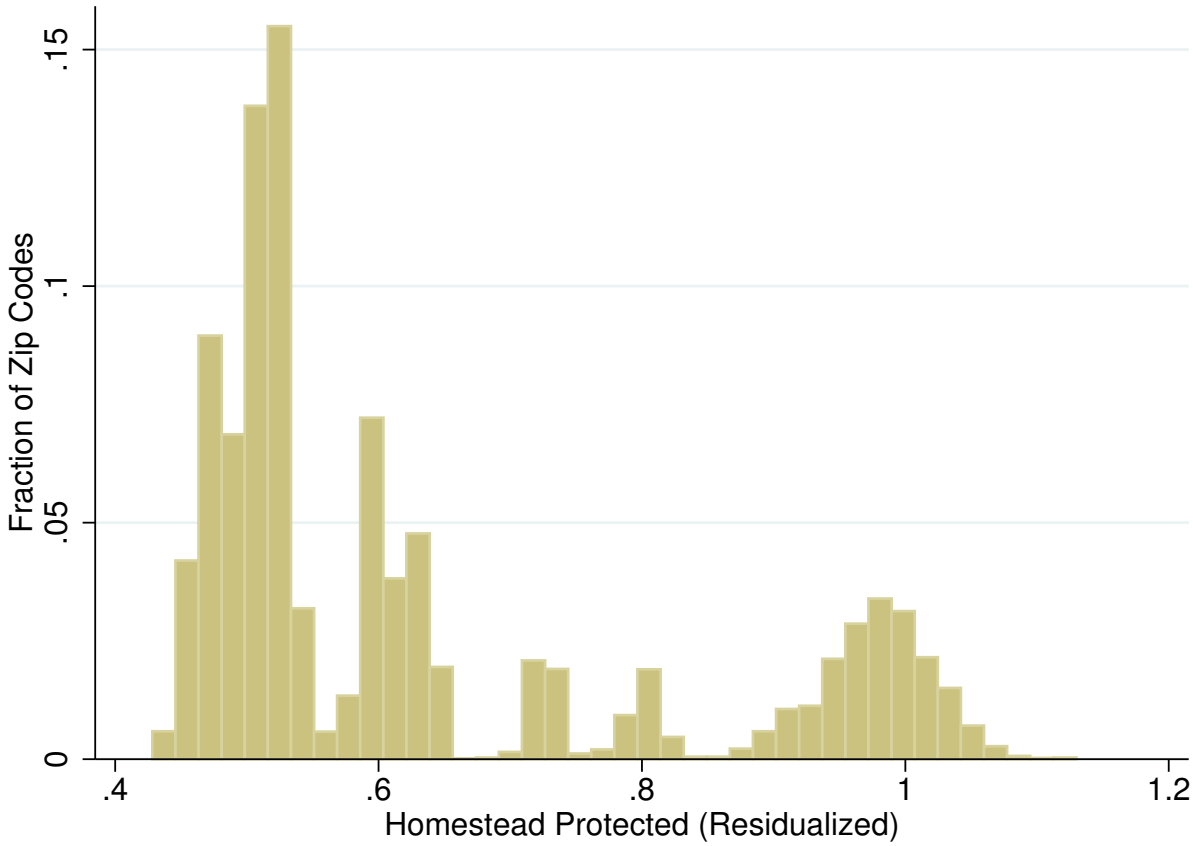


(b) Bankruptcy Homestead Exemptions



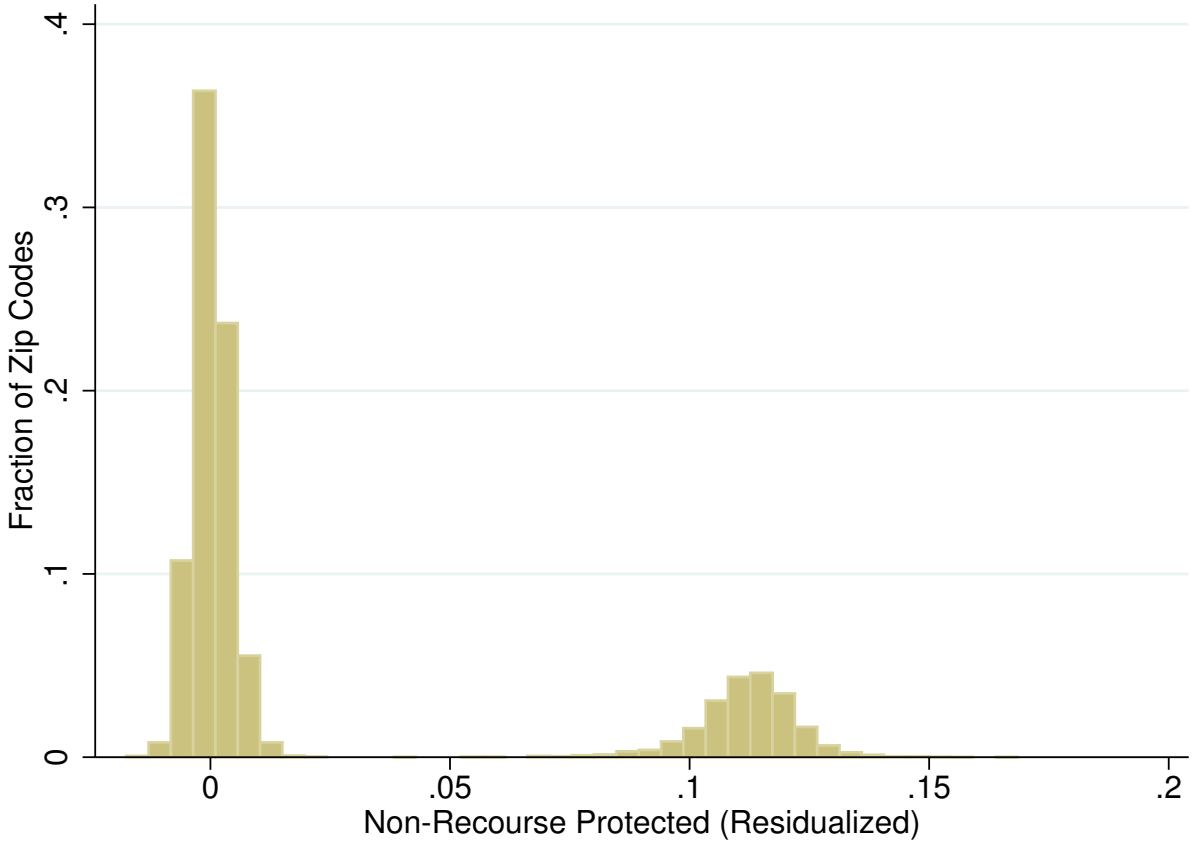
Notes: These figures display 2007 non-recourse laws and 2007 bankruptcy homestead exemptions by state.

Figure A.4
Distribution of Homestead Protected - Zip Code



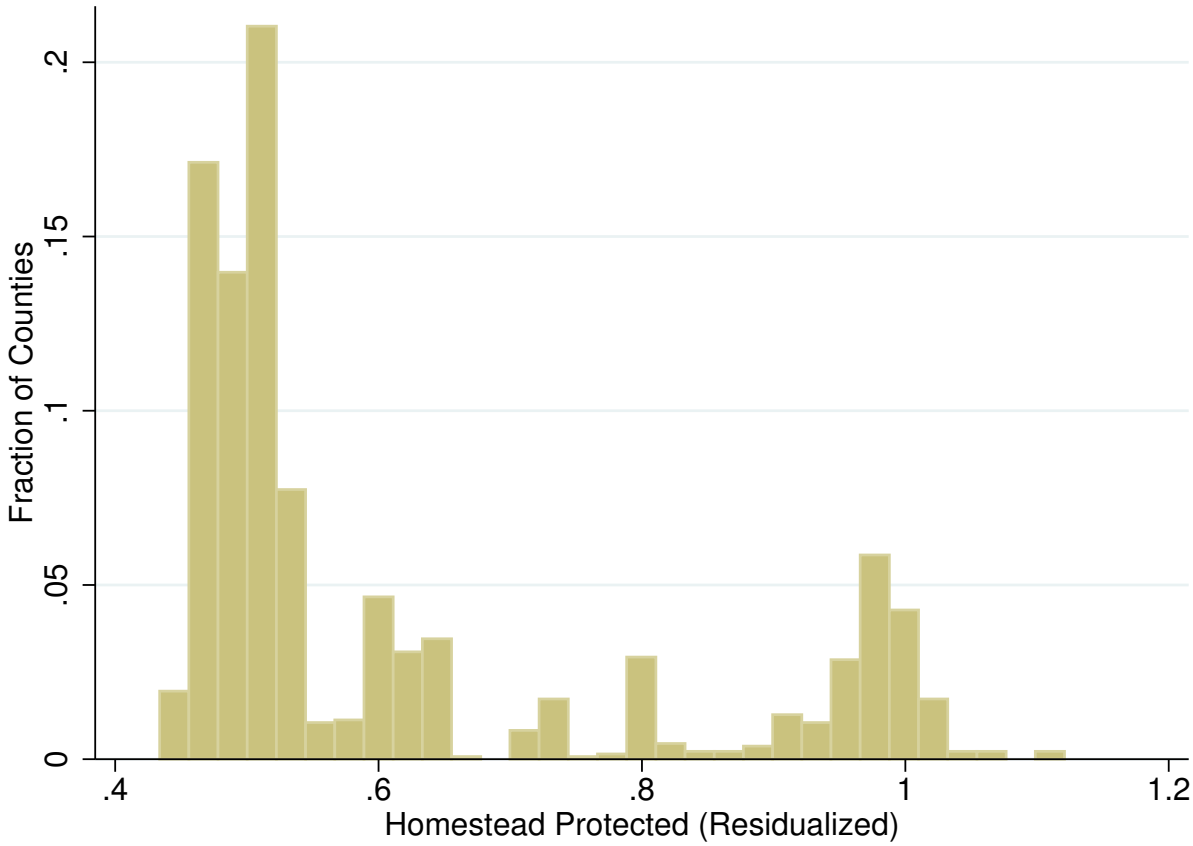
Notes: This figure displays the distribution of zip code-level bankruptcy home equity protection, as defined by individuals' 2007 zip code location. The protection measure is calculated from a random sample of individual-level credit reports as the fraction of individuals in a 2007 credit score-age demographic bin whose home equity is completely protected under the state's bankruptcy home equity exemptions. This measure is then averaged over all individuals in the zip code. This graph plots the average of the residualized measure.

Figure A.5
Distribution of Non-Recourse Protected - Zip Code



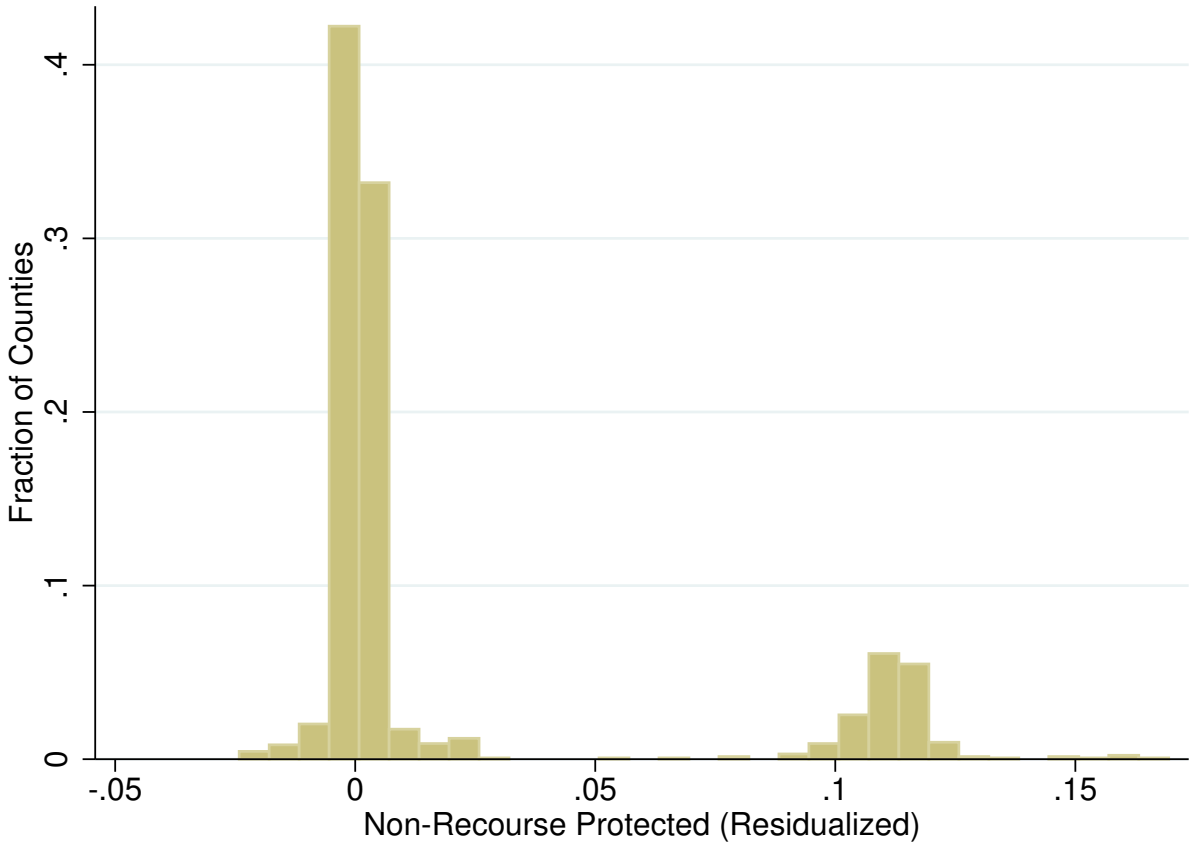
Notes: This figure displays the distribution of zip code-level Non-Recourse protection, as defined by individuals' 2007 zip code location. The protection measure is calculated from a random sample of individual-level credit reports as the fraction of individuals within a 2007 credit score-age demographic bin whose home equity is negative and for which the state is non-recourse. This measure is then regressed against a fully interacted set of dummies for 2007 credit score-age demographic characteristics, and residualized. This measure is then averaged over all individuals in zip code. This graph plots the average of the residualized measure.

Figure A.6
Distribution of Homestead Protected - County



Notes: This figure displays the distribution of county-level bankruptcy home equity protection, as defined by individuals' 2007 county location. The protection measure is calculated from a random sample of individual-level credit reports as the fraction of individuals in a 2007 credit score-age demographic bin whose home equity is completely protected under the state's bankruptcy home equity exemptions. This measure is then averaged over all individuals in the county. This graph plots the average of the residualized measure.

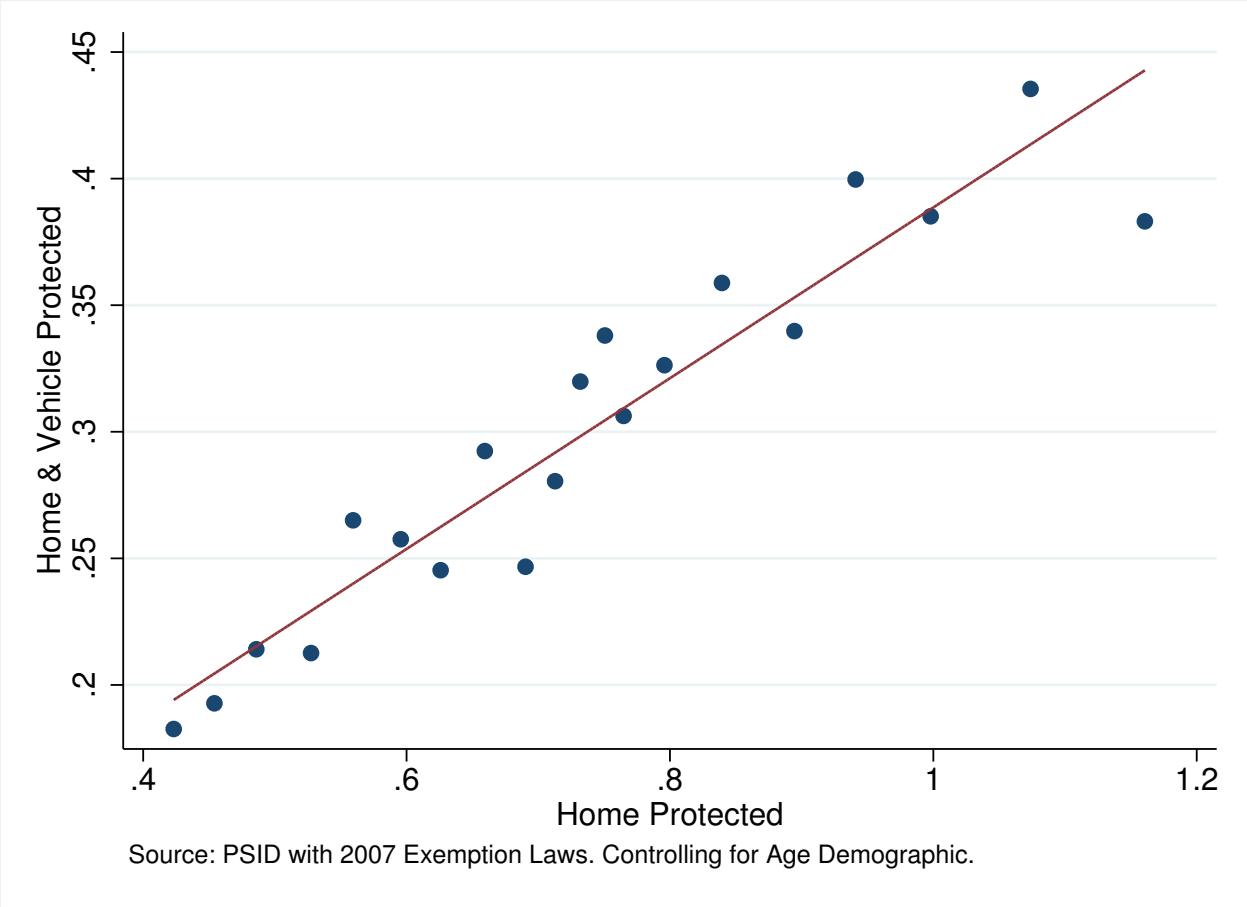
Figure A.7
Distribution of Non-Recourse Protected - County



Notes: This figure displays the distribution of county-level non-recourse protection, as defined by individuals' 2007 county location. The protection measure is calculated from a random sample of individual-level credit reports as the fraction of individuals within a 2007 credit score-age demographic bin whose home equity is negative and for which the state is non-recourse. This measure is then regressed against a fully interacted set of dummies for 2007 credit score-age demographic characteristics, and residualized. This measure is then averaged over all individuals in the county. This graph plots the average of the residualized measure.

E. Other Bankruptcy Protections

Figure A.8
Homestead Bankruptcy Exemptions Compared to Vehicle & Homestead Protections



Notes: This figure plots the bankruptcy homestead protection instrument against an instrument calculated using both bankruptcy vehicle and homestead exemptions. The x-axis is defined as the average fraction of individuals within an age bucket with home equity completely protected under a state's bankruptcy laws. The y-axis is defined as the average fraction of individuals within an age bucket with home equity and vehicle equity completely protected under a state's bankruptcy laws. The data is drawn from the 2007 Panel Survey of Income Dynamics public use dataset. The plot controls for age bucket dummies by residualizing both the x- and y-variables.

F. Protections Laws

Table A.4: State Non-Recourse and Bankruptcy Exemption Laws

State	Non-Recourse	Homestead Exemption	State	Non-Recourse	Homestead Exemption
AK	Non-Recourse	67,500	MT	Non-Recourse	200,000
AL	Recourse	10,000	NC	Recourse	37,000
AR	Recourse	Unlimited	ND	Non-Recourse	80,000
AZ	Non-Recourse	150,000	NE	Recourse	12,500
CA	Non-Recourse	75,000	NH	Recourse	200,000
CO	Recourse	90,000	NJ	Recourse	40,400
CT	Recourse	150,000	NM	Recourse	60,000
DE	Recourse	50,000	NV	Recourse	350,000
FL	Recourse	Unlimited	NY	Recourse	100,000
GA	Recourse	20,000	OH	Recourse	10,000
HI	Recourse	40,400	OK	Recourse	Unlimited
IA	Non-Recourse	Unlimited	OR	Non-Recourse	39,600
ID	Recourse	50,000	PA	Recourse	40,400
IL	Recourse	30,000	RI	Recourse	300,000
IN	Recourse	30,000	SC	Recourse	10,000
KS	Recourse	Unlimited	SD	Recourse	Unlimited
KY	Recourse	10,000	TN	Recourse	7,500
LA	Recourse	25,000	TX	Recourse	Unlimited
MA	Recourse	500,000	UT	Recourse	40,000
MD	Recourse	0	VA	Recourse	10,000
ME	Recourse	70,000	VT	Recourse	150,000
MI	Recourse	40,400	WA	Recourse	40,400
MN	Non-Recourse	200,000	WI	Recourse	40,400
MO	Recourse	15,000	WV	Recourse	50,000
MS	Recourse	75,000	WY	Recourse	20,000

Notes: This table lists the state laws for non-recourse mortgages and bankruptcy home equity exemptions. Homestead exemption amount is as of 2007. If Federal bankruptcy exemptions are allowed, the greater of the state and federal exemption amount is used. Source for Recourse Laws: http://www.alllaw.com/articles/nolo/foreclosure/anti-deficiency-laws.html, and Ghent and Kudylak (2011). Source for Bankruptcy Exemption Laws: hand-collected by the authors from NOLO and state legal documents.