

# **Saving Your Home in Chapter 13 Bankruptcy<sup>1</sup>**

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## **Abstract**

This paper examines how filing for bankruptcy under Chapter 13 helps financially distressed debtors save their homes. Filing under Chapter 13 stops lenders from foreclosing and gives debtors extra time to repay mortgage arrears, but does not reduce the total amount owed. We develop a model of debtors' decisions to default on their mortgages and file for bankruptcy and we evaluate it using a new dataset of debtors who filed for bankruptcy under Chapter 13 in 2006. We also examine the effect of allowing "strip-down" of residential mortgages in Chapter 13, so that bankruptcy judges could reduce the total amount owed.

The paper documents that 96% of Chapter 13 filers are homeowners and that more than 90% of Chapter 13 plans involve repayment of mortgages or car loans. The model predicts that introducing strip-down would allow an additional 100,000 debtors to save their homes each year

## 1. INTRODUCTION

This paper has three goals. First, it examines how filing for bankruptcy under Chapter 13 helps financially distressed debtors to save their homes. Filing for bankruptcy under Chapter 13 helps debtors save their homes by stopping lenders from foreclosing and giving debtors extra time to repay their mortgage arrears (payments that are overdue). Debtors can similarly use Chapter 13 to prevent repossession of their cars. Second, the paper presents new evidence that nearly all debtors who use Chapter 13 are homeowners who wish to save their homes. This is despite the fact that a major bankruptcy reform adopted in 2005 was intended to force some bankruptcy filers to repay their unsecured debts in Chapter 13.<sup>2</sup>

Third, the paper investigates how bankruptcy can be used to address the subprime mortgage crisis by allowing bankruptcy judges to “strip-down” mortgage debt in Chapter 13 when the mortgage principle exceeds the current market value of the house. The subprime mortgage crisis has caused and continues to cause many homeowners to lose their homes—often because they cannot afford their monthly payments once the initially low interest rate expires. Housing pundits estimate that between 2 and 3.3 million foreclosures will occur between 2007 and 2009, including 1 out of every five subprime mortgages made since 2005.<sup>3</sup> Foreclosures are very costly to both borrowers and lenders--borrowers must bear the cost of relocating and lenders lose a high fraction of the value of the house by the time it is resold. Foreclosures also harm neighborhoods because foreclosed homes deteriorate and cause blight and they harm localities by reducing property tax payments and squeezing local governments' budgets.<sup>4</sup> Foreclosures also lead to yet more foreclosures by pushing down housing prices, making it more difficult for homeowners to refinance, and encouraging additional defaults by homeowners whose mortgages are underwater.

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<sup>2</sup> The 2005 bankruptcy reform (the “Bankruptcy Abuse Prevention and Consumer Protection Act”) instituted a procedure to force some higher-income debtors to file under Chapter 13 and repay part of their unsecured debt from future income. See Mann (2007) for discussion of lenders' role in the 2005 reform and White (2007) for discussion of economic effects of the reform.

<sup>3</sup> See Stein (2007), Labaton (2008) and Pew Charitable Trusts (2008).

<sup>4</sup> A report by the Pew Charitable Trusts (2008) estimates that property values of homes in neighborhoods where foreclosures have occurred will fall by \$356 billion. This reduction in value causes assessments to fall, reducing local governments' property tax revenues.

Because foreclosure is costly to both borrowers and lenders, it would be in their joint interest to deal with the mortgage crisis by renegotiating many mortgages voluntarily. But very few renegotiations have in fact occurred. This is because most mortgages have been repackaged into mortgage-backed securities, where ownership is divided among multiple security-holders who have divergent interests. As a result, they are unlikely to agree on any changes in the loan terms.<sup>5</sup> In addition, while all mortgages have a servicer who acts on the owners' behalf, most mortgage servicing contracts compensate servicers for the costs of foreclosing, but not for the costs of renegotiating.<sup>6</sup> Another problem is that many homes in default have second mortgages, and the second mortgage holder can prevent the first mortgage from being refinanced unless the second mortgage is paid off.

The Bush Administration and Congress have considered a number of proposals for dealing with the subprime mortgage crisis by authorizing Federal Housing Administration to refinance subprime mortgages into fixed-rate 30-year loans—the latest is the “Hope for Homeowners” Act, which was passed by the House of Representatives in May 2008. This legislation would refinance mortgages at 85% of a home's current market value. To qualify, homeowners must have current mortgage payments that are unaffordable, but they must be able to meet an affordability standard for the payments under the new loan. In addition, the original mortgage lender would have to consent.<sup>7</sup>

Lenders will presumably consent to refinancing their worst loans, i.e., those in which the borrower has defaulted and the proceeds of foreclosure would be less than the amount that lenders would receive in the refinancing. In these cases, refinancing is economically efficient since it prevents foreclosure (although it may transfer large losses to the government if borrowers eventually default on the refinanced loans). But the consent requirement is a problem for other loans, since lenders may refuse their consent in some situations even when foreclosure would otherwise occur. This is because lenders have

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<sup>5</sup> Mortgage-backed securities not only divide mortgages among multiple owners, they also divide them among owners who have higher versus lower priority claims on the returns. This means that any change in terms is likely to make one group better off and another group worse off. Securities also limit whether and how many mortgages can be modified. A recent Moody's report claims that only 1% of subprime loans that have resetting interest rates were modified in 2007; see Drucker and Fricke (2007).

<sup>6</sup> Servicers also keep late fees and penalties imposed on borrowers in default, which means that they gain from foreclosing if they can collect these fees in foreclosure and they have little incentive to renegotiate if doing so means that the fees are dropped. See Stein (2008) and Porter (2008).

<sup>7</sup> Only about 400,000 homeowners are predicted to qualify for the program. See Bijaj (June 29, 2008).

imperfect information about individual homeowners' ability/willingness-to-repay and they wish to prevent strategic attempts to refinance by borrowers who would otherwise repay. They can do so by adopting a tough bargaining stance in which they never or rarely agree to any change in mortgage terms. But then lenders will sometimes refuse to consent to refinancing when borrowers are not behaving strategically and, in this situation, the result is foreclosure.<sup>8</sup>

In contrast, changing bankruptcy law so that bankruptcy judges could “strip-down” mortgages in Chapter 13 has the advantage that it would provide a mechanism for preventing foreclosures even when lenders refuse to consent to a refinancing. It would therefore complement the refinancing program by providing an alternative mechanism for avoiding foreclosure.<sup>9</sup> Also because few homeowners are expected to qualify for the Federal Housing Administration program, the bankruptcy route is likely to be to only alternative for many distressed homeowners to save their homes.

In the paper, we first discuss the treatment of homeowners in bankruptcy under current law. Then we develop a combined model of debtors' decisions to default on their mortgages and to file for bankruptcy under Chapter 13. The model is used to examine the effect of a new (and probably unintended) mortgage subsidy that was introduced into U.S. bankruptcy law as part of the 2005 bankruptcy reform. The new subsidy reduces debtors' obligation to repay unsecured debt by a dollar for each additional dollar of unsecured debt. The model is also used to examine the effect of allowing mortgage strip-down in Chapter 13. Finally, we evaluate the model's predictions using a new dataset of debtors who filed for bankruptcy under Chapter 13 in 2006.

The most important result of the paper is that Chapter 13 functions as a “save your home” bankruptcy procedure. This is evidenced by the fact that 96% of Chapter 13 filers

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<sup>8</sup> These models assume there are two types of debtors and lenders don't know individual borrowers' types. One type will repay if lenders take some punitive action, while the other type will default. Lenders' best strategy is a mixed strategy in terms of taking punitive action, which in this context is refusing consent to refinancing. The outcome is then that borrowers who won't repay can't refinance, so that they default and their homes are foreclosed. This type of model is relevant because, even among borrowers with subprime mortgages, the default rate is far below 100%. See White (1998) for a model of this type.

<sup>9</sup> See Coyle (2007) for discussion of the various bankruptcy reform bills pending in Congress as of fall 2007. But the Senate recently voted on and rejected one of these bills, S. 2136. It would have given bankruptcy judges power to reduce the mortgage principle, convert variable rate mortgages to 30-year fixed-rate loans, and/or disallow prepayment penalties and other fees ([www.opencongress.org/bill/110-s2136/show](http://www.opencongress.org/bill/110-s2136/show)). See Herszenhorn (April 4, 2008).

are homeowners and 78% of debtors file under Chapter 13 voluntarily, rather than being forced to do so. Of those that file Chapter 13 repayment plans, 71% repay mortgage arrears and 57% repay car loans (some repay both), while just 9% repay *only* unsecured debt. Our evaluation of the mortgage subsidy in Chapter 13 suggests that it has only a small effect—around 1% of our sample of 2006 Chapter 13 filers saved their homes due to the mortgage subsidy when they would otherwise have defaulted. But when strip-down of mortgages in Chapter 13 is introduced, the number of Chapter 13 filers who save their homes rather than defaulting is predicted to increase by more than 100,000 per year.

## **2. TREATMENT OF HOMEOWNERS IN BANKRUPTCY—CURRENT LAW AND PROPOSED REFORMS**

How does filing for bankruptcy help financially distressed homeowners save their homes? Filing for bankruptcy does not help homeowners directly, since under current law they must either repay their mortgages in full or give up their homes, regardless of whether they file or not.<sup>10</sup> Nonetheless bankruptcy helps homeowners in several ways. First, when debtors file under Chapter 13, mortgage lenders are stayed (prevented) from foreclosing during the bankruptcy procedure. Debtors can retain their homes by repaying arrears on their mortgages—interest, principle, and penalty payments that were due in the past—as part of a repayment plan that usually lasts for 5 years. They must also make all the normal mortgage payments that are due during the plan. Once the arrears are repaid, the original mortgage contract is reinstated. Thus filing under Chapter 13 gives financially-stressed debtors breathing space to repay arrears and save their homes. Car loans are treated the same way in Chapter 13, except that debtors must repay the entire loan in full during the repayment plan.<sup>11</sup> Second, the bankruptcy trustee may help

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<sup>10</sup> Prior to 1993, bankruptcy judges had the power to strip down mortgage loans. The prohibition on strip-down of mortgages in bankruptcy is based on the Supreme Court's decision in *Nobleman v. American Savings Bank*, 508 US 324 (1993) and on 11 U.S.C. § 1322(b)(2), which prevents bankruptcy judges from discharging any mortgage debt secured only by a primary residence, even if the value of the house is below the mortgage principle. 11 U.S.C. § 1322(c)(1) allows debtors to cure defaults on their mortgages in Chapter 13, as long as the residence has not been sold in foreclosure. See Bourguignon (2007) and Levitin and Goodman (2008) for discussion.

<sup>11</sup> Prior to the 2005 bankruptcy reform, underwater car loans could also be stripped down in bankruptcy. See Whitford (2007) for discussion.

debtors challenge excessive fees and penalties imposed by lenders.<sup>12</sup> Third, some or all unsecured debt is discharged (forgiven) in Chapter 13, which increases debtors' ability to repay their mortgages and car loans. For each additional dollar that debtors owe on their mortgages and car loans, an additional dollar of unsecured debt is discharged in Chapter 13.<sup>13</sup>

In contrast, debtors who file for bankruptcy under Chapter 7 receive little help in saving their homes, because they are obliged to repay the entire mortgage immediately to prevent foreclosure or repossession. The same applies to car loans. But Chapter 7 is attractive to debtors who do not wish to save their homes or their cars, because their unsecured debt is discharged and they are not required to repay from their future incomes.

These rules imply that distressed homeowners who wish to save their homes are likely to file for bankruptcy under Chapter 13, while debtors who do not own homes are likely to file under Chapter 7. Previous evidence is consistent with this prediction. Eraslan, Li and Sarte (2007) found that over 80% of a sample of Chapter 13 filers in 2001-2002 were homeowners and Zhu (2007) found that 86% of a sample of Chapter 13 filers in 2003 were homeowners. In contrast, homeownership is much less important among Chapter 7 bankruptcy filers--Zhu (2007) found that only 47% of a sample of Chapter 7 bankruptcy filers in 2003 were homeowners.<sup>14</sup>

Prior to the 2005 bankruptcy reform, all debtors had the right to choose between Chapters 7 and 13. But the 2005 bankruptcy reform changed this by requiring some debtors with above-median incomes to file under Chapter 13 and repay part of their unsecured debt from future income, if they file for bankruptcy at all. This change implies that, in theory, post-2005 Chapter 13 filers will consist of a mixture of financially distressed homeowners who file under Chapter 13 in order to save their homes and high-

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<sup>12</sup> See Porter (2006) for a study showing that mortgage lenders add questionable or excessive fees in half of all foreclosures.

<sup>13</sup> Some states allow debtors to prevent foreclosure outside of bankruptcy by curing defaults on their mortgages, but these programs usually require repayment of arrears more quickly than in Chapter 13. See Jacoby (2008).

<sup>14</sup> A recent study by Carroll and Li (2008) is the first to examine whether homeowners who file for bankruptcy actually succeed in saving their homes. They find that 30% of filings by homeowners resulted in foreclosure.

income debtors who file under Chapter 13 because it is the only bankruptcy procedure open to them. We examine this issue in the empirical section below.

Finally, we also investigate the effects of introducing “strip-down” of mortgages in Chapter 13. The legal theory of strip-down is that mortgages in which the current market value of the house is less than the mortgage principle can be divided into two parts: a secured part equal to the current market value of the house and an unsecured part equal to the difference between the mortgage principle and the current market value of the house. Under strip-down, the unsecured part of the mortgage would be treated like any other unsecured loan and would be partly or fully discharged in Chapter 13. Ironically, this change in the law would make the treatment of mortgages in bankruptcy the same as the treatment of other secured debts in bankruptcy, since bankruptcy law already allows for secured loans such as mortgages on rental properties and vacation homes to be stripped-down if they are underwater.

Although we focus on examining the effect of strip-down on existing mortgages, whether allowing strip-down would be economically efficient depends on how the change affects the supply of credit for new mortgages. A recent study by Levitin and Goodman (2008) suggests that allowing strip-down would have only a negligible effect on the supply of mortgage credit.<sup>15</sup>

### 3. MODEL

In this section, we model debtors’ decisions to file for bankruptcy and to default on their mortgages under current bankruptcy law. Suppose in period 0 debtors borrow an amount  $P$  in the form of unsecured debt (credit card or medical debt), an amount  $M$  in the form of a mortgage, and an amount  $A$  in the form of an automobile loan. In period 1, debtors owe  $P'$ ,  $M'$ , and  $A'$  on the three loans, respectively. All three amounts include the discounted present value of principle and interest payments, plus arrears, late fees, and penalties owed until each loan is repaid. In addition,  $M'$  and  $A'$  also include

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<sup>15</sup> Levitin and Goodman (2008) examine whether the abolition of strip-down in 1993 pushed down interest rates on home mortgages. They find little effect. They also find little or no difference between interest rates currently offered on owner-occupied single-family homes versus on owner-occupied two-family homes, even though strip-down is currently allowed on the latter but not the former.

interest on the arrears and  $M'$  may include additional interest owed because the mortgage had a low “teaser” rate during the first two or three years, but a higher rate thereafter. Because the focus of the model is on debtors’ decisions to default on their mortgages, we assume that they always repay their car loans in full.<sup>16</sup>

Both housing value and debtors’ incomes in period 1 are assumed to be uncertain. At the beginning of period 1, the value of the house  $v$  is drawn from a distribution  $f(v)$  and income  $y$  is drawn from a different distribution  $g(y)$ . The realized value of the house is denoted  $V_h$  and realized income per year is denoted  $Y$ . To keep the model simple, housing value and income are assumed to remain constant thereafter. Automobile value, in contrast, is known in advance and is assumed to be  $V_a$  in period 1.

After learning  $V_h$  and  $Y$ , debtors make two decisions: whether to default on their mortgages and whether to file for bankruptcy. Although most debtors are already behind on their mortgage payments at the time they file for bankruptcy, we use the term “default” to refer to debtors’ decisions to abandon their homes and move to rental housing. If debtors default but do not file for bankruptcy, then mortgage lenders are assumed to foreclose on the house. If debtors default and file for bankruptcy under Chapter 13, mortgage lenders cannot foreclose during the bankruptcy procedure and debtors are allowed to remain in their homes while they make mortgage payments under their repayment plans. Once debtors repay their mortgage arrears, the original mortgage contract is reinstated.

If foreclosure occurs, the mortgage lender sells the house and the proceeds are used to pay, first, the cost of foreclosure, denoted  $C_f$ ; second, the mortgage (first mortgage, then second mortgage if any); third, an amount up to the state’s homestead exemption, denoted  $X_h$ , goes to the homeowner; and fourth, unsecured debt.<sup>17</sup> All claims are paid in full until the proceeds of sale are exhausted. If anything remains after unsecured debt is repaid, it goes to the homeowner.

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<sup>16</sup> Alternately,  $M$  could be interpreted as an auto loan without changing the model.

<sup>17</sup> Mortgage loans are assumed to be non-recourse, so that if a debtor defaults, the lender can take the house but does not have any further claim on the debtor. See Pence (2003) for discussion of which states require that mortgage loans be non-recourse.

Now consider how debtors' obligation to repay in Chapter 13 is determined. Consider the mortgage first and suppose the payments are divided in two parts. The first part consists of arrears and interest on arrears, plus normal interest and principle payments owed during the 5-year repayment period. The discounted present value of debtors' mortgage obligations during the repayment period is denoted  $M'_1$ . The second part consists of normal interest and principle payments due from the end of the repayment period until the end of the mortgage contract. Assume that the mortgage contract has  $N$  years remaining. The discounted present value of debtors' mortgage obligations from year 6 until year  $N$  is denoted  $M'_2$ . Mortgage payments during and after the repayment plan sum to debtors' total obligation to repay, or  $M'_1 + M'_2 = M'$ .

As an example, suppose the debtor's normal mortgage payments are \$750 per month or \$9,000 per year, but she owes arrears equal to four months of payments, or \$3,000, plus late fees, penalties, and interest on these payments that total \$1,000. This means that she owes a total of \$49,000 during the 5-year repayment period.  $M'_1$  equals the discounted present value of these payments, or approximately \$45,000 at a discount rate of 3 percent. After the repayment plan, the debtor owes \$9,000 per year for  $N - 5$  years and  $M'_2$  equals the discounted present value of these payments. Suppose the original mortgage was for 30 years and the debtor defaulted after 2 years. Then  $M'_2$  equals the discounted present value of \$9,000 per year from year 6 to year 28, or approximately \$139,000 at the same interest rate.

The discounted present value of debtors' car payments during the repayment plan is  $A'$ . We assume that debtors repay this amount in full during the plan.

Now turn to debtors' obligation to repay unsecured debt in bankruptcy, which is the most complicated. Since the bankruptcy reform of 2005, debtors in bankruptcy have been subject to a "means test" that determines both whether they are obliged to file under Chapter 13 if they file for bankruptcy at all and their obligation to repay unsecured debt in Chapter 13. Debtors first compute a yearly income exemption, denoted  $X_y$ , which is the amount of income they are allowed to keep each year for their living expenses. The minimum value of  $X_y$  is the median family income level in the debtor's state of residence, adjusted for family size. This means if debtors' income is below the state

median income level, they are allowed to file for bankruptcy under Chapter 7 and, if they choose to file under Chapter 13, they are not required to repay any of their unsecured debt. If debtors' income exceeds the state median income level by \$1,200 per year or more, then they must file under Chapter 13 if they file for bankruptcy at all and, for 5 years, they must use all of their income above  $X_y$  to repay debt.

The income exemption  $X_y$  is determined by adding up various allowances for living expenses.<sup>18</sup> There is an allowance for rent that depends on average housing costs in the metropolitan area where the debtor lives, an allowance for transportation that depends on the number of cars the debtor owns (up to two) or the cost of public transportation, and an allowance for personal expenditures that depends on the debtor's family size and income. There are also additional allowances for some or all of debtors' actual expenditures on taxes, mandatory payroll contributions, insurance, telecommunications, childcare, child support, children's educational expenses, care of elderly or disabled relatives, and home security costs. Finally, debtors also add their secured debt obligations during the plan to the income exemption.

Suppose a particular debtor's income exemption is denoted  $X_y$ . If the debtor has a car loan, her income exemption over the 5-year period increases from  $5X_y$  to  $5X_y + A'$  and, if she also has a mortgage, her income exemption over the 5-year period increases to  $5X_y + A' + M'_1$ .

Debtors' disposable income during the repayment period equals  $5Y - 5X_y$ , where  $5X_y$  may equal  $5X_y$ ,  $5X_y + A'$  or  $5X_y + A' + M'_1$ , depending on what debts the particular debtor has.<sup>19</sup> Debtors must use all of their disposable income for 5 years to repay secured and unsecured debt. Because secured debt is repaid first, the amount

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<sup>18</sup> The procedure for determining exempt income is based on Internal Revenue Service procedures for collecting from delinquent taxpayers, but is more generous to debtors. Income for purposes of the means test is not current income, but is the debtor's average monthly income during the six months prior to filing, converted to an annual basis. For purposes of the model, the definition of income does not affect the results (although the definition of income affects debtors' work incentives during the repayment period). See White (2007) for discussion of the means test.

<sup>19</sup> For simplicity, we neglect discounting of  $Y$  and  $X_y$ , so that the discounted present value of income during the repayment period equals  $5Y$  and the same for the income exemption. This is equivalent to assuming that  $Y$  and  $X_y$  increase each year at a rate equal to the discount rate.

repaid to unsecured creditors equals disposable income minus secured debt payments. The procedure of increasing the income exemption by the amount of debtors' secured debt payments means that, for each additional dollar of secured debt payments, a dollar of additional unsecured debt is discharged until debtors' obligation to repay unsecured debt falls to zero. This discharge of unsecured debt increases debtors' ability to repay their mortgages, thus making it easier for them save their homes and cars. We refer to this increase in the income exemption due to secured debt obligations as the Chapter 13 mortgage subsidy.<sup>20</sup> The subsidy can be expressed as  $\min[M_1' + A', 5(Y - X_y), P']$  if this expression is positive, or else zero.

Debtors must also pay bankruptcy costs of  $C_b$  when they file for bankruptcy, where  $C_b$  includes lawyers' fees and filing fees. We assume that debtors must pay  $C_b$  in full at the time of filing.<sup>21</sup>  $C_b$  is assumed to be less than  $P'$ , since otherwise debtors would never file for bankruptcy.

### 3.1 Default and bankruptcy Decisions under Current Law

Now consider debtors' bankruptcy and mortgage default decisions in period 1. Debtors are assumed to make these decisions so as to maximize the discounted present value of their wealth defined over the next  $N$  years, i.e., until the end of the mortgage contract. However, debtors are assumed to have no financial wealth other than their home equity and, as a result, they may be subject to liquidity constraints that prevent them from making the wealth-maximizing choice.<sup>22</sup> Debtors have four possible choices: default on the mortgage/file for bankruptcy, default/no bankruptcy, no default/bankruptcy, and no default/no bankruptcy. We discuss debtors' decisions separately for different ranges of values of  $V$ . Debtors' decisions under current law are

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<sup>20</sup> Berkowitz and Hynes (1999) first suggested that filing for bankruptcy increase debtors' ability to repay their mortgages by reducing their unsecured debt obligations. See Lin and White (2001) for discussion.

<sup>21</sup> We discuss data on bankruptcy costs in the empirical section below.

<sup>22</sup> The assumption that debtors maximize their wealth means that they make "ruthless" decisions concerning both default and bankruptcy. For default, this means that they do everything possible to save their homes if doing so maximizes wealth, but they walk away from their homes if defaulting maximizes wealth. In reality, not all debtors make their default and bankruptcy decisions ruthlessly. See Fay et al (2002) for an empirical model of the bankruptcy filing decision that shows debtors are more likely to file as their financial gain increases.

considered first. Then we modify the model to consider their decisions if bankruptcy law allowed strip-down of mortgages.

**Case (A):**  $V < M'_2 - R$ . This is the lowest range of housing values.  $R$  denotes the discounted present value of debtors' alternate housing cost, or the cost of moving to rental housing in period 1 and paying rent for the next  $N$  years. Here, the value of the debtors' homes in period 1 is so low that the alternate cost of housing is less than the cost of owning, even if debtors make no mortgage payments during the repayment period.

First consider debtors' choice when their incomes are below the state median income level. These debtors keep all of their income in bankruptcy, so that they receive no mortgage subsidy. They therefore prefer to default on the mortgage, regardless of whether they file for bankruptcy. Now consider their bankruptcy decisions. If they file under Chapter 13, the present discounted value of their net wealth is  $NY + V_a - A' - C_b - R$ ; while if they do not file, it is  $NY + V_a - A' - P' - R$ . Because  $P' > C_b$ , they prefer bankruptcy.

Now consider debtors' choice when their incomes are above the state median income level. If they file for bankruptcy, they receive the mortgage subsidy, which reduces their cost of homeownership from  $M' - V_h$  to as low as  $M'_2 - V_h$ . However even with this subsidy, they are better off defaulting on the mortgage because the cost of renting is lower than the cost of owning, i.e.,  $R < M'_2 - V_h$ . They therefore choose between default/bankruptcy and default/no bankruptcy. The present discounted value of their net wealth if they choose the former is  $(N - 5)Y + [5X_y + A'] + V_a - A' - C_b - R$ ; while if they choose the latter it is  $NY + V_a - A' - P' - R$ . We use  $\tilde{Y}$  to denote the income level where debtors are indifferent between filing versus not filing for bankruptcy under Chapter 13 and, in case (A), this income level satisfies the condition  $5\tilde{Y}_A - (5X_y + A') = P' - C_b$ . Here, debtors' net gain from having their unsecured debt discharged in bankruptcy,  $P' - C_b$ , is just offset by the present value of their disposable

income,  $5\tilde{Y}_A - (5X_y + A')$ , which they must use to repay unsecured debt in bankruptcy. Debtors file if their income is below  $\tilde{Y}_A$ , but not otherwise.<sup>23</sup>

Figure 1 shows debtors' period 1 income  $Y$  on the horizontal axis and their period 1 housing value  $V_h$  on the vertical axis. Case (A) is the lowest horizontal band. In this region, debtors always default on the mortgage, but they file for bankruptcy under Chapter 13 if income is below  $\tilde{Y}_A$  and do not file otherwise. The default/bankruptcy subregion is labeled D/B, while the default/no bankruptcy subregion is labeled D/NB.

**Case (B):**  $M'_2 - R < V_h < M' - R$ . Here, housing value is higher, but the cost of rental housing  $R$  is still less than the cost of owning,  $M' - V_h$ . In this range of values, the mortgage subsidy in Chapter 13 causes some debtors to change from defaulting on their mortgages to saving their homes.

Debtors whose incomes are below the income exemption face the same choice as in case (A) and they still default and file for bankruptcy. However those whose incomes are above the exemption receive the mortgage subsidy if they keep their homes in bankruptcy and, in this case, their income during the repayment period becomes

$\min[5Y, 5X_y + A' + M'_1]$ . Consider debtors' choice whether to default. If they choose default/bankruptcy, the discounted present value of their wealth is  $((N - 5)Y + \min[5Y, 5X_y + A' + M'_1] + V_a - A' - R - C_b)$ ; while if they choose no

default/bankruptcy it is  $(N - 5)Y + \min[5Y, 5X_y + A' + M'_1] + V_a - A' + V_h - M' - C_b$ .

When income during the repayment period is  $5X_y + A'$  or less, they prefer to default, and when it is  $5X_y + (M'_1 + A')$  or more, they prefer to keep their homes. Suppose  $\hat{Y}$  denotes the income level where debtors are indifferent between defaulting and not defaulting. In case (B), this income level satisfies the condition

$5\hat{Y}_B - [5X_y + A'] = M' - V_h - R$ . Here the extra cost to debtors of keeping their homes rather than defaulting (the right-hand side) just equals the amount of income they must

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<sup>23</sup> This applies if  $5Y > 5X_y + A'$ . But the result remains the same if  $5X_y < 5Y < 5X_y + A'$ .

use to repay unsecured debt in bankruptcy (the left-hand side). Debtors default if their income is less than  $\hat{Y}_B$  and they keep their homes otherwise.

Debtors may also be forced to default because they are liquidity-constrained, even when it is financially advantageous for them to keep their homes. The first year's cost of the repayment plan is  $C_b + (M'_1 + A')/5$  and we make the extreme assumption that debtors are willing to use all of their income to repay the mortgage if it is financially worthwhile for them to do so. Debtors in case (B) thus default if either they are liquidity-constrained or if their incomes are below the condition discussed above, so that

$$5\hat{Y}_B = \max[5X_y + A' + M - V_h - R, 5C_b + M'_1 + A'].$$

Now consider debtors' bankruptcy decision when their incomes exceed the income exemption, or  $5Y > 5X_y + A' + M'_1$ . At a sufficiently high income level, debtors prefer not to file for bankruptcy. But if they do not file, they receive no mortgage subsidy and this means that they prefer to default rather than keep their homes. Therefore high-income debtors choose between the alternatives of default/no-bankruptcy and no-default/bankruptcy. The discounted present value of their wealth in the former situation is  $NY + V_a - A' - P' - R$ ; while in the latter it is

$$(N - 5)Y + [5X_y + M'_1 + A'] + V_a - A' + V_h - M' - C_b.$$

Debtors are indifferent between these alternatives at the income level  $\tilde{Y}_B$  that satisfies the condition

$$5\tilde{Y}_B - [5X_y + M'_1 + A'] + (M' - V_h) - R = P' - C_b.$$

Here, their net gain from debt discharge in bankruptcy (the right-hand side) is just offset by the cost of giving up their non-exempt income during the repayment period plus the extra cost of keeping their homes rather than renting (the left-hand side). They choose no-default/bankruptcy if their incomes are below  $\tilde{Y}_B$  and they choose default/no-bankruptcy otherwise. Note that  $\tilde{Y}_B$  increases as  $V_h$  rises, because debtors gain more from keeping their homes when home value is higher and this induces them to file for bankruptcy at higher income levels. At the boundary between cases (A) and (B),  $\tilde{Y}_B = \hat{Y}_A$ .

Assuming that  $\hat{Y}_B < \tilde{Y}_B$ , case (B) is divided into three sub-regions based on debtors' income: a default/bankruptcy sub-region in the lowest income range, a no-default/no-

bankruptcy sub-region in the highest income range, and a no-default/bankruptcy sub-region in-between, where the mortgage subsidy causes debtors to save their homes rather than defaulting. However if  $\hat{Y}_B \geq \tilde{Y}_B$ , then the middle sub-region does not exist and debtors always default. The middle sub-region is more likely to exist when debtors have more unsecured debt, so that the mortgage subsidy is larger.<sup>24</sup>

The second-lowest horizontal bar in Figure 1 shows the results in case (B) when the middle sub-region exists.

**Case (C).**  $M' - R < V_h < M' + X_h + C_f$ . In case (C),  $V_h$  is sufficiently high that the cost of owned housing  $M' - V_h$  is less than the cost of rental housing  $R$  and debtors prefer to keep their homes. But their homes are not valuable enough to force them to repay any unsecured debt in bankruptcy.

Consider debtors whose incomes are below the state median level first. While they prefer to keep their homes, they may be liquidity-constrained. As in case (B), we assume that the income level below which debtors default because they are liquidity-constrained is  $\hat{Y}_C$ , where  $5\hat{Y}_C = 5C_b + (M'_1 + A')$ . Debtors who default because they are liquidity-constrained also file for bankruptcy, since  $P' > C_b$ .<sup>25</sup>

Next consider debtors' decisions if they are not liquidity-constrained but have incomes below the income exemption. They still prefer to file for bankruptcy, so consider whether they default. The present value of their wealth if they choose default/bankruptcy is  $NY + V_a - A' - R - C_b$ ; while the present value of their wealth if they choose no-default/bankruptcy is  $NY + V_a - A' + V_h - M' - C_b$ . They prefer not to default since  $V_h > M' - R$ .

Finally consider debtors' bankruptcy decisions when their incomes exceed the income exemption including the mortgage subsidy. Since they do not default, the present value of their wealth if they choose no-default/bankruptcy is

$(N - 5)Y + [5X_y + M'_1 + A'] + V_a - A' + V_h - M' - C_b$ ; while the present value of their

<sup>24</sup> The condition for the middle sub-region to exist is  $(M' - V_h - R) + (M'_2 - V_h - R) < P' - C_b$ .

<sup>25</sup> These debtors may file under Chapter 7 if they have already given up their homes. Or they might file under Chapter 13, but give up their homes when they realize that they cannot afford a repayment plan.

wealth if they choose no-default/no-bankruptcy is  $NY + V_a - A' + V_h - M' - P'$ . They are indifferent between the two choices at the income level  $\tilde{Y}_C$ , where  $5\tilde{Y}_C = 5\tilde{Y}_A + M'_1$ . They file for bankruptcy if  $Y \leq \tilde{Y}_C$  and do not file otherwise.<sup>26</sup>

Figure 1 shows the results for case (C) in the middle horizontal band. There are three sub-regions: a default/bankruptcy sub-region in the lowest income range, a no-default/no-bankruptcy sub-region in the highest income range, and a no-default/bankruptcy region in the middle income range. Debtors in the middle income region may receive the mortgage subsidy, but it does not change their default decisions since they would keep their homes anyway. Compared to case (B), fewer debtors default but more file for bankruptcy.

**Case (D).**  $M' + X_h + C_f < V_h \leq M' + X_h + C_f + P' - C_b$ . Here home equity  $V_h - M'$  exceeds the cost of foreclosure plus the homestead exemption. Therefore in a foreclosure, the house would sell for enough to pay  $V_h - M' - X_h - C_f > 0$  to unsecured creditors. Case (D) is unlikely to occur in states with high homestead exemptions, but may occur in states with low homestead exemptions. We abbreviate  $V_h - M' - X_h - C_f$  as *NEHE*, for “non-exempt home equity.”

Consider debtors whose incomes are below the income exemption. Even though they have no disposable income, they must repay unsecured creditors *NEHE*.<sup>27</sup> And because they have no wealth other than their home equity, they must pay this amount from income even though their incomes are exempt. Debtors are again assumed to be liquidity-constrained and forced to default if the cost of the repayment plan exceeds half of their incomes. The income level below which they default is  $\hat{Y}_D$ , where

$5\hat{Y}_D = 5C_b + (M'_1 + A' + NEHE)$ . Liquidity-constrained debtors also file for bankruptcy.

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<sup>26</sup> Note that  $\tilde{Y}_C = \tilde{Y}_B$  at the boundary between cases (B) and (C).

<sup>27</sup> Debtors in case (D) and (E) are obliged to repay unsecured debt because the “best interest of creditors” test (11 U.S.C. § 1307 (2000)) requires that unsecured creditors receive at least as much in Chapter 13 as they would get in a Chapter 7 bankruptcy. In Chapter 7, these debtors would be obliged to sell their homes and repay unsecured creditors *NEHE*, so in Chapter 13 they are obliged to repay the same amount.

Now consider the choice of debtors who are not liquidity-constrained. They do not default, so consider their bankruptcy decisions. Their wealth if they do not file is  $NY + V_a - A' + V_h - M' - P'$ . Their wealth if they file is  $(N - 5)Y + \min[5Y, 5X_y + A' + M'_1] + V_a - A' + V_h - M' - NEHE - C_b$ , depending on whether their incomes are below or above the income exemption. In the former case, debtors prefer to file for bankruptcy as long as unsecured debt exceeds  $C_b + NEHE$ . In the latter case, debtors are indifferent between filing and not filing at an income level where  $5\tilde{Y}_D = 5\tilde{Y}_C - NEHE$ . They file if their incomes are below  $\tilde{Y}_D$  and they avoid bankruptcy otherwise.

Figure 1 shows debtors' choices in case (D) as the second-highest horizontal band. Debtors in case (D) are more likely to be liquidity-constrained than those in case (C), because those in case (D) must repay some of their unsecured debt in addition to repaying their mortgages. In addition, debtors in case (D) are less likely to file for bankruptcy as the value of their homes rises, because their obligation to repay unsecured creditors increases and they therefore gain less from filing.

**Case (E).**  $V_h > M' + X_h + C_f + P' - C_b$ . In case (E), the value of the house is so high that selling it would generate enough to repay unsecured creditors at least the amount  $P' - C_b$ . This means that debtors in case (E) do not gain from filing for bankruptcy.

Debtors in case (E) default on their mortgages if they are liquidity-constrained, which occurs if income is below  $\hat{Y}_E$ , where  $5\hat{Y}_E = 5C_b + (M'_1 + A' + P')$ . But whether they ever file for bankruptcy is ambiguous. If they default because they are liquidity-constrained, then they might file for bankruptcy in order to delay foreclosure and gain extra time to sell their homes themselves. Above this income level, debtors choose no-default/no-bankruptcy. The top horizontal bar in figure 1 shows the results in case (E). Here, debtors are assumed to avoid bankruptcy even when they are liquidity-constrained.

Overall, the results in figure 1 imply that debtors default on their mortgages for two reasons: because liquidity constraints force them to default even though they prefer to

save their homes and because their home value is so low that they are better off renting rather than owning. Debtors in the left-hand sub-regions of cases (C) through (E) and some of those in the left-hand sub-region of case (B) default because they are liquidity-constrained. Debtors in case (A) and in the left-hand and right-hand sub-regions of case (B) default because they are better off renting rather than owning, while the mortgage subsidy causes those in the middle region of cases (B) to keep their homes rather than defaulting. In contrast, debtors in the middle sub-regions of cases (C) and (D) receive the subsidy and keep their homes, but they would have kept their homes anyway. For these debtors, the main effect of the subsidy is to increase their probability of filing for bankruptcy. The mortgage subsidy thus reduces default, but at the cost of increasing bankruptcy filings and subsidizing debtors who do not change their default decisions. In the empirical section below, we examine how many debtors receive the mortgage subsidy and how many save their homes as a result of it.

### **Default and Bankruptcy Decisions with “Strip-down”**

Now consider the possibility of changing bankruptcy law so that bankruptcy judges would have the power to “strip-down” debtors’ mortgage obligations in Chapter 13. In particular, suppose bankruptcy judges reduce mortgage payments both during and after the repayment period if debtors’ home values fall below the original mortgage principle by some fixed proportion  $k$ . Thus if  $M/V < k$ ,  $M'_1$  is replaced by  $(M/V)M'_1$  and  $M'_2$  is replaced by  $(M/V)M'_2$ .<sup>28</sup> All other aspects of bankruptcy law are assumed to remain the same.

Debtors’ default and bankruptcy decisions remain mainly the same under strip-down as under current law, except that  $M'_1$  and  $M'_2$  are replaced by  $(M/V)M'_1$  and  $(M/V)M'_2$ , respectively. The main changes are as follows. First, because mortgage payments fall, the horizontal lines in figure 1 shift downward, more debtors fall in case (E), and fewer debtors fall in cases (A) through (D) taken together. Second, the reduction

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<sup>28</sup> Bankruptcy judges could reduce mortgage payments by reducing the term of the mortgage, reducing interest rates, and/or discharging fees. To discourage debtors from presenting biased assessments of the decline in home value, the decline could be based on an objective measure for the area, such as the change in the S&P/Case-Schiller housing value indices for the relevant metropolitan area over the period since the mortgage was issued.

in mortgage payments makes all the liquidity constraints less binding, so that fewer debtors default because they are liquidity-constrained. Third, because  $\hat{Y}_B$  shifts to the left and  $\tilde{Y}_B$  shifts to the right, more debtors are in the middle region of case (B) where the mortgage subsidy causes them to save their homes. Overall, these changes are likely to cause more debtors to save their homes. In the next section, we calculate the size of these effects.

#### 4. Characteristics of Chapter 13 bankruptcy filers

We collected a new dataset of all Chapter 13 bankruptcy filings in Delaware in 2006—there were 586 filings in total. The data are taken from both the forms that debtors submit at the time of filing and their repayment plans. We used filings in Delaware because the Delaware bankruptcy court has been a leader in making bankruptcy filings publicly available and because Delaware filers are representative of bankruptcy filers nationally.<sup>29</sup> Delaware's homestead exemption is \$50,000.

The importance of Chapter 13 as a save-your-home bankruptcy procedure is illustrated by the facts that 96% of Chapter 13 filers in our sample are homeowners and that 78% of Chapter 13 filers pass the means test, which means that they filed under Chapter 13 voluntarily.<sup>30</sup> (See table 1.) The average home value is \$197,000 for homeowners and the average level of mortgage debt for those who list mortgages at filing is \$153,000. Average home equity for all homeowners is \$39,900 and equity is positive for 68% of homeowners. Because average home equity is positive, most debtors in the sample have an incentive to save their homes. See table 1.

Turning to other debts, 57% of debtors list car loans at filing and the average car debt is \$18,400; 89% of debtors list unsecured loans and the average unsecured debt is \$29,700; 52% list priority debt (mainly taxes owed) at filing and the average priority debt is \$8,500; while 16% list student loans and the average student loan debt is \$15,000.

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<sup>29</sup> Debtors' filing forms and repayment plans are available through the Bankruptcy Courts' online PACER system. For bankruptcy forms, see [http://www.uscourts.gov/rules/Revised\\_Rules\\_and\\_Forms/BK\\_Form\\_B22C\\_101105.pdf](http://www.uscourts.gov/rules/Revised_Rules_and_Forms/BK_Form_B22C_101105.pdf). Zhu (2007) discusses how Delaware filers are representative of bankruptcy filers nationally.

<sup>30</sup> We categorize debtors as homeowners if they give the value of their homes or the amount of the mortgage on their filing forms or, because this data is sometimes missing, if they repay a mortgage in their repayment plans. Because mobile home loans are generally listed as mortgages on bankruptcy forms, owners of mobile homes are categorized as homeowners.

Now turn to debtors' Chapter 13 repayment plans. We located repayment plans for 90% of Chapter 13 filers. Among the remainder, some may have abandoned their efforts to save their homes and shifted their bankruptcy filings to Chapter 7, while others may have repaid their mortgage arrears without filing a repayment plan—perhaps after successfully renegotiating their mortgages with lenders. Among plan filers, 71% propose to repay mortgages, 41% propose to repay car loans, 38% propose to repay unsecured debt, 8% of plans propose to repay priority debt, and 0.5% propose to repay student loans. (Both priority debt and student loans are non-dischargeable in Chapter 7, but can be repaid over 5 years in a Chapter 13 repayment plan.)

Around 9% of Chapter 13 filers propose to repay only unsecured debt in their repayment plans and these plans raise the issue of why debtors filed under Chapter 13 in the first place. Nearly two-thirds of debtors in this group passed the means test and could have filed under Chapter 7, so that high incomes did not force them to file under Chapter 13. But 83% were homeowners and their average home equity was \$66,000. Thus a possible explanation for why these debtors filed under Chapter 13 is that their home equity exceeded the Delaware homestead exemption of \$50,000. If they had filed under Chapter 7, they would have been obliged to sell their homes and use the proceeds to repay some of their unsecured debt.

Finally, the average lawyer's fee in our sample is around \$2,800. In addition, debtors must pay a bankruptcy court filing fee of \$274 and they must take a credit counseling course prior to filing and a debt management course before they receive a discharge. Bankruptcy trustees also impose a fee of 10% of the amount paid under the repayment plan and the average trustee's fee in the sample—assuming that debtors complete their repayment plans—is \$3,100.<sup>31</sup> Our evidence thus suggests that filing for bankruptcy under Chapter 13 costs the average debtor more than \$6,000.

## 5. Simulation and results

Now turn to the estimation of the model in figure 1. We collected or constructed data for the variables  $Y, X_y, V_h, M, M', M'_1, M'_2, P', V_a, A'$  and  $C_b$ . For the homestead

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<sup>31</sup> If debtors do not complete their repayment plans, then the trustee's fee is lower but debtors do not receive a discharge from their debt. In this situation, creditors may resume their collection efforts.

exemption  $X_h$ , we used the Delaware value of \$50,000. We assumed that the cost of foreclosure  $C_f$  equals one-third of housing value. The number of years in the future that debtors take into account in making their decisions,  $N$ , is assumed to be 28—equal to the length of a 30-year mortgage obtained two years earlier. To construct the present discounted value of the cost of alternate housing, we used the median rent in Delaware (corrected to 2006 dollars) and one-time moving costs of \$2,000. The mortgage interest rate is assumed to be .06 and the discount rate is assumed to be .03. In the simulations, we exclude observations that have missing house value, income or mortgage principle and we also drop observations that have no repayment plan. With these exclusions, the sample size falls to 436. The appendix gives details concerning how we constructed the variables and table 2 gives summary statistics for variables not listed in table 1.

Table 3, column (1), gives results for the base case model discussed in section III-1 and figure 1. Nearly all Chapter 13 filers—97%--are predicted to gain from filing for bankruptcy and 71% are predicted to gain from default. Surprisingly, only 15% of debtors' mortgages are underwater in the sense that the mortgage principle exceeds the market value of the house.

Now consider the mortgage subsidy and how it affects whether debtors default versus save their homes in the base case. Three categories of filers are of interest. The first is filers in the middle sub-region of case (B)--who are predicted to save their homes rather than defaulting because of the mortgage subsidy. The average mortgage subsidy for these debtors is \$43,300, or about 8% of the discounted present value of future mortgage payments. But only 0.5% of filers fall in this region. Thus although the mortgage subsidy is large in dollar terms, it causes very few homes to be saved. The second category of interest is liquidity-constrained filers in the left-hand sub-regions of cases (C) - (E) who default. They would receive the mortgage subsidy if they kept their homes, but the subsidy isn't large enough to induce them to do so. These debtors might change their default decisions and save their homes if strip-down were introduced. 38% of filers are liquidity-constrained in the base case. The third category consists of filers who receive the mortgage subsidy, but would have saved their homes regardless, i.e., those in the middle sub-regions of cases (C) and (D). The mortgage subsidy is wasted on these debtors since it increases the number of bankruptcy filings and causes losses for

both secured and unsecured lenders, but it does not prevent any defaults. 5.7% of all filers fall in this category and their average mortgage subsidy is \$38,700. Comparing the flow of mortgage subsidy dollars to filers in the first versus third categories, 92% of mortgage subsidy dollars are wasted.

Because our data are from 2006 and most of the decline in housing prices occurred after our period of data collection, we reran the base case simulation assuming that all housing values are 20% lower.<sup>32</sup> The results are shown in column (2) of table 3. With lower housing values, many more mortgages are underwater—the increase is from 15% in column (1) to 46% in column (2). The number of filers who are predicted to default increases, but the number who are predicted to default because they are liquidity-constrained falls from 38% to 27.7%. (This is mainly because fewer debtors are in cases (C) through (E).) The proportion of filers who are in the first category—those who save their homes because of the mortgage subsidy—doubles from 0.5% in the base case to 1.1%. But even with the increase, the mortgage subsidy still saves very few homes.

In column (3) of table 3, we introduce mortgage strip-down in Chapter 13. We set  $k = 1$ , so that strip-down reduces debtors' mortgage payments by the ratio of house value—reduced by 20%—to the mortgage principle, whenever housing value is less than the mortgage principle. Mortgage payments both during and after the repayment period are reduced by the same proportion. Relative to the situation in column (2), introducing strip-down reduces the probability of default from 75% to 70%, but has little effect on the probability of bankruptcy. Now consider how default changes as a result of strip-down. The first category of filers who save their homes rather than defaulting more than doubles in size when strip-down is introduced, rising from 1.4% in column (2) to 3.4% in column (3). For these filers, the average mortgage subsidy is \$34,600—lower than in column (2) because strip-down reduces the value of the subsidy. But the average value of strip-down is high, \$102,000, so that the average total benefit from both sources is \$137,000. Together, both subsidies cut the present value of debtors' future mortgage costs by 44%.

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<sup>32</sup> The 20% figure is loosely based on a 16% decline in the S&P/Case-Schiller national index of home values from the second quarter of 2006 (when home prices peaked) to the first quarter of 2008, plus widespread predictions of an additional drop in home prices during the rest of 2008. (The decline during 2006 was less than 2 percent, so we assume that it did not affect the reported housing values of filers in our sample.) See [http://www2.standardandpoors.com/portal/site/sp/en/us/page.topic/indices\\_csmahp/0,0,0,0,0,0,0,0,1,3,0,0,0,0,0.html](http://www2.standardandpoors.com/portal/site/sp/en/us/page.topic/indices_csmahp/0,0,0,0,0,0,0,0,1,3,0,0,0,0,0.html).

The second category of filers consists of those who are liquidity-constrained and introducing strip-down reduces the percent of filers who are liquidity-constrained from 27.7% to 25.4%, or by 2.3 percentage points. Filers who are no longer liquidity-constrained after the introduction of strip-down move from the left-hand sub-region to the middle sub-region of cases (C), (D) or (E), where they save their homes.<sup>33</sup> For the group of filers that is no longer liquidity-constrained, the average value of the mortgage subsidy is \$6,700 and the average value of strip-down is \$32,400, for an average total benefit of \$39,100. For these filers, the two subsidies reduce the present value of future mortgage costs by 17%. Overall, introducing strip-down causes the percent of filers who save their homes rather than defaulting to more than triple, from 1.4% to 5.7%.

Finally, 13.1% of filers are in the third category under strip-down—those who receive the mortgage subsidy or strip-down (or both), but would have saved their homes anyway. This represents a large increase relative to the number of filers in this situation without strip-down. For these filers, the average combined benefit increases from \$38,100 without strip-down to \$45,400 with strip-down. But the percent of the combined mortgage subsidy and strip-down that is wasted falls slightly under strip-down, from 61% to 56%.

How significant an impact would introducing strip-down have on the subprime mortgage crisis? In 2007, 822,000 personal bankruptcy filings occurred nationally, of which 321,000 were under Chapter 13. Based on the results in table 3, column (2), the mortgage subsidy caused about  $(.014) * 321,000 = 4,500$  debtors nationally to save their homes rather than defaulting in 2007. If strip-down had been introduced in 2007, we predict that this figure would have increased by  $(.043) * 321,000 = 13,800$  per year, so that a total of 18,300 foreclosures would have been prevented in 2007. This is not a large effect. However, these estimates ignore the fact that many additional homeowners would file under Chapter 13 and save their homes, rather than defaulting and filing under Chapter 7 or avoiding bankruptcy completely. To get a rough sense of how many additional debtors would save their homes in Chapter 13 if strip-down were introduced,

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<sup>33</sup> Some debtors in the left-hand sub-region of case (B) are also liquidity-constrained and may move to the middle sub-region of case (B) when strip-down is introduced. They are included in the first category of filers.

we use the results in Fay, Hurst and White's (2003) model of bankruptcy filings, which estimated that for each \$1,000 increase in the financial benefit from filing for bankruptcy, the number of filings increased by 7 percent per year. Our calculations imply that debtors in the first and second categories receive an average benefit from strip-down of \$74,400 (based on a weighted average of \$102,000 for filers in the first category and \$34,400 for filers in the second category). An increase of this magnitude in the benefit from saving their homes in Chapter 13 is predicted to increase the number of Chapter 13 filings by  $(74.4)(7\%) = 5.20\%$ , so that the number of homes saved in Chapter 13 would increase by  $5.2\% \times 18,300 = 95,000$  each year. Overall, introducing strip-down is predicted to cause an additional  $95,000 + 13,800 = 109,000$  additional homes to be saved each year. Although this figure is small relative to predictions of the number of foreclosures that could occur in the next year or two, introducing strip-down nonetheless could make an important contribution to solving the subprime mortgage crisis by providing a mechanism for saving homes from foreclosure when debtors wish to save their homes, but lenders are unwilling to renegotiate or to consent to a refinancing.

## **6. Conclusion**

In this paper, we model how homeowners are treated in Chapter 13 bankruptcy and the extent to which filing for bankruptcy helps them keep their homes. Even before the bankruptcy reform of 2005, debtors used Chapter 13 to save their homes, since filing under Chapter 13 stops lenders from foreclosing and gives debtors more time to repay mortgage arrears. The 2005 bankruptcy reform introduced a new mortgage subsidy in Chapter 13, since it reduces the amount that debtors in Chapter 13 must pay unsecured creditors by a dollar for each additional dollar of mortgage or car loan payments, until debtors' unsecured debt obligations are completely eliminated. This subsidy makes filing for bankruptcy under Chapter 13 more attractive to homeowners and makes it easier for them to save their homes. Our data suggest that around 96% of Chapter 13 filers are homeowners and that around 90% of Chapter 13 repayment plans involve repaying mortgages or car loans or both. Changing bankruptcy law by introducing strip-down of mortgages in Chapter 13 would further increase debtors' incentive to save their homes rather than defaulting.

Our simulations suggest that the mortgage subsidy has little effect on whether debtors save their homes, but that introducing strip-down would cause an additional 109,000 homes to be saved in Chapter 13. Although the figure is small compared to the current level of foreclosures, it would contribute to solving the subprime mortgage crisis by saving some homes from foreclosure when debtors wish to keep their homes, but lenders are unwilling to consent to refinancing or to renegotiate the mortgage contract. Strip-down would therefore complement and strengthen the proposed Congressional program for solving the mortgage crisis.

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**Appendix:**  
**Explanation of Variables Used in the Simulation**

1.  $V$ : **house value**. This is the debtor's figure for the market value of the house, taken from Schedule A, "Real Property." When house value is missing, we assume it equals assets (from the Summary of Schedules, bottom figure) minus the amount of the debtor's automobile loan (from Schedule D).
2.  $Y$ : **debtor's income per year**. The income figure is taken from Schedule I, "Current Income of Individual Debtor(s)." If this figure is missing, we use the income figure given on Form B22C, line 15, which is based on debtors' average monthly income during the six months prior to filing.
3.  $X_y$ : **income exemption per year**. This is given on Form B22C, line 16 or line 57, depending on whether debtors have below-median income or not. For debtors with below-median income, the exemption equals the median income level in Delaware, adjusted for family size. For debtors with above-median income, it equals the sum of the rent, transport, personal care, and other allowances, as described in the text.
4.  $M'$ : **total mortgage payment**. This equals  $M'_1 + M'_2$ --see below.
5.  $M'_1$ : **mortgage payment during the repayment period**. We use data on the monthly mortgage payment during the repayment plan, taken from the first page of the repayment plan (Schedule J, questions Q1, Q3, and Q13). (This is the sum of the first and second mortgage payments including interest, property taxes, insurance, and maintenance cost. If the debtor has an auto payment, it's also included.) Then we convert the monthly payment to present value using a discount rate of 3% per year. This gives us a multiplier of 56 that converts monthly mortgage payments to the present value of the total mortgage payment under the plan, assuming a 5-year plan. Since we have data on the length of the repayment plan, we adjust the calculation if the plan is less than 5 years. A problem is that the mortgage payment figure usually doesn't include the normal mortgage payment, since only the arrears and interest on the arrears are paid through the bankruptcy trustee. So if the normal mortgage payment exceeds the payment under the plan, we use the sum of the normal mortgage payment plus the

- payment under the plan. But if the normal mortgage payment is less than the payment under the plan, then we assume that the payment under the plan includes the normal mortgage payment.
6.  $M'_2$ : **normal mortgage payment from the end of the repayment plan to the end of the mortgage.** We start with data on the monthly normal mortgage payment, taken from Schedule J, questions Q1, Q3, and Q13. Since we don't know the remaining term of the mortgage, we assume that the mortgage term is 27 years from the date of filing. We convert the monthly normal mortgage payment to present value using a 3% discount rate. Then we add the payments from years 6 through 27 to get the present value of mortgage payments from the end of the repayment plan through the end of the mortgage. This gives us a multiplier of 165 to convert the normal monthly payment to the total payment after the end of the repayment plan. If the repayment plan is less than five years, then we adjust the multiplier.
  7.  $P'$ : **unsecured debt.** The principle amount of unsecured debt equals the sum of the principle amount of credit card debt, bank debt, medical bills, student loans and priority debt. Figures are taken from the Summary of Schedules. To compute the discounted present value of future payments, we assume an interest rate of 30% (since debtors are in financial distress) and a repayment period of 5 years. Future payments are discounted at the rate of 3%. The resulting multiplier per dollar of principle is 2.1.
  8.  $A'$ : **automobile loans.** This principle amount of automobile loans is taken from Schedule D. To compute the discounted present value of future payments, we assume an interest rate of 7% and a loan term of 5 years. Future payments are discounted at the rate of 3%. The resulting multiplier per dollar of principle is 1.1.
  9.  $X_v$ : **homestead exemption.** Equals \$50,000 in Delaware.
  10.  $C_b$ : **bankruptcy cost.** This is the sum of debtors' lawyers' fees plus the Chapter 13 filing fee of \$274. We take the lawyer's fee from the "Statement of Compensation of Attorney for Debtor" or from the repayment plan, front page. Where this figure is missing, we substitute the average value. We assume that

debtors pay the entire cost of bankruptcy when they file, although in fact some debtors repay part of their lawyers' fee under their repayment plans.

11. *R*: ***alternate housing cost***. We assume that rent per month is \$640, moving costs (paid only at the beginning) are \$2,000, and the time period considered by debtors is 27 years. The \$640 figure is the median rent in Delaware in 2000, according to the *U.S. Census of Population*. Rent is assumed to increase at a rate of 2% per year and is discounted to present value at a rate of 3% per year. Using these values, the present value of alternate housing cost over the next 27 years is therefore \$168,000.
12. *C<sub>f</sub>*: ***cost of foreclosure***. Based on Pence (2003), we assume that the cost of foreclosure equals 30% of house value.
13. *M*: ***original mortgage principle***. Taken from Schedule D.

**Table 1: Summary Statistics for Chapter 13 Debtors**

	<b>Mean</b>	<b>Std. deviation</b>
If homeowner	96%	
If debtor passes the means test	78%	
Income	\$40,000	\$23,300
House value (if positive)	\$197,000	\$122,000
If repayment plan	90%	
If mortgage listed at filing	83%	
Mortgage principle (if positive)	\$153,000	\$108,000
If mortgage debt in plan (plan filers only)	71%	
If home equity positive (for homeowners)	68%	
Home equity (for all homeowners)	\$39,900	\$70,000
If auto loan listed at filing	57%	
Auto loan (if positive)	\$18,400	\$17,300
If auto debt in plan (plan filers only)	41%	
If priority debt	52%	
Priority debt (if positive)	\$8,500	\$18,600
If priority debt in plan (plan filers only)	8%	
If student loans listed at filing	16%	
Student loans (if positive)	\$15,000	\$23,800
If student loans in plan (plan filers only)	0.5%	
If unsecured debt listed at filing	89%	
Unsecured debt (if positive)	\$29,700	\$37,500
If unsecured debt in plan (plan filers only)	38%	
If only unsecured debt in plan (plan filers only)	9%	
Lawyer's fee + filing fee	\$2,800	\$490
Trustee's fee (plan filers only)	\$2,900	\$2,500

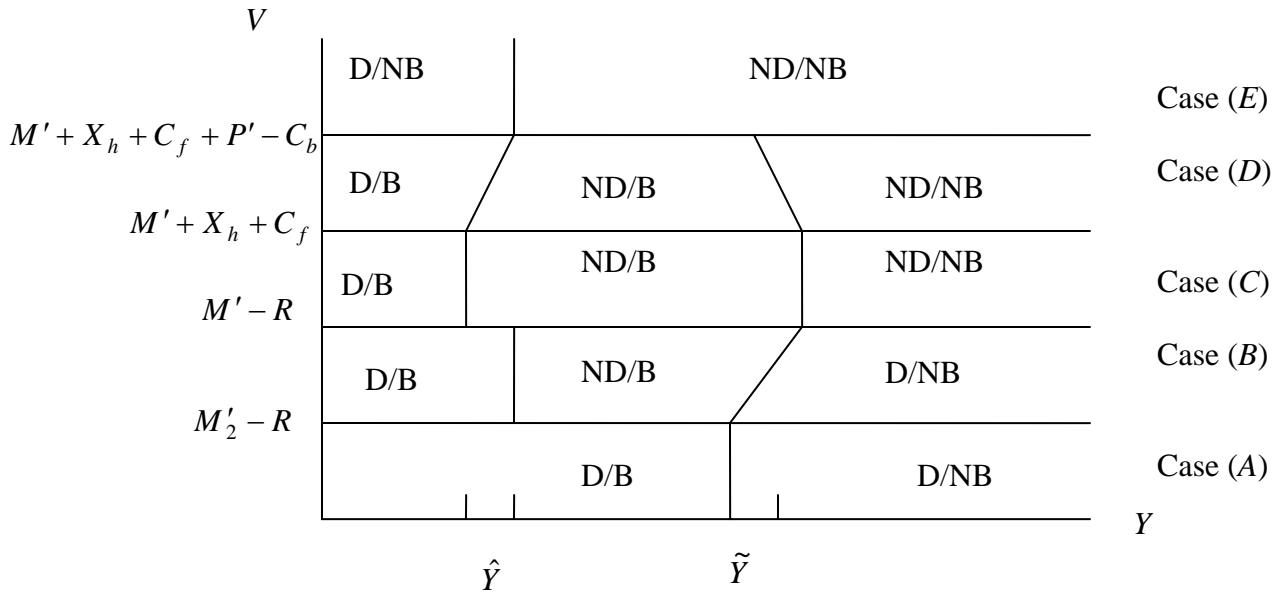
**Table 2: Additional Values Used in the Simulations**

	Mean	S.D.
$X_y$ (Income exemption)	\$56,800	\$14,300
$M'$ (PV of future mortgage payments)	\$211,000	\$123,000
$M'_1$ (PV of future mortgage payments during the plan)	\$30,000	\$23,800
$M'_2$ (PV of future mortgage payments after the plan)	\$180,000	\$115,000
$P'$ (Unsecured debt, includes student loans)	\$33,400	\$43,700
$A'$ (Car loan)	\$10,500	\$15,900
$C_b$ (Bankruptcy cost)	\$3,100	\$490
$X_h$ (Homestead exemption)	\$50,000	0
$RENT$ (PV of future rental housing cost, including moving cost)	\$145,000	0

**Table 3: Simulation Results**

	Base Case (1)	With 20% Lower Housing Value (2)	With Strip-down and 20% Lower Housing Value (3)
All Chapter 13 filers:			
if bankruptcy predicted	.97	.97	.97
if default predicted	.71	.75	.70
if house value < mortgage	.15	.46	.46
Category 1: Filers who don't default due to the mortgage subsidy and/or strip-down (middle sub-region of case (B)):			
proportion of all Chapter 13 filers	.005	.014	.034
average mortgage subsidy	\$43,300	\$74,000	\$34,600
average value of strip-down	--	--	\$102,400
average combined benefit	\$43,300	\$74,000	\$137,000
Category 2: Filers who default because they are liquidity-constrained (left sub-regions of cases (C) - (E)):			
proportion of all Chapter 13 filers	.383	.277	.254
values for filers who are no longer liquidity-constrained and save their homes under strip-down			
average mortgage subsidy			\$6,700
average value of strip-down			\$32,400
Category 3: Filers who would not default but receive the mortgage subsidy and/or strip-down (middle sub-regions of cases (C) and (D)):			
proportion of all Chapter 13 filers	.057	.041	.131
average mortgage subsidy	\$38,700	\$38,100	\$12,000
average value of strip-down	--	--	\$33,400
average combined benefit	\$38,700	\$38,100	\$45,400
percent of mortgage subsidy and/or strip-down dollars that is wasted:	92%	61%	56%

**Figure 1: Homeowners' Predicted Bankruptcy and Default Decisions**



Notes: D indicates default on the mortgage, ND indicates no default, B indicates that debtors file for bankruptcy, and NB indicates no bankruptcy.  $Y$  denotes debtors' income and  $V$  denotes home value. Other notation is described in the text.