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# Who Invests in Home Equity to Exempt Wealth from Bankruptcy?

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## Non-Technical Summary

Individuals who file for personal bankruptcy according to Chapter 7 of the US bankruptcy code can generally retain some assets. Specifically, at the state level there tend to be exemptions for certain asset classes up to specific thresholds. The main exemption is the homestead exemption, which enables the filer to retain home equity in his primary residence ("homestead") up to the exemption amount. The homestead exemption ranges from $0 in Maryland to an unlimited amount in eight US states, including Florida and Texas, in 2006. Personal bankruptcy is quite common in the US, with about one million Chapter 7 filings in 2009, and homestead exemptions therefore frequently apply. With a home ownership rate of about 67% in the US in 2009, the homestead exemption significantly affects the financial position of households that emerge from personal bankruptcy, especially in high exemption states.

This paper provides an empirical and a theoretical investigation of the impact of the homestead exemption on household portfolio allocation, and in particular on the share of home equity in net worth and on home ownership. We present a two-period model of the allocation of wealth between home equity and another asset category in the presence of a homestead exemption and major expense risk. This expense risk takes the form of an uninsurable medical expense, although it can easily be reinterpreted as any type of uninsurable income or other economic risk. The model implies that marginal household investment in home equity as related to wealth jumps down as home equity reaches the exemption level.

The estimation uses household level data from the Survey of Income and Program Participation (SIPP) of the US Census Bureau. This data source provides information on wealth allocation and a host of personal and household characteristics for approximately 30,000 households. The homestead exemption is found to have an economically significant effect on a household's investment in home equity. Specifically, the percentage change in home equity as a share of the percentage change in wealth is estimated to be 24.3% higher if the household's home equity is below the exemption rather than above it.

The impact of the exemption level on home equity investment is estimated to be stronger for households with younger household heads, as these could face heightened income risk and a correspondingly higher probability of personal bankruptcy. A positive impact of the homestead exemption on home equity investment is confirmed by instrumental variables estimation where we use the historical exemption level in 1920 as an instrument for the more recent state-level exemption level. This choice of instrument is motivated by the fact that historical exemption levels are an important determinant of more recent exemption levels. We also

estimate a Heckman two-stage selection model, where in the first stage households decide on home ownership. This approach yields a consistent impact of the homestead exemption on home equity investment.

We, however, find only a weak relationship between the homestead exemption and home ownership. In probit regressions, in particular, we fail to find a significant impact of the homestead exemption on home ownership, except for households residing in states with unlimited homestead exemptions.

Our results imply that homestead exemptions distort household asset portfolios without bringing about clear benefits in terms of increased home ownership, questioning the desirability of homestead exemptions.

# Who Invests in Home Equity to Exempt Wealth from Bankruptcy?

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**Abstract**: Homestead exemptions to personal bankruptcy allow households to retain their home equity up to a limit determined at the state level. Households that may experience bankruptcy thus have an incentive to bias their portfolios towards home equity. Using US household data for the period 1996 to 2006, we find that household demand for real estate is relatively high if the marginal investment in home equity is covered by the exemption. The home equity bias is more pronounced for younger households that face more financial uncertainty and therefore have a higher ex ante probability of bankruptcy

**Key words**: Homestead exemptions; Personal bankruptcy; Portfolio allocation; Home ownership

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## 1. Introduction

Individuals who file for personal bankruptcy according to Chapter 7 of the US bankruptcy code can generally retain some assets. Specifically, at the state level there tend to be exemptions for certain asset classes up to specific thresholds. The main exemption is the homestead exemption, which enables the filer to retain home equity in his primary residence ("homestead") up to the exemption amount.[1]

The homestead exemption ranges from $0 in Maryland to an unlimited amount in eight US states, including Florida and Texas, in 2006. Personal bankruptcy is quite common in the US, with about one million Chapter 7 filings in 2009, and homestead exemptions therefore frequently apply. With a home ownership rate of about 67% in the US in 2009[2], the homestead exemption significantly affects the financial position of households that emerge from personal bankruptcy, especially in high exemption states.

The homestead exemption potentially affects household portfolio choice, because a household needs to have home equity to benefit from the wealth protection offered by the homestead bankruptcy exemption. This paper provides an empirical and a theoretical investigation of the impact of the homestead exemption on household portfolio allocation, and in particular on the share of home equity in net worth and on home ownership.

The estimation uses household level data from the Survey of Income and Program Participation (SIPP) of the US Census Bureau. This data source provides information on wealth

[1] Homestead exemption laws generally also include an element of exemption from property taxes but our primary focus is on the bankruptcy protection that they offer.

[2] Computed as owner occupied housing units as a percent of the total number of occupied housing units using data from the Housing Vacancy Survey of the US Census Bureau.

allocation and a host of personal and household characteristics for approximately 30,000 households. The homestead exemption is found to have an economically significant effect on a household's investment in home equity. Specifically, the percentage change in home equity as a share of the percentage change in wealth is estimated to be 24.3% higher if the household's home equity is below the exemption rather than above it.

The impact of the exemption level on home equity investment is estimated to be stronger for households with younger household heads, as these could face heightened income risk and a correspondingly higher probability of personal bankruptcy. A positive impact of the homestead exemption on home equity investment is confirmed by instrumental variables estimation where we use the historical exemption level in 1920 as an instrument for the more recent state-level exemption level. This choice of instrument is motivated by the fact that historical exemption levels are an important determinant of more recent exemption levels. We also estimate a Heckman two-stage selection model, where in the first stage households decide on home ownership. This approach yields a consistent impact of the homestead exemption on home equity investment.

We find only a weak relation between the homestead exemption and home ownership. In probit regressions, in particular, we fail to find a significant impact of the homestead exemption on home ownership, except for households residing in states with unlimited homestead exemptions. This could reflect that households wishing to purchase a home on account of a high risk of personal bankruptcy are thwarted by a lack of mortgage financing necessary to complete the purchase. Households that own a home instead are likely to have more leeway to adjust their home equity share to obtain the desired bankruptcy protection, as they can always pay down their existing mortgage.

The empirical work is motivated by a two-period model of the allocation of wealth between home equity and another asset category in the presence of a homestead exemption and major expense risk. This expense risk takes the form of an uninsurable medical expense, although it can easily be reinterpreted as any type of uninsurable income or other economic risk. The model implies that marginal household investment in home equity as related to wealth jumps down as home equity reaches the exemption level. This is corroborated in the empirical work.

Personal bankruptcy, and the role of exemptions therein, have been the subject of several theoretical and empirical studies. In a world of incomplete contracting, Zame (1993) shows that contingent debt repayment, made possible by bankruptcy, can be welfare improving. The consumer will declare bankruptcy in states of nature with low income or high expenses, providing some consumption insurance across states of nature. Such insurance comes at a cost of a more limited ability to borrow, and hence a reduced ability to smooth consumption over time. Livshits et al. (2007) calibrate a heterogeneous life-cycle model with US data to investigate whether the ability to declare personal bankruptcy, followed by a period of exclusion from new borrowing, improves welfare compared to a system where a “fresh start” is not possible. Their calculations suggest that a bankruptcy system that offers a fresh start is welfare improving for the case where expense shocks are explicitly modeled. Athreya (2002) instead finds that the possibility of consumer bankruptcy reduces welfare in a quantitative analysis of the effects of bankruptcy laws in an incomplete market exchange economy.

Homestead exemptions allow households to emerge from bankruptcy with positive net worth. The effect of these exemptions should be to further insure households against untoward income and expense shocks, and to also further limit their ability to borrow and to smooth

consumption intertemporally. Li and Sarte (2006) analyze the implications of exemptions for welfare in a general equilibrium model with endogenous capital formation and labor supply. In a model calibrated with US data, they find that lowering the level of exemptions increases output and is welfare improving.[3]

Gropp, Scholz and White (1997) empirically investigate how exemptions affect aggregate credit to households. They argue that the protection offered by exemptions increases household demand for credit, while it reduces the supply of credit. They find that the net impact on credit is negative for less-well-off households, but it is positive for high-asset households.[4] Bankruptcy protection potentially makes owning a business with unlimited liability less risky. Fan and White (2002) find that the probability that a household owns a small business is higher in states with unlimited exemption than in other states. Fay et al. (2002) examine how bankruptcy exemptions affect the household bankruptcy decision, and they find that the financial gain that households can attain by filing for bankruptcy, as affected by the exemptions, is a main determinant of the bankruptcy decision.

There is also related literature on the determinants of home ownership. Li (1977) relates home ownership to household characteristics such as the age of the household head, income

[3] Lower exemptions are found to reduce the incentive to save for borrowers, leading to higher lending rates, which reduces the amount of debt and stimulates capital formation. With higher lending rates, fewer households will opt for a Chapter 13 bankruptcy, thereby increasing the labor supply, output and welfare.

[4] Berkowitz and Hynes (1999) find that homestead exemptions tend to reduce the probability of being denied secured mortgage credit. Berkowitz and White (2004), instead, find that unincorporated businesses are more likely to be denied unsecured credit or to receive less credit at higher interest rates, if they are located in states with unlimited rather than low homestead exemptions. Berger et al. (2008) construct a measure of bankruptcy protection that reflects the extent to which a business owner's home equity is covered by the homestead protection, and find that larger home equity protection leads to less and costlier credit to small businesses with unlimited liability.

and family size. Using micro-level data from 14 OECD countries, Chiuri and Jappelli (2003) find that the availability of mortgage finance – as measured by down payment ratios – affects owner occupancy rates especially for young households. King and Leape (1998) jointly consider the home ownership decision and the resulting household portfolio share in a general study of household portfolio allocation of US households and find that both home ownership and investment in owner-occupied housing respond positively to increases in wealth.

Recent work on housing and portfolio composition has recognized that housing is special because it is an asset as well as a durable consumption good, and because adjustments to housing wealth imply large transactions costs. Flavin and Yamashita (2002) consider the optimal household portfolio under the assumption that the household is constrained to live in the house that is owns and show that this implies that housing introduces considerable portfolio risk, especially for younger households with low net worth. Cocco (2005) provides empirical evidence that house price risk crowds out stockholdings, and that this crowding out is stronger for households with low net worth. Using data from the SIPP survey, Chetty and Szeidl (2009) find that increases in household home equity, as explained by higher state-level house price indices, lead to a larger share of stocks in liquid wealth. Also using SIPP data, Corradin et al. (2010) estimate a model of optimal housing wealth adjustment where house price movements are predictable and there are housing adjustment costs. These authors find empirical support for the existence of a region of inaction for values of the housing share in net worth, for which the household optimally does not adjust his housing wealth up or down.

Homestead bankruptcy exemptions also set investments in home equity apart from other investments. To our knowledge, our paper is the first to investigate the empirical impact of homestead exemptions on the home equity share in net worth and on home ownership.

Homestead exemptions are found to provide bankruptcy protection especially to households that can be expected to need this, such as households that report poor health and low wealth. This protection, however, comes at a cost of biasing household portfolios towards real estate. This distortion comes in the form of higher home equity shares in net worth for home owners. Our findings inform the policy debate about the desirability of homestead exemptions, and contribute to the literature on the effect of personal bankruptcy on household portfolio choice.

The remainder of this paper is organized as follows. Section 2 discusses the role and evolution of exemptions in the US system of personal bankruptcy. Section 3 presents a simple two-period model of optimal investment in home equity in a world with bankruptcy exemption and major expense risk. Section 4 discusses the data, and section 5 presents the empirical results. Section 6 concludes.

## 2. The role of exemption in US personal bankruptcy

The US bankruptcy code defines two main possibilities for personal bankruptcy. Under Chapter 13, which is not considered in this paper, the filer agrees to a payment plan with his creditors, typically over the course of three to five years, and keeps all of his assets in bankruptcy. Under Chapter 7, a debtor instead surrenders his non-exempt property to a bankruptcy trustee who then liquidates the property, and distributes the proceeds to the debtor's creditors. In exchange, the debtor is entitled to a discharge of debt.

Bankruptcy exemptions define the assets that the debtor is permitted to retain in Chapter 7 bankruptcy. Typically, every state has exemption laws that define the value of the property that can be protected from creditor collection actions within the state, while there also are federal exemptions applying in federal cases. Importantly, homestead exemptions define the

amount of housing wealth that debtors may protect from liquidation under Chapter 7 bankruptcy.[5]

In the past thirty years, the United States has had two major reforms of its personal bankruptcy laws that have substantially affected the way in which exemptions may be used in personal bankruptcy.[6] The Bankruptcy Reform Act of 1978 was a comprehensive reform that established a uniform national set of exemptions while allowing states to opt out and set their own exemption levels if desired. Every state had set its own exemptions by 1983, although up to this day many states continue to allow debtors the option of using the federal exemptions.

More recently, the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) of 2005 placed three important limitations on the debtor's ability to engage in pre-bankruptcy planning to enhance the use of bankruptcy exemptions.

First, the act empowered judges to reverse any asset transfers between exemption and non-exemption categories made shortly before the bankruptcy filing. The objective was to prevent debtors from exchanging unprotected assets for assets protected under exemptions or transferring ownership of unprotected assets to friendly third parties at artificially low prices, only to reverse the transaction once the bankruptcy case was closed.

[5] There are also exemptions protecting other personal property from creditors. As we focus on home equity investment in this paper, we disregard these exemptions that tend to be small relative to the homestead exemption.

[6] There was one additional reform of bankruptcy legislation in the US in 1994 that did not concern bankruptcy exemptions.

Second, the reform of 2005 introduced a provision that aims to prevent households from "forum shopping", i.e. moving to states with particularly generous exemptions shortly before declaring bankruptcy.[7]

Third, the reform placed a cap on the homestead exemption in situations where the debtor has added value to the homestead during the 1,215 days (about 3 years and 4 months) preceding the bankruptcy case. The pertinent provision provides that "any value in excess of $125,000" added to a homestead can not be exempted from bankruptcy. Exceptions apply if the additional value was transferred from another homestead within the same state, or if the homestead is the principal residence of a family farmer.[8]

The number of Chapter 7 filings peaked at about 1.4 million in 2005 before falling to about 400,000 in 2006, as households apparently tried to take advantage of the more favorable rules before BAPCPA was enacted. By 2009, the number of Chapter 7 filings had increased back to a level of about 1 million, which indicates that bankruptcy exemptions remain very relevant even after the reform of 2005.

Table 1 presents data on homestead exemptions for the 50 US states and DC, with the federal homestead exemption at the bottom of the table. We present data for 1996, and for each of the years 2000-2006, corresponding to our sample period of 1996-2006 in the estimation below. We coded the state exemption level to the federal exemption, if the state permits the use

[7] Under BAPCPA if a debtor has moved to another state less than 730 days before a bankruptcy case, then the exemption of the debtor's state of residence for the majority of the 180 day time period preceding the 730 days before the filing applies. If the new residency requirement renders the debtor ineligible for any state exemption, then the debtor can choose the federal exemption. See BAPCPA (2005), § 522(b)(3).

[8] Thus, the cap applies in situations where a debtor has purchased a new homestead in a different state, or where the debtor has increased the value to his homestead through a renovation or addition. See BAPCPA (2005), § 522(p).

of the federal exemption and the state exemption is lower than the federal exemption.[9] The table shows considerable cross-sectional variation in homestead exemptions, with Maryland applying an exemption of zero, and 8 states, including Florida and Texas, applying an unlimited exemption in 2006.[10] If the exemption is unlimited, the household can retain its primary residence fully in bankruptcy regardless of its value. In the empirical work below, we code unlimited exemptions to a value of one million dollars in 2000, adjusting this amount for other years to reflect price level variation.

Comparing homestead exemptions in 1996 and 2006, we see that most states increased exemption levels to some extent to offset inflation and maintain the real value of the exemptions. Several states, however, made more significant changes in their homestead exemptions. Rhode Island, for example, increased its exemption amount from $30,000 in 1996 to $300,000 in 2006, DC moved from the federal homestead exemption to an unlimited exemption in 2006, and Delaware changed from a zero homestead exemption to an exemption of $50,000 in 2006 given that Delaware does not permit the use of the federal exemption. Thus, there is some time variation in homestead exemption levels, in addition to considerable cross-state variation.

## 3. A model of home equity investment with bankruptcy exemption

[9] This applies to, for instance, Hawaii, Michigan, and New Jersey.

[10] Some states impose acreage limitations on homestead exemptions. For example, Texas's homestead exemption has no dollar value limit and has a 10 acres exemption limit for homesteads inside of a municipality (urban homestead) and 100 acres for those outside a municipality (rural homestead). The rural acre allotment is doubled for a family. Exemptions in Kansas and Oklahoma protect 160 acres of land of any value outside a municipality's corporate limits and 1 acre of land of any value within a municipality's corporate limits. The emphasis in our empirical work is on the dollar value limits of the homestead exemptions.

To motivate subsequent empirical work, this section sets out a simple two-period model of wealth allocation in the presence of major expense risk. In the first period, the representative individual allocates his wealth $W$ between two categories. First, the individual can invest in a wealth category $H$, that is covered by a bankruptcy exemption $X > 0$ in case of a second-period bankruptcy. We will refer to $H$ as housing, even though in practice other assets can be covered by an exemption as well, including clothing, furniture and pension rights. The bankruptcy exemption $X$ includes any homestead exemption covering the home equity in a primary residence. The second wealth category, denoted $B$, represents all asset classes that are not potentially covered by an exemption. We will refer to $B$ as bonds.

The wealth categories, $B$ and $H$, differ in two respects. First, we think of the protected wealth category, $H$, as owner occupied housing and, hence, $H$ is taken to be a consumption good as well as an asset, while $B$ is only an asset. Second, we assume that asset $B$ dominates asset $H$ in its investment return. Assets included in $B$, specifically, provide a return of $r > 0$, while the investment return on $H$ is set to zero for simplicity.

With probability $\pi$, the agent faces a major expense in the second period, denoted $M$, which can be thought of as an uninsurable medical expense.[11] We assume that $M > W(1 + r)$ so that the medical expense will exhaust the individual's second-period wealth and trigger a personal bankruptcy, even if he previously invested only in higher yielding bonds.[12] Second-

[11] Jacoby et al. (2000) and Mathur (2006) find that illness or injury and resulting medical bills are implicated in more than half of personal bankruptcies.

[12] We can assume that a government program will cover the part of the medical bill that the individual cannot pay. Such a government program can be thought to be financed by a first-period tax $\tau$ on an endowment $Y$, with $W = (1 - \tau)Y$ being the after-tax endowment or wealth. The government budget is then given by

(continued)

period wealth after any payment towards the medical bill is used for second-period, non-housing consumption, *C*. With probability $1 - \pi$, the agent does not face a medical bill and his consumption *C* equals $B(1 + r) + H$. With probability $\pi$, the individual, instead, consumes $\min[H, X]$, as *X* is the maximum wealth protection offered by the exemption. We will assume $(1-\pi)(1+r)>1$ to not exclude the possibility that the individual jointly holds bonds and housing less than the exemption.

Utility derived from housing and non-housing consumption, *U(H, C)*, is taken to be separable so that it can be written as *V(H) + Z(C)*, with the Inada conditions applying.[13] In the first period, the agent chooses *B* and *H* so as to maximize expected utility, *EU*, written as[14]

$$EU = V(H) + (1-\pi)Z(B(1+r) + H) + \pi Z(\min(H, X)) \qquad (1)$$

subject to the wealth constraint $W = B + H$, and to $B \geq 0$ to prevent 'strategic' first-period borrowing to invest in the protected housing asset.[15]

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$$(1+r)\tau Y = \pi[M - (B(1+r) + \max(H - X, 0))]$$

with *r* also representing the return on government surplus. The representative individual considers the tax rate $\tau$ as given.

[13] These are $V(0) = 0, V'(H) > 0, V''(H) < 0$, $\lim_{H\to 0} V'(H) = \infty$, and $\lim_{H\to\infty} V'(H) = 0$, with analogous conditions applying to *Z(C)*.

[14] In this specification, housing consumption can be taken to occur in either period or in both periods, with any discounting of utility from second-period consumption implicit in the subutility functions *V* and *Z*.

[15] The agent should not be able to obtain unsecured credit if $H = W < X$, as then there would never be any repayment if loan proceeds were invested in the home. With $H = W > X$, unsecured creditors can claim housing wealth in excess of the exemption (depending on their seniority relative to other claimants if the agent faces medical bills), which makes this kind or credit possible. Similarly, mortgage finance can be incorporated in the model. Extensions of this kind, however, do not change the incentive for the household to lower its marginal investment in housing out of wealth when housing investment reaches the exemption level.

The marginal contributions of investments in bonds and housing to expected utility *EU* can be written as follows

$$\frac{dEU}{dB} = (1-\pi)(1+r)Z'(B(1+r)+H) \tag{2}$$

$$\frac{dEU}{dH} = V'(H) + (1-\pi)Z'(B(1+r)+H) + i(H,X)\pi Z'(H) \tag{3}$$

where *i(H, X )* is an index function that equals 1 if $H < X$ and 0 if $H > X$. A marginal investment in bonds is seen to add to second-period, non-housing consumption only in the absence of the medical expense. A marginal investment in housing also adds to second-period, non-housing consumption without the medical expense, and in addition if there is a medical expense and housing is fully covered by the exemption, i.e. $H < X$.

The first order conditions (2) and (3) imply two scenarios in which the agent is at the margin indifferent between allocating his wealth to bonds and to housing. First, the investment in housing may at the margin not be covered by the exemption so that we have $\frac{dEU}{dB} = \frac{dEU}{dH}$ with $H > X$ which implies

$$(1-\pi)(1+r)Z'(W(1+r)-rH) = V'(H) + (1-\pi)Z'(W(1+r)-rH) \tag{4}$$

where $W - H$ has been substituted for *B*.

The relationship between *W* and *H* implicit in (4) is pictured as the 'no protection' line, labeled *NP*, in Figure 1. This schedule is upward sloping as (4) implies

$$\frac{dH}{dW} = \frac{(1-\pi)r(1+r)Z''(W(1+r)-rH)}{V''(H) + (1-\pi)r^2 Z''(W(1+r)-rH)} > 0$$

where $H \leq W$ as $B \geq 0$. We consider the case where along the *NP* schedule $\frac{Z''(W(1+r)-rH)}{Z'(W(1+r)-rH)} > \frac{V''(H)}{V'(H)}$, which means that the marginal utility of housing consumption

declines relatively fast. In this case, we have $dH/dW < 1$ so that the *NP* schedule has a slope of less than one in Figure 1, and it starts at the origin.[16]

Second, the individual can be indifferent between investing in bonds and housing for the case where housing wealth is fully exempted from bankruptcy in the bad state. From (3) and (4), we see that $\frac{dEU}{dB} = \frac{dEU}{dH}$ with $H < X$ implies

$$(1-\pi)(1+r)Z'(W(1+r)-rH) \;=\; V'(H) + (1-\pi)Z'(W(1+r)-rH) + \pi Z'(H) \qquad (5)$$

The relationship between $W$ and $H$ implicit in (5) is now pictured as the 'protection' line, labeled *P*, in Figure 1. This schedule is upward sloping as (5) implies

$$\frac{dH}{dW} = \frac{(1-\pi)r(1+r)Z''(W(1+r)-rH)}{V''(H)+\pi Z''(H)+(1-\pi)r^2 Z''(W(1+r)-rH)} > 0$$

where $H \leq W$ as $B \geq 0$. We further assume that along the *P* schedule we have $\frac{Z''(W(1+r)-rH)}{Z'(W(1+r)-rH)} > \frac{V''(H)+\pi Z''(H)}{V'(H)+\pi Z''(H)}$ (a relatively fast decline of the marginal utility of housing consumption) to guarantee $dH/dW < 1$.[17] The *P* schedule thus has a slope of less than one, and it meets the $45^o$ line with wealth equal to $W_p$ as implicit in $V'(W_p) = [(1-\pi)(1+r)-1]Z'(W_p)$. Note that the *P* schedule is situated above the *NP* schedule, as for given values of wealth and housing, $\frac{dEU}{dB} = \frac{dEU}{dH}$ with $H > X$ in (4) implies $\frac{dEU}{dB} < \frac{dEU}{dH}$ for same $H$ and $W$ and with $H < X$ in (5). This implies $W_p > 0$.

[16] The provided condition and (4) imply $dH/dW < 1$.

[17] This condition and (5) imply $dH/dW < 1$.

Next, we consider how the optimal investment in housing $H$ varies with the individual's wealth, $W$. With the Inada conditions applying, the agent allocates his entire wealth to 'housing' to guarantee some second-period, non-housing consumption at very low levels of wealth.[18] At a certain higher level of wealth, the individual start to invest jointly in bonds and in housing.

We can now distinguish two possible overall relationships between wealth and housing, depending on the size of the exemption, $X$, relative to the wealth levels at which the individual starts to invest in bonds with the housing investment protected, denoted $W_{p.}$

Case A: $X > W_p$ (weak preference for housing consumption)

This is a case of a weak relative preference for housing consumption, as the individual starts to invest jointly in bonds and housing at a level of wealth $W_p$ below the exemption X.

The overall relationship between wealth and housing is now pictured in Figure 2, Panel A. For wealth levels up to $W_p$, the individual just holds housing. At that point, the investor starts to invest jointly in both bonds and housing, along the $P$ schedule. Housing continues to rise with wealth until housing equals the exemption level, i.e. $H = X$. At that point, the marginal contribution of higher housing to expected utility (i.e., $\frac{dEU}{dH}$ for $H$ rising) drops, as any further investment in housing no longer adds to second-period, non-housing consumption in the bad state. Therefore, the individual starts to invest at the margin only in bonds until the $NP$ schedule

[18] Note that the wealth insurance offered by the exemption is valuable to the individual as without it he obtains a subutility $Z$ of zero with probability $\pi$. However, this insurance comes at a cost of biasing consumption towards housing if a housing allocation is chosen above the $NP$ schedule. The optimal level of the exemption $X$ in this model is not considered.

is reached at a wealth level $\hat{W}$.[19] At that wealth level, the individual starts to invest jointly in bonds and housing again, along the *NP* schedule. For wealth levels below $\hat{W}$ in the figure, the individual is seen to hold additional wealth in the form of housing on account of a housing exemption that covers the marginal investment in housing.

Case B: $W_p \geq X$ (strong preference for housing consumption)

This is a case of a strong preference for housing consumption, as the individual starts to invest jointly in bonds and housing at a wealth level equal to the exemption.

The relationship between wealth and housing is now presented in Figure 2, Panel B. For wealth levels up to *X* the investor just holds housing. At that point, any further investment in housing ceases to add to second-period, non-housing consumption in the bad state. Therefore, the investor only invests in bonds at the margin as wealth increases until the *NP* schedule is reached at a wealth level $\hat{W}$. For higher wealth levels, the investor invests jointly in bonds and housing, along the *NP* schedule. For wealth below $\hat{W}$, the individual is now seen to maintain a higher housing investment on account of the exemption.

In both panels of Figure 2, the marginal investment in housing, *dH/dW*, is higher at the lowest levels of wealth than it is at very high levels of wealth. Furthermore, the marginal investment in housing out of wealth drops in both panels when housing investment reaches the

[19] Using (4) we can find $\hat{W}$ implicitly from $(1-\pi)rZ'(\hat{W}(1+r)-X) = V'(X)$.

exemption level. In the empirical work below, we test whether marginal investment in housing is relatively high if investment in housing is below the exemption level.

## 4. The data

We use household data from the Survey of Income and Program Participation of the US Census Bureau that at each moment tracks about 30,000 households. Our sample period is from 1996 to 2006. During this period, information was collected from three consecutive groups of households or panels that were interviewed during the years 1996-2000, 2001-2003, and 2004-2006, respectively. During its active period, each panel is interviewed many times with intervals of several months, while panels of households do not overlap across periods. During a calendar year, the households in a panel are typically asked to answer different questions at different times, with for our purposes no repetition of the same relevant question within a calendar year. This enables us to organize the data by calendar year, yielding at least 2 usable years of data per panel and with some households moving between states and thus subject to different state homestead exemptions in our sample.

The SIPP collects information on home ownership, home value and mortgage debt, as well as on a wide range of other real and financial assets and liabilities. The SIPP thus is well suited to study household portfolio allocation, and in particular the share of a household's net worth that is held in the form of home equity in the household's primary residence. As we know whether a household owns its home, the underlying home ownership decision can be

examined as well. The SIPP, in addition, contains other information on household composition and characteristics that can be considered to affect the home equity investment decision.[20]

A first variable used in this study is Own, which is a dummy variable that takes on a value of 1 if the household owns its residence, and it is zero otherwise (see the Appendix for variable definitions and data sources). The mean ownership rate in our sample is 72% as seen in Table 2, which provides summary statistics on main variables. The mean Home equity, computed as house value minus mortgage debt, is seen to be $79,389. The average home value equals $119,036, the average household monthly income is $4,447, and total debt per household amounts to $56,233.

A key household characteristic is the variable Age, which is the age of the household head. A household's home equity can be expected to increase with age, as mortgage debt tends to be paid down over time. In the regressions below we control for the lifecycle profile of investment in real estate by using an age spline. Health also potentially affects a household's investment in exempted home equity. The Good health variable is a dummy variable that equals one if the health of the household head is reported to be good, very good or excellent, corresponding to a score of at least 3 on a scale from 1 to 5. By this measure, 55% of household heads have a good health. Members denotes the number of individual household members, with a mean value of 2.55. A larger family is expected to own a larger and more expensive residence. Married is a dummy variable that takes on a value of one if the household head is

[20] We cleaned the data based on a number of consistency checks. We dropped home-owing households with zero income or with large negative values of home equity (less than -$300,000), and we eliminated observations with very large positive or negative changes in wealth (in excess of 400%, corresponding to 1.5% of the sample).

married, and zero otherwise. Marriage may signal household stability promoting home ownership. The average homestead exemption, when finite, is seen to be $50,378, while 17% of the households in the sample reside in a state with unlimited homestead exemptions. Below is a dummy variable that equals one if the household's home equity is less than the exemption level, which is the case for 54% of households.

As documented by Goodman (1993), homestead exemptions were used to attract indebted settlers to mainly uninhabited areas, as these exemptions allowed people to acquire a new home out of reach of previous creditors. Those regions, where it was more difficult to settle, required higher homestead exemptions to be attractive to potential settlers. Hynes, Malani and Posner (2004) document that state-level exemption levels have been quite persistent, which suggests that current exemption levels still reflect the determinants of historical exemption levels. We take advantage of this by using the 1920 homestead exemption as an instrument for current exemptions levels below. Average 1920 homestead exemption levels were $1,699 in 1920 US dollars. Finally, the state-level rate of house price appreciation was 3.5% a year on average.

## 5. Empirical implementation

The main prediction of the model in section 3 is that marginal household investment in home equity is higher, if the household's home equity is below the exemption level rather than above it. In regression 1 of Table 3, we start by simply relating changes in (the log of) home equity to changes in (the log of) wealth for all households. The estimated coefficient is 0.569, and it is significant at the 1% level. Only home owners can make marginal changes in home equity in response to marginal changes in wealth. Restricting the sample to home-owning

households in regression (2), we find that the estimated coefficient increases to 0.997, which suggests that such households invest almost all additional wealth in their home. In regression 3, we permit the coefficient on changes in log wealth to differ depending on whether the household's home equity is above or below the homestead exemption in his state of residency. We find a steeper slope for households below the exemption, as indicated by an estimated coefficient of 0.102 for the Delta wealth*Below variable that is significant at the 1% level.

An increase in house prices may affect both the change in home equity and the change in overall wealth. This could result in spurious correlation between these two variables. Hence, it is important to emphasize that we identify the effect of exemptions on home equity by focusing on the difference between the coefficients on the change in wealth above and below the exemption. As long as the effects of house prices on both home equity and total wealth do not differ systematically for levels of home equity below and above the exemption, this identification strategy should be valid. This is quite likely, given that exemption levels differ widely across states. In addition, in order to further alleviate concerns about endogeneity, we instrument for the change in wealth below, and obtain consistent results.

In regression 4, we add squared and cubed terms of changes in wealth yielding a somewhat larger coefficient of 0.255 for Delta wealth*Below that is significant at 1%. In regression 5, we add further controls related to a household's home value, financial situation, health and age, and the state's house price appreciation. The Delta wealth*Below term obtains a coefficient of 0.247 that is significant at 1%. For regression 5 we cannot reject that the sum of the estimated coefficients on the two Delta wealth terms for households with home equity below the exemption are equal to one, consistent with the theoretical model. Households thus invest a share of marginal wealth close to unity in their homes if their home equity is below the

exemption, and marginal investment in home equity jumps down significantly around the exemption level.

We further find that a smaller share of marginal wealth is invested in the homestead, if the household head classifies himself as in good health. The estimated coefficient for the Good health variable is significant at the 1% level. Households with healthier household heads could invest less in home equity partly because they are less in need of any exemption from bankruptcy, consistent with our theoretical model. Household investment in real estate potentially depends on the level of prior investment in real estate. We find that marginal investment in housing is positively related to household's home value. Changes in home equity are further seen to be negatively related to household income and total household debt. We also find that marginal investment in home equity varies with age. As household heads age, they tend to invest less in home equity. Finally, note that the house price appreciation is only weakly associated with changes in home equity after we control for overall changes in wealth and use state fixed effects.

In Table 4 we perform a simple illustrative simulation using the coefficients from regression 5 of Table 3 to ascertain the economic magnitude of the effect of exemptions on the allocation of wealth by a typical household. The economic effect is driven by the differences in coefficients that relate changes in log home equity to changes in log wealth for households with housing investment below and above the exemption. Approximately, the coefficients can be interpreted as relating percentage changes in home equity to percentage changes in wealth. In the simulation, we start out with the sample median wealth level of homeowners (net of total debt) at age 25 of $30,000 (of which $22,000 is invested in home equity and $8,000 in other instruments), and use the sample average growth rate of wealth net of debt of 5.1% per year.

We compare a household that resides in a state with an exemption level equal to or below $20,000 (including Alabama, Delaware, Georgia, Illinois, Indiana, New York, Ohio, Tennessee and Virginia) to a household that resides in a state with an exemption level equal to or above $200,000 (including Arkansas, Florida, Iowa, Kansas, Minnesota, Oklahoma, South Dakota, Texas, and Vermont).

As indicated in the table, our estimation implies that the percentage change in home equity equals 70.6% of the percentage change in wealth for a household with home equity exceeding the exemption, while it is 94.9% for a household with home equity less than the exemption. [21] Thus, the percentage change in home equity is 24.3% lower as a share of the percentage change in real wealth if marginal investments in home equity are not covered by the exemption.

The table provides summary information on the allocation of wealth over the life time of the household. Specifically, at age 60, a household in a low exemption state would have $75,095 invested in real estate and $93,727 in non-real estate. In contrast, for a household in a high exemption state the amounts would be $113,519 in real estate and $55,303 in non-real estate, i.e. a difference in the amount invested in real estate of about $38,000. Households in high exemption states thus are simulated to allocate a significantly large sharer of their wealth towards housing than households in low exemption states. [22]

[21] See also Note 3 at the bottom of Table 4 for further details on the calculations.

[22] In the data set, the median home equity of households at age 60 is $88,389. This is in between the amounts of $75,095 and $113,519 simulated for households that have always lived in very low and very high exemption states between ages 25 and 60, respectively. A comparable household with home equity that passes the exemption threshold between ages 25 and 60 would be simulated to have home equity at age 60 between these two simulated values potentially in the vicinity of $88,389. Hence, our simulation model, which assumes a constant relationship over the life cycle between the percentage change in home equity and the percentage

(continued)

Next, we consider the effect of including a polynomial of order ten for changes in wealth on our estimation of the role of the Delta wealth*Below variable. While we feel that a $10^{th}$ order polynomial represents an over-parameterization of the relationship between marginal changes in wealth and marginal changes in home equity, we want to check whether with very high order polynomials, i.e. allowing for a highly nonlinear relationship between changes in wealth and changes in investment in real estate, we continue to find an impact of housing wealth relative to the exemption on the marginal investment in housing. All control variables are as before. The results are reported as regression 1 in Table 5. We obtain an estimate of 0.337 for Delta wealth*Below that is statistically significant at the 1% level. Most higher order terms are insignificant (unreported). Hence, we can be confident that our estimation of the role of the Delta wealth*Below variable is not a reflection of some unaccounted for nonlinearity in the relationship between the change in wealth and the change in home equity.[23]

The homestead exemption potentially affects the home equity investment of home owners as well as the earlier home ownership decision. To control for the potential impact of the homestead exemption on the selection of home owners, we estimate a Heckman two-stage selection model where the first stage concerns the selection of home owners, and the second stage the home equity investment of home owners. The selection variable is the household head's marital status, reflected in the Married variable, as marriage can imply household stability and promote home ownership, even if married couples may not purchase different

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change in overall wealth depending on the value of home equity relative to the exemption, does very well in predicting the absolute level of investment in home equity at age 60. Note that at age 60.69% of households in the sample have home equity above the exemption threshold.

[23] In unreported regressions we also checked whether the results change if we drop the post bankruptcy reform (BAPCPA) years 2005 and 2006, and found essentially unchanged coefficients.

homes or finance them differently. The results of the second stage regression are reported as regression 2 of Table 5. The Delta wealth*Below variable obtains a coefficient of 0.247 that is significant at the 1% level and identical to the corresponding coefficient in regression 5 of Table 3. This suggests that the selection issue does not bias the estimate of the coefficient for the Delta wealth*Below variable in the benchmark regression.

The state-level exemption level is possibly endogenous to home equity investment, say on account of political pressures from home owners. Rising home equity investment could possibly lead to additional political demands from home owners for bankruptcy protection, giving rise to higher homestead exemptions. Hynes, Malani and Posner (2004) have considered several explanatory variables for the state-level homestead exemption on political grounds (including the individual bankruptcy rate, the number of banks per 100,000 population, and government transfers per capita), failing to find any statistically significant relation. These authors conclude that the best explanation for the current homestead exemption is the past exemption level, which is testimony to a high persistence of state-level homestead exemption policies.

This also suggests that to understand current state-level variation in homestead exemptions we have to go back to the historical reasons for their introduction. As documented by Goodman (1993), a main reason for the introduction of homestead exemptions in 19$^{th}$ century America was to enable a state (or territory) to attract indebted settlers from other regions with the prospect of being able to establish a homestead out of reach of creditors. Texas introduced the first homestead law in 1839 to attract southern agriculturalists heavily burdened by debts following the depression of the late 1830s. Other Southern states soon retaliated with their own homestead exemption laws, starting with Georgia and Mississippi in 1841 (see

Goodman (1993), Table 1). Historical homestead exemption levels thus can be seen as an equilibrium outcome of a game where states use exemption policies to attract additional settlers. In this equilibrium, relatively unattractive states need to institute relatively high homestead exemptions to be competitive to potential settlers.[24]

In an instrumental variable regression, we use the 1920 exemption as an instrument for the homestead exemption level. We exclude all households in states with unlimited exemptions. We then use the predicted values of the instrumental variable regression to calculate Below and rerun the baseline model.[25] The results are reported as regression 3 of Table 5. The Delta wealth*Below variable obtains a coefficient of 0.345, significant at the 1% level. The *F*-test of excluded instruments is rejected at the 1% level, which suggests that the 1920 exemption level is an appropriate instrument for today's exemption.

An increase in house prices may affect both the change in home equity and the change in overall wealth. This could result in spurious correlation between these two variables, as long as the change in local real estate values, included as a control, is not sufficient to measure this effect. In order to alleviate this concern, regression 4 in Table 5 shows results of instrumental variable regressions, in which we use the annual change in the S&P 500 index as an instrument for Delta wealth. This is akin to the identification strategy employed in Chetty and Szeidl

[24] Regions that were relatively unattractive to settlers required more time to acquire sufficient populations to officially become a US state. Thus, a state's year of statehood is a useful index of a state's attractiveness, and it should be positively correlated with the state exemption level. The correlation between Log statehood and Log exemption with data for 2000 is calculated to be 0.36. In this calculation, we exclude DC, as according to the US constitution this is not a US state.

[25] This amounts to estimating what Angrist and Pischke (2009) refer to as a "fuzzy regression discontinuity model", as instead of estimating the discontinuity off a known threshold (the actual exemption level), we estimate it using an estimated threshold.

(2010) and amounts to focusing on changes in wealth due to changes in the value of financial assets. The instrument is significant at the 1% level at the first stage, and the second stage results confirm the earlier findings: the coefficient for the instrumented change in wealth below the exemption is positive and significant at the 1% level.[26]

Next, we consider whether the sensitivity of a household's home equity share to the exemption level depends on the household head's age and health. First, in regression 1 of Table 6 we include an interaction variable of Delta wealth*Below with a dummy variable set to one if the household head is younger than 40 years. Now the Delta wealth*Below variable itself obtains a coefficient of 0.010 that remains significant at 5%, while the triple interaction variable receives a coefficient of 0.468 that significant at 1%. This suggests that the jump down in the the marginal investment in home equity at the exemption level is much larger for young households. Potential reasons are that younger households face more economic uncertainty that could result in bankruptcy, that older households move less frequently and thus have fewer opportunities to adjust the value of their home to their optimal home equity investment, and that older households are more likely to have paid down their initial mortgage.[27]

In regression 2 we include an interaction variable of the Delta wealth*Below variable and an indicator variable for poor health. Poor health is expected to increase the demand for home equity in household portfolios to the extent that less healthy households are more likely to be hit by catastrophic health care bills that can trigger personal bankruptcy. The triple

[26] We interacted the instrumented Delta wealth with the Below dummy one period lagged.

[27] It may also be the case that older households have more difficulty in obtaining home equity loans as a means to fine tune their home equity investment.

interaction term, however, obtains a negative coefficient of -0.171 that is significant at 1%, suggesting that households experiencing poor health invest more in home equity at the margin when the exemption in not binding.

Next, we recognize that age and health are strongly negatively correlated, which suggests that the estimation of the triple interaction terms in both regressions 1 and 2 are subject to left-out-variable bias. To correct this, regression 3 includes the two previous triple interaction variables as well as an additional quadruple variable of Delta wealth*Below with the household age and health indicator variables. In regression 3, the Delta wealth*Below*(Age<40) variable is estimated with a coefficient of 0.473 that is significant at 1%, while the other three multiple interaction variables are estimated to be insignificant. This is evidence that younger households, regardless of their health status, bias their investment portfolios towards home equity with a view to obtain wealth insurance against bankruptcy through the homestead exemption.

Finally, we check whether households not only adjust the intensive margin of investing in their home given that they own a home, but also the extensive margin of owning a home. In particular, we estimate a set of probit regressions of home ownership that use the state level homestead exemption directly as an explanatory variable. For this purpose, we define the Exemption variable as the state-level homestead exemption in US dollars divided by 1,000,000, while it is set to zero in case the exemption is unlimited. The results are reported in Table 7. To start, regression 1 excludes observations of unlimited homestead exemptions. In this regression, the Married variable (our instrument in the Heckman sample selection specification in Table 5) obtains a coefficient of 0.684 that is significant at the 1% level, suggesting a strong positive relationship between marriage and home ownership. The exemption variable obtains a

coefficient of 0.175 that is statistically insignificant. In regression 2, we include households that face an unlimited exemption, and add a dummy variable that is equal to one if in fact the exemption is unlimited. The coefficient on the exemption level is insignificant, but we obtain a positive coefficient on the unlimited dummy that is significant at the 1% level.

To explore whether this effect is indeed due to the unlimited nature of the exemption, we construct the Exemption II variable where we code the exemption to be $1,000,000 if it is unlimited (before dividing by 1,000,000). We then re-estimate regressions 1 and 2 after replacing the Exemption variable by the Exemption II variable. In regression 3, we obtain a positive and significant coefficient on the modified exemption variable. With the unlimited dummy included in regression 4, however, the modified exemption variable is insignificant and only the unlimited variable obtains a positive and significant coefficient (at the 10% level). While we cannot fully exclude that the homestead exemption has a material impact on home ownership, this effect seems to be confined to cases in which the exemption is unlimited.

At first glance, it is somewhat surprising that there is only limited evidence that the homestead exemption affects the home ownership decision. After all, one expects the demand for wealth insurance against personal bankruptcy that is found to be a significant determinant of the marginal investment in home equity to also affect the demand for owning a home, as home ownership is a prerequisite for benefiting from the homestead bankruptcy exemption.[28]

A household, however, can unilaterally decide to alter its home equity share by repaying part or its entire mortgage (which is to say that the supply of mortgage credit to households is

[28] In the model of section 3, households always invest a positive share of their wealth in asset *H*, which can be taken to mean that they always purchase a home. While this clearly is a simplification, it implies that the level of the exemption, if positive, does not affect the home ownership decision.

fully elastic in a downward way once a mortgage has been provided). Home ownership, instead, reflects the demand for generally mortgage-financed homes by households as well as the supply of mortgage finance. The exemption may have little impact on home ownership, because households that wish to purchase a home to protect against personal bankruptcy are the same households that face difficulty in financing a home purchase.[29]

## 6. Conclusions

For many households, their home is their single most important asset. Thus, investment in home equity is a key aspect of household portfolio choice. Recent contributions on the determination of housing in household portfolios have focused on the joint home ownership and housing consumption decision, and on high transaction costs that make the home investment decision special. Home equity investment is also special in that home equity tends to benefit from a favorable treatment in US personal bankruptcy law in the form of homestead exemptions. This paper is the first to examine how homestead exemptions affect the share of housing in household portfolios using detailed US household data from the Survey of Income and Program Participation over the 1996-2006 period.

We estimate that the percentage change in home equity as a share of the percentage change in overall wealth is 24.3% lower if the marginal investment in home equity is not covered by the exemption. Our baseline coefficients suggest that at age 60 households in high

[29] The homestead exemption could affect home ownership through its impact on home purchases as well as through its impact on home retention for households that experience financial distress. Li and White (2009) and Li, White and Zhu (2009) argue that bankruptcy reform introduced in 2005 that limited the bankruptcy shield offered by homestead exemptions increased foreclosure rates.

exemption states allocate about $38,000 more towards real estate compared to households in low exemptions states. This amounts to more than 20% of their total average wealth. The jump down in marginal investment in housing is more pronounced for younger households that may face a higher probability of personal bankruptcy. We find no evidence that our results suffer from selection bias due to limiting ourselves to homeowners, while there is only a weak relationship between home ownership and the homestead exemption. In some specifications, home ownership is estimated to be more likely in states with unlimited exemptions.

The bias in household portfolios towards home equity induced by its special bankruptcy protection suggests that these portfolios are not efficient as they expose the household to too much real estate risk in no-bankruptcy states of the world. Wealth protection against personal bankruptcy may be desirable (as suggested, for instance, by Li and Sarte (2006) on the basis of a simulation model), but its provision through an exemption for home equity appears to be unnecessarily distorting household portfolio choice.

An exemption for home equity could be rationalized if it were to influence home ownership, and if in addition home ownership produced positive externalities on neighborhood stability, as claimed by a substantial literature.[30] However, we do not find robust evidence that homestead exemptions affect home ownership. Thus, the costs of homestead exemptions in biasing household portfolios towards home equity are clear, while there are no obvious counterbalancing benefits of singling out home equity for special bankruptcy protection.

This paper documents the microeconomic cost of homestead exemptions by showing that household portfolios tend to be biased towards home equity. At the macroeconomic level,

[30] Glaeser and Sacerdote (1999), for instance, find a negative relation between home ownership and crime.

homestead exemptions potentially lead to biases as well. Any macroeconomic distortion depends on how increased demand for home equity at the micro level is accommodated at the macro level. Potential macroeconomic responses to higher homestead exemptions are higher average house prices and reduced aggregate mortgage financing demand in the short run, and increased housing construction in the long run. The macroeconomic implications of homestead exemption, however, are beyond the scope of this paper. Our results imply that homestead exemptions distort household asset portfolio without bringing about clear benefits in terms of increased home ownership. The paper therefore contributes to the policy debate about the desirability of homestead exemptions.

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Table 1. Homestead exemptions by state in 1996 and 2000-2006

| State | 1996 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|
| Alabama | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Alaska | 54,000 | 62,000 | 64,800 | 64,800 | 64,800 | 67,500 | 67,500 | 67,500 |
| Arizona | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 150,000 | 150,000 |
| Arkansas | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited |
| California | 75,000 | 75,000 | 75,000 | 75,000 | 75,000 | 75,000 | 75,000 | 75,000 |
| Colorado | 60,000 | 60,000 | 60,000 | 90,000 | 90,000 | 90,000 | 90,000 | 90,000 |
| Connecticut | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 |
| DC | 30,000 | 32,300 | 34,850 | 34,850 | 34,850 | 36,900 | 36,900 | Unlimited |
| Delaware | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50,000 |
| Florida | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited |
| Georgia | 10,000 | 10,000 | 10,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| Hawaii | 30,000 | 32,300 | 34,850 | 34,850 | 34,850 | 36,900 | 36,900 | 40,400 |
| Idaho | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 |
| Illinois | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 |
| Indiana | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 |
| Iowa | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited |
| Kansas | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited |
| Kentucky | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Louisiana | 15,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 |
| Maine | 25,000 | 25,000 | 25,000 | 50,000 | 12,300 | 70,000 | 70,000 | 70,000 |
| Maryland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Massachusetts | 100,000 | 100,000 | 100,000 | 300,000 | 300,000 | 500,000 | 500,000 | 500,000 |
| Michigan | 30,000 | 32,300 | 34,850 | 34,850 | 34,850 | 36,900 | 36,900 | 40,400 |
| Minnesota | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 |
| Mississippi | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 |
| Missouri | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 15,000 | 15,000 | 15,000 |
| Montana | 80,000 | 120,000 | 120,000 | 120,000 | 120,000 | 200,000 | 200,000 | 200,000 |
| Nebraska | 10,000 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 | 12,500 |
| Nevada | 125,000 | 125,000 | 125,000 | 125,000 | 125,000 | 200,000 | 200,000 | 350,000 |
| New Hampshire | 60,000 | 60,000 | 60,000 | 100,000 | 100,000 | 200,000 | 200,000 | 200,000 |
| New Jersey | 30,000 | 32,300 | 34,850 | 34,850 | 34,850 | 36,900 | 36,900 | 40,400 |
| New Mexico | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 |
| New York | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 100,000 |
| North Carolina | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 37,000 |
| North Dakota | 80,000 | 80,000 | 80,000 | 80,000 | 80,000 | 80,000 | 80,000 | 80,000 |
| Ohio | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Oklahoma | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited |
| Oregon | 33,000 | 33,000 | 33,000 | 33,000 | 33,000 | 33,000 | 33,000 | 30,000 |
| Pennsylvania | 30,000 | 32,300 | 34,850 | 34,850 | 34,850 | 36,900 | 36,900 | 40,400 |
| Rhode Island | 30,000 | 32,300 | 34,850 | 150,000 | 150,000 | 150,000 | 200,000 | 300,000 |
| South Carolina | 30,000 | 32300 | 34,850 | 34,850 | 34,850 | 36,900 | 36,900 | 40,400 |
| South Dakota | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited |
| Tennessee | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Texas | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited | Unlimited |
| Utah | 10,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 |
| Vermont | 60,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 | 150,000 |
| Virginia | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Washington | 30,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 |
| West Virginia | 30,000 | 30,000 | 30,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 |
| Wisconsin | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 |
| Wyoming | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| | | | | | | | | |
| Federal exemption | 30,000 | 32,300 | 34,850 | 34,850 | 34,850 | 36,900 | 36,900 | 40,400 |

Table 2. Summary statistics of main variables

This table reports summary statistics on the main regression variables. Own is a dummy variable that equals one if the household owns a home, and zero otherwise. Home equity is household home equity. Home value is the value of the residence if owned, and zero otherwise. Income is total household income. Total debt is total household debt. Wealth is total household net worth. Good health is a dummy variable that equals one if the household head reports health that is good, very good, or excellent, and zero otherwise. Age is the age of the household head. Married is a dummy variable that equals one if the household head is married, and zero otherwise. Members is the number of individuals in the household. Exemption is the state-level homestead exemption. Unlimited is a dummy variable that equals one if the exemption is unlimited, and zero otherwise. Below is a dummy variable that equals one if household home equity is less than the exemption level, and zero otherwise. House price appreciation is the annual percentage change in the deflated state-level OFHEO house price index.

| Variable | Obs | Mean | Std.dev. | Min | Max |
|---|---|---|---|---|---|
| Own | 138,848 | 0.72 | 0.45 | 0 | 1 |
| Home equity | 138,848 | 79,389 | 110,174 | -95,000 | 850,000 |
| Home value | 138,848 | 119,036 | 139,710 | 0 | 850,000 |
| Income | 138,848 | 4,447 | 4,738 | -3,611 | 342,957 |
| Total debt | 138,848 | 56,233 | 109,919 | -409,000 | 11,500,000 |
| Δln(wealth) | 138,848 | 0.090 | 0.979 | -3.99 | 3.99 |
| Δln(home equity) | 138,848 | 0.246 | 1.540 | -12.07 | 13.65 |
| Good health | 138,848 | 0.55 | 0.50 | 0 | 1 |
| Age | 138,848 | 52.19 | 16.75 | 16 | 88 |
| Members | 138,848 | 2.55 | 1.46 | 1 | 16 |
| Married | 138,848 | 0.55 | 0.50 | 0 | 1 |
| Exemption | 115,121 | 50,378 | 63,450 | 0 | 500,000 |
| Unlimited | 138,848 | 0.17 | 0.38 | 0 | 1 |
| Below | 138,848 | 0.54 | 0.50 | 0 | 1 |
| Exemption (1920) | 75,298 | 1,699 | 1,443 | 0 | 5,000 |
| House price appreciation | 138,848 | 0.035 | 0.031 | -0.04 | 0.22 |

Table 3. Homestead exemptions and investments in home equity

The dependent variable is the first difference in log home equity. Delta wealth is the difference in log wealth. Delta wealth*Below represents an indicator whether the household is below the homestead exemption times the first difference in log wealth. Log home equity represents the log of household home equity. Log income is the log of total household income. Log total debt is the log of total household debt. Delta income and Delta total debt represent the first difference in log income and log total debt, respectively. Good health is a dummy variable that equals one if the household head reports health that is good, very good, or excellent, and zero otherwise. Age is the age of the household head. House price appreciation is the annual percentage change in the deflated state-level OFHEO house price index. The sample is limited to households that own a house. Regressions include state and year fixed effects. Robust standard errors in parentheses, corrected for clustering at the household level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

| Variables | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Delta wealth | 0.569*** | 0.997*** | 0.951*** | 0.758*** | 0.697*** |
| | (0.012) | (0.021) | (0.018) | (0.025) | (0.025) |
| Delta wealth squared | | | | 0.193*** | 0.179*** |
| | | | | (0.012) | (0.012) |
| Delta wealth cube | | | | 0.010* | -0.014** |
| | | | | (0.006) | (0.006) |
| Delta wealth*Below | | | 0.102*** | 0.255*** | 0.247*** |
| | | | (0.033) | (0.064) | (0.063) |
| Delta wealth | | | | -0.094*** | -0.070*** |
| squared*Below | | | | (0.013) | (0.012) |
| Delta wealth | | | | -0.002 | -0.005 |
| cube*Below | | | | (0.008) | (0.008) |
| Log home value | | | | | 0.241*** |
| | | | | | (0.013) |
| Log income | | | | | -0.087*** |
| | | | | | (0.009) |
| Log total debt | | | | | -0.008*** |
| | | | | | (0.002) |
| Good health | | | | | -0.045*** |
| | | | | | (0.010) |
| Age ≤ 24 | | | | | 1.423*** |
| | | | | | (0.115) |
| Age >24 & ≤34 | | | | | 0.801*** |
| | | | | | (0.032) |
| Age>34 & ≤44 | | | | | 0.281*** |
| | | | | | (0.015) |
| Age >44 & ≤54 | | | | | 0.155*** |
| | | | | | (0.014) |
| Age>54 & ≤64 | | | | | 0.063*** |
| | | | | | (0.015) |
| House price | | | | | 0.294 |
| appreciation | | | | | (0.216) |
| State fixed effects | Yes | Yes | Yes | Yes | Yes |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.13 | 0.23 | 0.23 | 0.25 | 0.28 |
| N | 138,848 | 100,558 | 100,558 | 100,558 | 100,558 |

## Table 4. Economic effects of exemptions

We start out with the median wealth net of debt of a household at age 25 of a homeowner in the sample, which is $30,000. We use the fact that in the sample $22,000 of this total is home equity and the remainder other investments. We use the average annual growth rate of net worth in the sample of 5.06%, ignoring cohort effects. For all controls we assume that households in low and high exemptions states are identical, i.e. have the same levels of all control variables. We then obtain the following outcomes for the case where the exemption is equal to or below $20,000 vs. the exemption is equal to or above $200,000, i.e. households in low exemptions states are always above the exemption and households in high exemption states are always below. For simplicity, we are assuming equal returns on investment in home equity as in other investments. Pension wealth is not considered.

| | (1)<br>Exemption ≤ 20,000[1/] | (2)<br>Exemption ≥ 200,000[2/] |
|---|---|---|
| Initial total wealth at age 25 | 30,000 | 30,000 |
| of which in HE | 22,000 | 22,000 |
| of which in non-HE | 8,000 | 8,000 |
| Growth rate of wealth per year | 5.06% | 5.06% |
| Percentage change in HE as a share of percentage change in wealth | 70.6%[3/] | 94.9%[3/] |
| Implied growth rate of home equity | 3.57% | 4.80% |
| Total wealth at age 60 | 168,822 | 168,822 |
| of which in HE | 75,095 | 113,519 |
| of which in non-HE | 93,727 | 55,303 |

1/ e.g., Alabama, Delaware, Georgia, Illinois, Indiana, New York, Ohio, Tennessee, Virginia.
2/ e.g., Arkansas, Florida, Iowa, Kansas, Minnesota, Oklahoma, South Dakota, Texas, Vermont, DC (after 2005), Massachusetts (after 2002), Montana (after 2004), New Hampshire (after 2004), and Rhode Island (after 2005).
3/ Calculation: Without exemption: $\left[\hat{\beta}_1\Delta\overline{W} + \hat{\beta}_2(\Delta\overline{W})^2 + \hat{\beta}_3(\Delta\overline{W})^3\right]/\Delta\overline{W}$ = [0.697*0.0506 + 0.179*(0.0506)$^2$ - 0.014*(0.0506)$^3$]/0.0506. With exemption: $\left[\hat{\beta}_1\Delta\overline{W} + \hat{\beta}_2(\Delta\overline{W})^2 + \hat{\beta}_3(\Delta\overline{W})^3 + \hat{\gamma}_1\Delta\overline{W} + \hat{\gamma}_2(\Delta\overline{W})^2 + \hat{\gamma}_3(\Delta\overline{W})^3\right]/\Delta\overline{W}$ = [0.697*0.0506 + 0.179*(0.0506)$^2$ - 0.014*(0.0506)$^3$+0.247*0.0506-0.070*(0.0506)$^2$-0.005(0.0506)$^3$]/0.0506. $\hat{\beta}$ and $\hat{\gamma}$ are the estimated coefficients from regression 5 in Table 3 and $\Delta\overline{W}$ is equal to the average annual growth rate of median wealth in the sample.

Table 5. Higher order polynomials, sample selection, endogeneity and slope effects

The dependent variable is the difference in log home equity. Delta wealth is the difference in log wealth. Delta wealth*Below represents an indicator whether the household is below the homestead exemption times the first difference in log wealth. Control variables are as in Table 3 and unreported. In all regressions the sample is limited to households that own a house. Regression 1 includes a $10^{th}$ order polynomial in Delta wealth by itself and interacted with the discontinuity variable. The regression model in column 2 is a Heckman sample selection model. The instrument in the sample selection model is Married. This is a dummy variable that equals one if the household head is married, and zero otherwise. Lambda is Heckman's lambda. Regression 3 is an IV regression with the level of the homestead exemption in 1920 as instrument for the contemporaneous exemption level. Regression 4 is an IV regression with the annual change in the S&P 500 index as an instrument for Delta wealth. Regressions include state and year fixed effects. Robust standard errors are in parentheses, corrected for clustering at the household level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Variables | Higher order polynomials | Sample selection | Instrument for exemption | Instrument for Delta wealth |
| Delta wealth | 0.557*** | 0.699*** | 0.712*** | 0.568 |
| | (0.020) | (0.011) | (0.025) | (0.556) |
| Delta wealth squared | 0.181*** | 0.180*** | 0.160*** | |
| | (0.054) | (0.005) | (0.015) | |
| Delta wealth cube | 0.193*** | 0.014*** | 0.019*** | |
| | (0.029) | (0.002) | (0.005) | |
| Delta wealth*Below | 0.337*** | 0.247*** | 0.345*** | 2.979*** |
| | (0.088) | (0.017) | (0.067) | (0.433) |
| Delta wealth | -0.014 | -0.071*** | -0.057*** | |
| squared*Below | (0.116) | (0.007) | (0.019) | |
| Delta wealth cube*Below | -0.160** | -0.005 | -0.021** | |
| | (0.067) | (0.003) | (0.009) | |
| Lambda | | -0.185*** | | |
| | | (0.018) | | |
| Instrument (first stage) | | 0.229*** | 30.47*** | 1.057*** |
| | | (0.033) | (9.72) | (0.40) |
| Higher order polynomials | Yes | No | No | No |
| Controls | Yes | Yes | Yes | Yes |
| State fixed effects | Yes | Yes | Yes | Yes |
| Year fixed effects | Yes | Yes | Yes | Yes |
| $R^2$ | 0.28 | | 0.28 | 0.09 |
| N | 100,558 | 138,848 | 75,298 | 100,558 |

Table 6. Vulnerable households

The dependent variable is first difference in log home equity. Delta wealth is the difference in log wealth. Delta wealth*D represents an indicator whether the household is below the homestead exemption times the first difference in log wealth. Poor health is a dummy variable that equals one if the household head reports health that is not good, very good, or excellent, and zero otherwise. Age is the age of the household head. Control variables are as in Table 3 and unreported. In all regressions the sample is limited to households that own a house Regressions 2, 4, and (6) also include squared and cubed terms of the two and three way slope interactions, respectively. Regressions include state and year fixed effects. Robust standard errors in parentheses, corrected for clustering at the household level. Coefficients not reported for brevity. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

| | (1) | (2) | (3) |
|---|---|---|---|
| Variables | | | |
| Delta wealth | 0.698*** | 0.697*** | 0.698*** |
| | (0.025) | (0.025) | (0.025) |
| Delta wealth squared | 0.180*** | 0.180*** | 0.180*** |
| | (0.012) | (0.012) | (0.012) |
| Delta wealth cube | 0.014** | 0.014** | 0.014** |
| | (0.006) | (0.006) | (0.006) |
| Delta wealth*Below | 0.110** | 0.275*** | 0.120** |
| | (0.053) | (0.065) | (0.055) |
| Delta wealth squared*Below | -0.102*** | -0.069*** | -0.107*** |
| | (0.014) | (0.014) | (0.016) |
| Delta wealth cube*Below | 0.001 | 0.010 | -0.005 |
| | (0.007) | (0.008) | (0.008) |
| Delta wealth*Below*(Age<40) | 0.468*** | | 0.473*** |
| | (0.058) | | (0.062) |
| Delta wealth*Below*(Poor health) | | -0.171*** | -0.034 |
| | | (0.044) | (0.050) |
| Delta wealth*Below*(Age<40)*(Poor health) | | | -0.277 |
| | | | (0.176) |
| Higher order polynomials | No | No | No |
| Controls | Yes | Yes | Yes |
| State fixed effects | Yes | Yes | Yes |
| Year fixed effects | Yes | Yes | Yes |
| $R^2$ | 0.28 | 0.28 | 0.28 |
| N | 100,558 | 100,558 | 100,558 |

Table 7. Homestead exemptions and home ownership

The dependent variable is a home ownership dummy variable that equals 1 if the household owns a home, and zero otherwise. Exemption is the state-level homestead exemption in US dollars divided by 1000000 and equal to zero if the exemption is unlimited. Exemption II is the state-level homestead exemption in US dollars with unlimited exemption levels set to 1 million US dollars divided by 1,000,000. Unlimited is a dummy variable that equals one if the homestead exemption is unlimited, and zero otherwise. Log income is the log of total household income. Good health is a dummy variable that equals one if the household head reports health that is good, very good, or excellent, and zero otherwise. Age is the age of the household head. Married is a dummy variable that equals one if the household head is married, and zero otherwise. Members is the number of number of individuals in the household. House price appreciation is the annual percentage change in the deflated state-level OFHEO house price index. All regressions include state fixed effects and year effects. Robust standard errors in parentheses, corrected for clustering at the household level. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

| Variables | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Exemption | 0.175 | 0.158 | | |
| | (0.151) | (0.148) | | |
| Exemption II | | | 0.310** | 0.158 |
| | | | (0.125) | (0.148) |
| Unlimited | | 0.655*** | | 0.497* |
| | | (0.233) | | (0.272) |
| Log income | 0.345*** | 0.335*** | 0.335*** | 0.335*** |
| | (0.006) | (0.006) | (0.006) | (0.006) |
| Good health | 0.252*** | 0.246*** | 0.246*** | 0.246*** |
| | (0.010) | (0.009) | (0.009) | (0.009) |
| Age ≤24 | -1.920*** | -1.941*** | -1.941*** | -1.941*** |
| | (0.034) | (0.030) | (0.030) | (0.030) |
| Age >24 & ≤34 | -1.293*** | -1.325*** | -1.325*** | -1.325*** |
| | (0.016) | (0.015) | (0.015) | (0.015) |
| Age>34 & ≤44 | -0.789*** | -0.813*** | -0.813*** | -0.813*** |
| | (0.015) | (0.014) | (0.014) | (0.014) |
| Age >44 & ≤54 | -0.485*** | -0.491*** | -0.491*** | -0.491*** |
| | (0.015) | (0.013) | (0.013) | (0.013) |
| Age>54 & ≤64 | -0.238*** | -0.243*** | -0.243*** | -0.243*** |
| | (0.015) | (0.014) | (0.014) | (0.014) |
| Married | 0.684*** | 0.674*** | 0.674*** | 0.674*** |
| | (0.011) | (0.010) | (0.010) | (0.010) |
| Members | 0.013*** | 0.017*** | 0.017*** | 0.017*** |
| | (0.004) | (0.004) | (0.004) | (0.004) |
| House price | 0.177 | 0.132 | 0.180 | 0.132 |
| appreciation | (0.197) | (0.181) | (0.179) | (0.181) |
| State fixed effects | Y | Y | Y | Y |
| Year fixed effects | Y | Y | Y | Y |
| Pseudo $R^2$ | 0.22 | 0.21 | 0.21 | 0.21 |
| Observations | 115,121 | 138,848 | 138,848 | 138,848 |

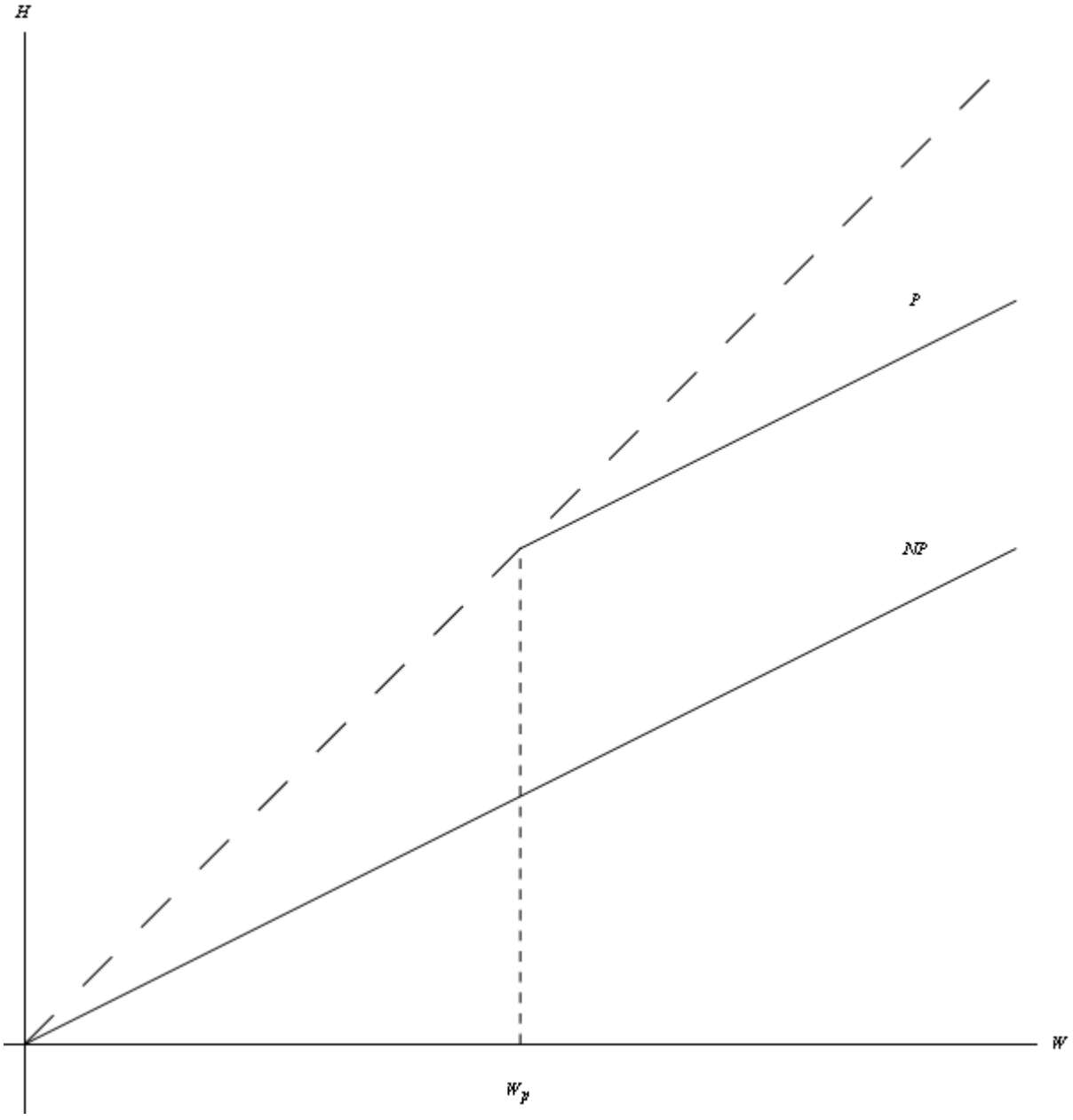



Figure 1. Housing with and without bankruptcy protection

This figure plots housing investment, *H*, against wealth, *W*. The *P* and *NP* schedules represent points where marginal investment in housing is protected and not protected by the homestead exemption in case of a medical expense, respectively.

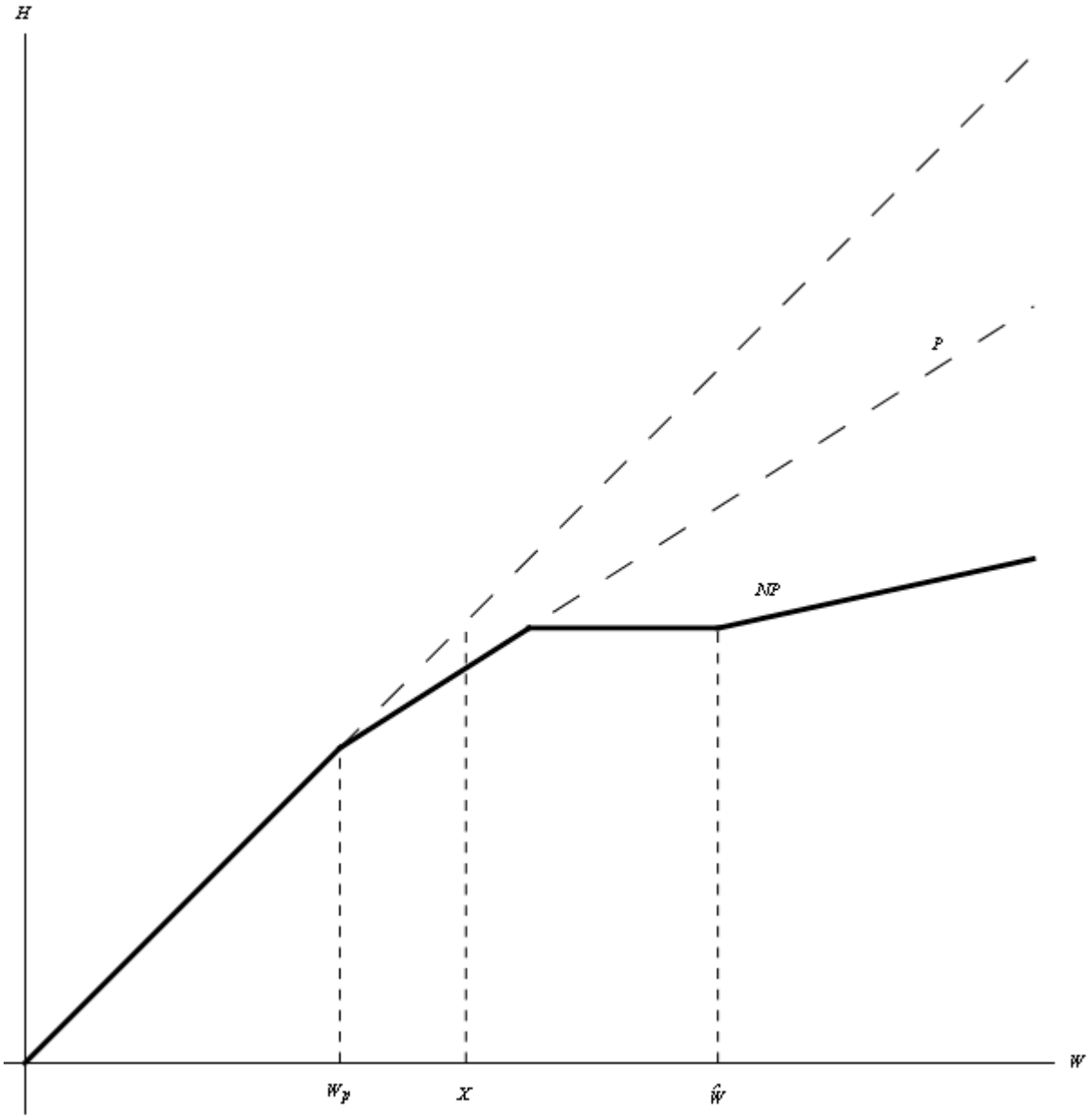
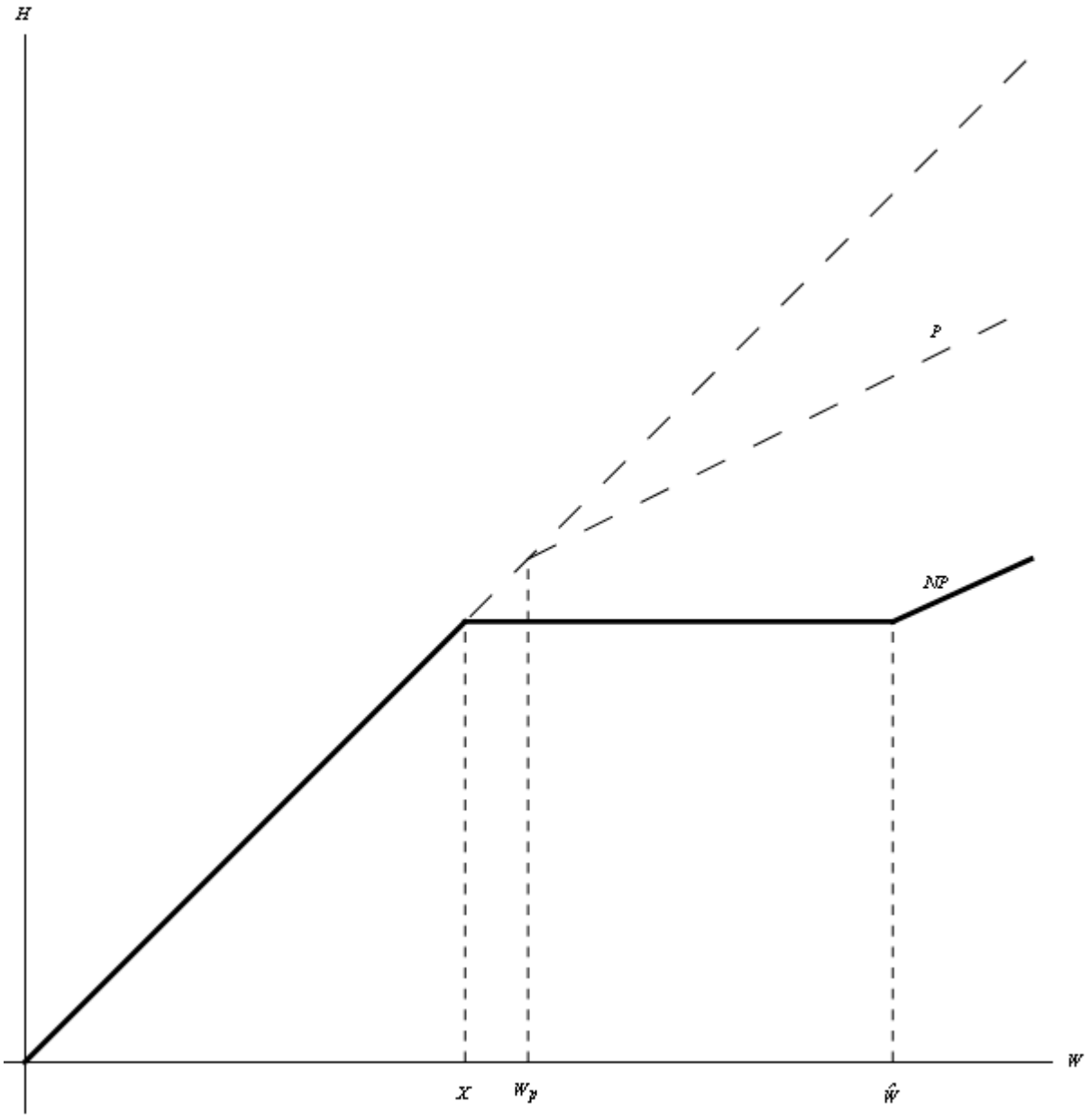



Figure 2. The relation between housing and wealth

Panel A. Weak preferences for housing consumption




Panel B. Strong preferences for housing consumption

## A**ppendix A. Variable definitions and data sources**

| Variable | Description | Sources |
|---|---|---|
| Own | Dummy variable that takes a value of one if the household owns a home, and zero otherwise. | SIPP |
| Home equity | Household home equity in US dollars | SIPP |
| Home value | Value of the residence if owned, and zero otherwise | SIPP |
| Income | Total household income. | SIPP |
| Total debt | Ttotal household debt | SIPP |
| Wealth | Total household net worth in US dollars | SIPP |
| Good health | Dummy variable that equals one if the household head reports health that is good, very good, or excellent, and zero otherwise. | SIPP |
| Age | Age of household head | SIPP |
| Members | Number of individuals in the household | SIPP |
| Married | Dummy variable that takes a value of one if the individual is married, and zero otherwise. | SIPP |
| House price appreciation | Annual percentage change in the deflated state-level house price index. | Office of Federal Housing Enterprise Oversight |
| Exemption | State-level homestead exemption in US dollars divided by 1,000,000 and equal to zero if the exemption is unlimited. | Elias, Renauer, and Leonard, various years |
| Exemption II | State-level homestead exemption in US dollars with unlimited exemption levels set to 1 million US dollars divided by 1,000,000. | Elias, Renauer, and Leonard, various years |
| Unlimited | Dummy variable that equals one if the homestead exemption is unlimited, and zero otherwise. | Elias, Renauer, and Leonard, various years |
| Below | Dummy variable that equals one if household home equity is less than the exemption level, and zero otherwise. | Elias, Renauer, and Leonard, various years and SIPP |
| Exemption 1920 | State-level homestead exemption in US dollars in 1920 divided by 1,000,000. Missing if the exemption is unlimited or for territories that attained statehood after 1920. | where doe s this come from? |

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