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Did Easy Credit Lead to Overspending? Home Equity Borrowing and Household Behavior in the Early 2000s

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Abstract:
Using data from the Panel Study of Income Dynamics, this paper examines how households' home equity extraction during the previous decade affected their spending and saving behavior. The study makes use of recently released 2009 housing and wealth data as well as the extensive data on household expenditures and balance sheets that are available starting in 1999. The results show that during the height of the house-price boom (the 2003–2005 period) a one-dollar increase in equity extraction led to 14 cents higher household expenditures. Households also spent 21 cents of their extracted equity on home improvements and additions and saved roughly 19 cents of each dollar extracted through balance-sheet reshuffling. The spending, saving, and residential investment patterns are similar during the 2001-to-2003 and 2005-to-2007 periods. There is less evidence of households' extracting equity to fund expenditures prior to 2001, except for health care and transportation-related expenses. Overall, the results are consistent with households' extracting equity to fund necessary expenditures and desired investments.

JEL Classifications: E21

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1 Introduction

According to work by Greenspan and Kennedy (2007), households' net equity extraction from their homes averaged nearly 6 percent of disposable income between 2001 and 2005. Cooper (2009) shows that changes in housing wealth impact households' spending primarily by serving as borrowing collateral. The results in that paper show that households smooth consumption during periods of income shortfalls by borrowing against their homes. This paper considers in more detail the role of equity extraction during the recent house-price boom. In particular, the paper analyzes what factors influence households' decisions to extract equity from their homes. The paper further considers how equity extraction affects household spending, balance sheets, and residential investment.

There are multiple reasons why households may extract equity from their homes other than to finance desired expenditures and/or smooth consumption in response to a negative income shock. For instance, households may borrow to make home repairs or improvements. Anecdotal evidence from the house-price boom suggests that many households used home equity to upgrade kitchens, redo landscaping, and/or otherwise repair or improve their homes. In this case, equity extraction is used to fund residential investment needs.[1]

Alternatively, households may borrow against their homes to consolidate other, more costly debt, such as credit cards. Recently, home equity credit has been one of the cheapest forms of borrowing, so it makes sense for households to substitute toward such financing. Not only are the interest rates on home equity lines of credit low compared with rates on credit cards, but the interest payments on home equity debt are for the most part tax deductible.[2] Indeed, the ratio of credit card (revolving) debt relative to income peaked around 2000 and subsequently trended down slightly. The ratio levels off somewhat starting in 2005 (see Figure 1). At the same time, home equity debt relative to income shot up, starting around 2000, and has only recently fallen back.[3]

Home equity borrowing also potentially offers households a less expensive (and tax-deductible) way to help finance educational expenditures for their children. In this regard, equity extraction helps finance human capital investments. Households may also extract

[1]Categorizing home improvement spending is somewhat tricky. The National Income and Product Accounts (NIPA) classify home improvements, such as a remodeled kitchen, as residential investment. Spending solely on new kitchen appliances, however, falls within the durable good consumption classification.

[2]Home equity loans that are used to purchase or improve a property are tax deductible. Home equity lines of credit used for other purposes are deductible up to $100,000. These deductibility rules therefore cover the vast majority of homeowners.

[3]Another potential driver of equity extraction and increases in home equity debt during the house-price boom were so-called "piggy-back" loans, used to finance the purchase of a new house. Households that wished to buy a new home but either did not have or did not want to make a down payment of 20 percent could extract equity from their existing home, or fictitious equity from their new home, to achieve a loan amount greater than 80 percent of the value of their house.

equity to invest in personal businesses or other forms of entrepreneurship. Equity may also be used to help finance the purchase of second homes and/or other real estate investments. In addition, some households may extract equity to engage in a form of investment arbitrage. To the extent that such households believe they can earn a greater return in the financial markets than the tax-adjusted cost of equity extraction, they may borrow against their homes and invest in stock, bonds, or other financial instruments.

Understanding households' uses of extracted equity is important for understanding the potential losses and economic implications of the decline in house prices and households' reduced ability to borrow against their homes. Equity extraction that goes primarily toward funding necessary or unnecessary household expenditures is potentially a concern, since it will likely cause a crash in consumption when house prices fall. A reduction in the availability of cheap forms of credit to fund residential or human capital investments is also a concern, but the macroeconomic implications are likely different—especially since consumer spending makes up nearly two-thirds of U.S. GDP. In addition, if much of households' extracted equity goes toward balance-sheet reshuffling, then a drop in available equity will likely lead to a smaller value of balance-sheet changes but have a much more limited impact on the overall macroeconomy than a sharp drop in household expenditures.

This paper investigates households' home equity borrowing behavior, using data from the Panel Study of Income Dynamics (PSID) through 2009. The 2009 data are available in a limited pre-release from the PSID and include information on home ownership and household balance sheets, but not on household spending or income. The PSID is beneficial for this study because it tracks households over time and includes detailed data on households' income, housing wealth, mortgage debt, balance sheets, automobiles, active saving, and home improvement investments. Starting in 1999, the PSID added detailed data on household expenditures in addition to food consumption and the dataset was expanded in 2005 to cover most of households' personal spending categories. The PSID therefore includes the vast majority of the data necessary to analyze the impact of equity extraction on household behavior. In addition, the panel component of the survey allows one to control for changes in households' income over time, along with other important factors for analyzing the causes and effects of households' equity extraction. The time component of the survey also allows for considering whether households' equity extraction behavior was different during the housing boom than in earlier years.

The analysis of households' reasons for extracting equity focuses on the 1997-to-2009 period. Overall, households with greater initial house values and higher house-price growth were more likely to extract equity. Households with higher financial wealth were, not surprisingly, less likely to extract equity, since they possessed other resources to finance their investment and expenditure needs. Households with high loan-to-value ratios are substan-

tially less likely to extract equity, as they possessed less equity available for equity extraction to begin with. Households with college age children also had a higher predicted probability of borrowing against their homes, consistent with some households' extracting equity to finance educational expenses. The bi-yearly results over the sample period further suggest that the vast majority of the time households whose head was unemployed for 13 weeks or more during the year were more likely to extract equity, and households with higher income growth were less likely to extract equity, although neither effect is precisely estimated. These results are broadly consistent with households' borrowing against their homes when they are worse off financially. Overall, the predictors of equity extraction are roughly in line with what one would expect, based on various reasons why households might extract equity. There do not appear to be time-specific patterns in the reasons for equity extraction.

Turning to the relationship between equity extraction and household behavior, the results suggest that a one-dollar increase in equity extraction between 2003 and 2007 led to a 10-cent to 20-cent increase in overall nonhousing expenditures for homeowners who did not move houses.[4] This effect appears strongest in the 2003 and 2005 periods (covering equity extraction in 2001-to-2003 and 2003-to-2005, respectively), which preceded the downturn in house prices in 2006.[5] The exact expenditure categories that increased as a result of equity extraction in these years vary somewhat, but overall the increase was broadly concentrated in transportation-related expenses, food, schooling, and nonmajor home upkeep (including utilities). Equity extraction had a much smaller impact on spending in 1999 and 2001, when a good portion of the expenditure impact was concentrated in health care costs. Overall, these results suggest that when equity extraction is used for consumption purposes, it goes toward necessary household expenditures.

Equity extraction also resulted in greater residential investment (home improvement spending) as well as increased household saving. During the 2003–2005 and 2005–2007 periods, a one-dollar increase in equity extraction led to a roughly 20-cent increase in capital spending on home additions and improvements. Household saving increased by a similar amount over these time intervals. Overall, equity extraction had a positive impact on home improvement spending, with the effect being the largest in the two periods just mentioned, as well as in 1997–1999. In addition, there was a positive relationship between equity extraction and household saving between 2001 and 2007, roughly coinciding with the boom years of the housing cycle. The exact balance-sheet location for the increased saving varies by period, but, overall, households extracted equity to invest in personal businesses as well

[4]Households that moved from one owner-occupied dwelling to another were more likely to extract equity to help fund their house purchase. Including these households in the analysis, not surprisingly, lowers the consumption effect somewhat.

[5]The equity extraction data cover a two-year horizon, whereas the spending data are only for one year. This difference in timing is accounted for in the analysis and is discussed in more detail in Section 3.

as other real estate. This balance-sheet reshuffling is consistent with households' using the equity in their homes to help finance other capital investments.

There is also evidence that households transferred some of the equity extracted to financial assets, especially in the 2003–2005 period. There is little evidence, however, that households extracted equity to repay noncollateralized debt. The fact that nearly equal amounts of equity extraction went toward increased spending, home improvements, and balance-sheet reshuffling, especially during the years of the house-price boom, suggests that households did not borrow against their home solely to meet their short-term spending desires. Instead, a good chunk of the money went toward long-term investments and/or balance-sheet reshuffling.

The results do not explain the entire destination of each dollar of equity extracted during the house-price boom. This is likely because the data do not adequately account for households that extracted equity as part of financing the purchase of a new home. Anecdotal evidence suggests that such equity extraction behavior occurred with some frequency during the house-price boom. Regardless, the results are consistent with households' using the equity in their homes to finance desired expenditures and investment.

The paper most closely related to this one is Canner et al. (2002). The authors use survey data about mortgage refinancing from questions added to the 2001 and 2002 monthly Survey of Consumers (SOC) to focus on the characteristics of households that refinance mortgages, on these households' decisions to refinance, and on households' uses of their liquified home equity. The authors report that roughly 16 percent of the dollars extracted went toward consumer purchases, 35 percent to home improvements, 26 percent to the repayment of other debt, and the remaining portion to stock market and business investments. These are average effects, rather than the marginal effects of a dollar of equity extraction discussed in this paper.

The most striking difference between the findings of Canner et al. (2002) and the ones in this paper is that they find a substantial effect of other debt repayment. It is possible that the marginal impact of debt repayment is small compared with the average effect. It is also possible that debt repayment is more easily captured with a high-frequency survey like the SOC than with the two-year horizon covered by the PSID. In particular, the debt may be paid off as a one-time event and then built back up over time, an effect that would be captured in the PSID data as little change in other debt holdings. In addition to identifying the marginal effects of households' increases in equity extraction, this paper contributes to the literature by considering households' equity extraction behavior over time, especially during the main years of the house-price boom. This paper also uses disaggregated expenditure and household saving data that are not available elsewhere within a panel survey. The breadth of the data along with the time dimension allow for analyzing households' equity

extraction behavior in a way that addresses households' purposes for borrowing and the implied economic consequences of falling house prices and reduced home equity borrowing capacity.

Other related research on equity extraction and household expenditures includes Hurst and Stafford (2004). In that paper, the authors use survey data from the PSID about households' mortgage refinancing activity between 1991 and 1994 to examine the relationship between consumption and home equity borrowing. The authors find evidence that households refinance to smooth spending in response to income shocks. They do not, however, consider the impact of equity extraction on households' balance sheets. This paper expands on Hurst and Stafford's work by examining the relationship between equity extraction and household expenditures during the house-price boom in the previous decade. The analysis also includes households that increased their mortgage debt for any reason, and not just households that refinanced to obtain a lower interest rate. An additional related paper is Klyuev and Mills (2006). Those authors examine the relationship between mortgage equity withdrawal and household saving across countries, using aggregate data. In contrast, this paper, by using household-level data to analyze the relationship between equity extraction and household behavior, exploits variation across households in terms of their leverage and individual-specific house-price growth—an approach not possible with aggregate analysis.

The remainder of the paper proceeds as follows. Section 2 presents the empirical approach. Section 3 discusses the data and reports summary statistics about equity extraction and households' balance sheets. Section 4 presents the empirical results. Section 5 concludes.

2 Background and Empirical Approach

This paper uses an empirical approach to address two primary questions. First, what factor or factors determine whether or not a household extracts equity from its home and have these reasons changed over time? Second, how does equity extraction impact households' spending, investment, and balance sheets? The next two subsections discuss the empirical approach taken in this paper for analyzing these issues.

2.1 Factors Affecting Equity Extraction

Macroeconomic theory, in particular the permanent income hypothesis, states that households consume the annuity value of their lifetime resources. Households smooth transitory income gains by lending or saving, and they smooth transitory income shortfalls by dis-saving or borrowing. The lower a household's financial assets, the greater its demand for borrowing in response to a negative income shock. In fact, households' demand for equity extraction

should be inversely related to their amount of *liquid* financial wealth. Households' less liquid assets, such as IRAs, pension accounts, or businesses, are not easily accessed to smooth consumption over a short horizon. In contrast, housing wealth, while illiquid, is easily collateralizable at a relatively low cost. This was especially true during the early 2000s. Indeed, home equity borrowing has been an attractive mode of obtaining credit since 1986, when Congress increased the deductibility of mortgage interest and eliminated the tax deduction for credit card interest. Households with greater equity in their homes should therefore be more likely to extract equity, conditional on needing to borrow.

The following cross-sectional, binary choice model considers the factors that determine a household's decision to extract equity from its home:

$$\begin{aligned} E^i_{t,t+1} &= a_0 + a_1 lw^i_t + a_2 iw^i_t + a_3 v^i_t + a_4 L^i_t + a_6 \Delta y_{t,t+1} \\ &+ a_7 U^i_{t+1} + a_8 \Delta p^i_{t+1} \beta \mathbf{R^i_t} + \eta \mathbf{Z^i_t} + \epsilon^i_{t,t+1} \, . \end{aligned} \tag{1}$$

In particular, $E_{t,t+1}$ is an indicator variable that takes a value of 1 if a homeowner extracts equity from his or her home between period t and period $t+1$ and is 0 otherwise; lw^i_t is a household's real liquid financial wealth; iw^i_t is a household's real illiquid financial wealth; U^i_t is an indicator variable that takes a value of 1 if the household suffers a spell of unemployment in period $t+1$ and is 0 otherwise;[6] v^i_t is a household's housing loan-to-value (LTV) ratio; L^i_t is an indicator variable that takes a value of 1 if a household's LTV ratio is greater than 0.8 and is 0 otherwise; $\Delta y_{t+1,t}$ is a household's percent change in income over the equity extraction period; Δp^i_t is the change in the household's home value between t and $t+1$; $\mathbf{R^i_t}$ is a vector of dummy variables for the region in which the household lives; and $\mathbf{Z^i_t}$ is a vector of household demographics and other covariates, such as the number of college age children in the household. The vector of covariates also includes a cubic term for the age of the household head.[7]

The timing in equation 1 captures the fact that the PSID is conducted every other year starting in 1997, and thus the equity extraction data span the two-year horizons between 1997 and 2007. The next section discusses in more detail this timing and how equity extraction is calculated. Equation 1 is estimated using a probit specification for the whole sample period: 1997–2007, as well as the five relevant two-year time horizons: 1997–1999, 1999–2001, 2001–2003, 2003–2005, and 2005–2007. The 1997-to-1999 period precedes much of the run-up in house prices and can provide insight into whether households' reasons for extracting equity was different before versus during the house-price boom.

[6] A head or spouse is deemed unemployed if he or she reports 13 or more weeks out of work in year $t+1$.

[7] Including additional covariates such as dummy variables for the household head's education level and marital status does not noticeably affect the estimates or fit of the empirical model.

The estimated effects from equation 1 report how a given covariate impacts households' predicted probability of extracting equity. The regressions control for the potential endogeneity between a household's change in income and its decision to extract equity. Section 3 discusses what determines whether or not a household extracts equity from its home, along with how the other relevant variables are calculated. If households extract equity in response to an income shortfall, then there should be a negative relationship between income growth and equity extraction [$a_6 < 0$]. Higher liquid wealth should also reduce a household's probability of extracting equity from its home [$a_1 < 0$], all else equal, to the extent that a household extracts equity to finance necessary expenditures or consumption shocks. In addition, households with LTV ratios greater than 0.8 should be less likely to extract equity than other households, since they face higher borrowing costs than less-leveraged households [$a_4 < 0$]. These higher financing costs are due to the fact that banks require households to hold primary mortgage insurance (PMI) when they have less than 80 percent equity in their homes. These PMI requirements were relaxed somewhat during the recent house-price boom.[8]

In addition, having college age children will lead to a *higher* probability of equity extraction to the extent that households use home equity loans to help finance post-secondary education. Similarly, households that live in areas of high house-price growth should be more likely to borrow against their homes, assuming they lacked sufficient equity to borrow prior to the price increase. As prices rise, so does households' equity. Households that are unemployed may also have a higher probability of extracting equity [$a_3 > 0$]. These households demand borrowing to smooth consumption to the extent that their unemployment spell restricts their cash flow and limits their ability to finance consumption. Section 4.1 reports the results from estimating equation 1.

2.2 Impact of Equity Extraction on Household Behavior

2.2.1 Consumption

Background

Arguably, there are few basic explanations for why households extract equity from their homes for consumption purposes. First, home equity borrowing capacity may act as an alternative buffer stock for labor income risk. Evidence suggests that households that face future income uncertainty treat collateralized borrowing capacity as a partial substitute for liquid saving. Households may therefore borrow to smooth consumption in response

[8]See Hurst and Stafford (2004) for a detailed discussion about the (potentially nonlinear) relationship between households' LTV ratios and their borrowing and spending behavior.

to a temporary income shortfall, especially if they lack sufficient financial savings or other financing options. Alternatively, households may extract equity to finance large anticipated or unanticipated one-time expenditures, such as car purchase costs, college tuition payments, or medical expenses.[9] Finally, households may simply feel wealthier because of changes in house prices, especially if they perceive the house-price changes to be permanent, and extract equity as an alternative way of smoothing consumption and spending some of their perceived new wealth.

It is difficult to pin down households' exact reasons for extracting equity to finance consumption. In particular, the PSID lacks direct questions about whether households' expenses were anticipated or unanticipated, whether they experienced any unanticipated income shortfalls, and/or about their house-price expectations. To the extent that equity extraction occurs for consumption purposes, however, the destination of the extracted funds provides some clues for explaining households' behavior. For example, if households extracted equity to spend funds on necessary expenditures like food, utilities, and transportation costs, then they were potentially borrowing as a result of a negative income shock. If equity extraction impacted expenditures on health care, cars, or schooling, then it is likely that households were borrowing to finance anticipated or unanticipated one-time large expenditures.[10] In addition, households that felt wealthier due to rising house prices may have extracted equity as a way to spend some of their perceived higher wealth. In this case equity extraction may have been used to fund discretionary items such as vacations; however, the type of spending deemed discretionary versus nondiscretionary likely varies by household. Starting in 1999, the PSID has the necessary disaggregated consumption data to distinguish the destination of households' extracted funds. The actual available data are discussed in more detail in Section 3.

Empirical Approach

Economic theory says that in a frictionless world consumption is a function of households' lifetime resources. Often this relationship is written in the form

$$C_t = f(H, W),$$

where H is a measure of human capital or permanent income and W captures households'

[9]This paper uses the terms "one-time expenditures" and "consumption shocks" interchangeably. College tuition payments are not necessarily a "shock," but the idea is to capture that the expenditures financed by equity extraction are likely large, especially relative to households' ordinary spending. The paper also uses "consumption" and "expenditures" interchangeably, even though consumption technically includes the service flow from durable goods while expenditures do not.

[10]Arguably, health care spending may be a necessity for some households.

lifetime financial wealth. Life-cycle consumption theory further suggests that additional controls, such as households' ages, help to explain fluctuations in consumption relative to income due to households' time-varying spending needs over their lifetimes. In a world with credit constraints, there is a potential further disconnect between household consumption and income. The question then is whether equity extraction, especially in a world where borrowing constraints are prevalent, has any additional explanatory power for consumption beyond these basic economic relationships. In other words, does consumption rise (or fall) when households extract equity, conditional on the other factors that are know to explain households' spending behavior.

The relevant consumption function of interest is:

$$c^i_{t+1} = b_0 + b_1 x^i_{t,t+1} + b_2 y^i_{t+1} + b_3 w^i_{t+1} + b_4 h^i_{t+1} + \zeta \mathbf{R^i_t} + \gamma \mathbf{Z^i_t} + \epsilon^i_{t+1} \,, \tag{2}$$

where c^i_{t+1} is a household's nonhousing consumption (or component thereof) in period $t+1$; $x^i_{t+1,t}$ is the amount of equity that a household extracts from (or saves in) its home between t and $t+1$[11]; w^i_{t+1} is a household's real financial wealth; h^i_{t+1} is a household's real housing wealth in period t; and y^i_{t+1} is a household's disposable income in period $t+1$. Finally, $\mathbf{R^i_t}$ and $\mathbf{Z^i_t}$ are vectors of regional dummy variables and household demographic covariates, respectively, as discussed earlier. The next section discusses the available consumption data in more detail.

If households extract equity to fund expenditures, then there should be a positive relationship between equity extraction and consumption [$b_1 > 0$]. In addition, homeowners who extract equity and remain in their homes may behave differently than those homeowners who extract equity while moving from one owner-occupied home to another. In particular, households that move may be more likely to extract equity to help finance their house purchase than to spend on consumption. A slightly modified version of equation 2 accounts for differences in the behavior of homeowners who move versus those who do not.

$$c^i_{t+1} = d_0 + d_1 x^i_{t,t+1} + d_2 y^i_{t+1} + d_3 w^i_{t+1} + d_4 h^i_{t+1} + d_5 M^i_{t+1} + d_6 \left(M^i_{t+1} \cdot x^i_{t+1,t}\right) + \zeta \mathbf{R^i_t} + \gamma \mathbf{Z^i_t} + \epsilon^i_{t+1} \,, \tag{3}$$

where M^i_{t+1} is an indicator variable that equals 1 if a household moves between time t and $t+1$ and is 0 otherwise. If households that move indeed use more of the money they extract for home financing purposes than for consumption, then the marginal effect of equity extraction on consumption for movers ($d_1 + d_6$) should be smaller than for nonmovers ($d_1 < 0$). If movers do indeed extract less equity for consumption purposes than nonmovers, then the

[11] Equity extraction is available only over two-year horizons, while the spending data in the PSID cover a one-year period. The equity extraction data are averaged to take this timing discrepancy into account.

estimated effect should be larger when moving is taken into account than when it is not ($d_1 > b_1$).

Endogeneity Issues

There are potential endogeneity problems involved in estimating equation 2. These issues can be best explained algebraically, using a simplified example. Suppose that household consumption is determined by the following data-generating process:

$$c_t^i = b_0 + b_2 y_t^{i,p} + \epsilon_t^i + \nu_t^i \,, \tag{4}$$

where $y_t^{i,p}$ is a household's permanent income, ϵ_t^i is a shock to consumption that is potentially correlated with permanent income, and ν_t^i is a transitory consumption shock that is assumed to be uncorrelated with permanent income. The transitory shock is like a taste shock. An example of an expenditure shock that is a correlated with permanent income is a credit shock that causes an economic downturn and job losses. If $E[y_t^{i,p}\epsilon_t] \neq 0$, then the OLS estimate of a household's marginal propensity to consume out of permanent income will be biased toward zero.

An additional potential source of endogeneity occurs because most often the econometrician has an imperfect measure of households' permanent income. In particular, the econometrician typically estimates the following version of equation 3

$$c_t^i = b_0 + b_2 y_t^i + \epsilon_t^i + \nu_t^i \,, \tag{5}$$

where y_t^i is a household's *current* income. Current income is also potentially correlated with ϵ_t^i, since it captures households' permanent plus transitory income. These earnings may also be correlated with households' transitory consumption shocks if families take on additional temporary jobs to fund their current consumption needs. To resolve the potential income endogeneity issues, the econometrician can estimate equation 4 with two-stage least squares (2SLS), using lagged income as an instrument for a household's current earnings. This approach is exactly correct if actual income follows a random walk.

Equations 2 and 3 are estimated using 2SLS to account for the potential income endogeneity issues. In particular, lagged income (y_t^i) is used as an instrument for (y_{t+1}^i). Lagged income should be uncorrelated with both the permanent and transitory current consumption shocks, and thus using 2SLS addresses the relevant income endogeneity.

The presence of transitory consumption taste shocks (ν_t^i) can additionally result in non-standard measurement error when estimating equation 4 or, analogously, equation 2. This alternative form of endogeneity does not directly impact the coefficient estimates in equation

5, all else equal, since these taste shocks are assumed to be uncorrelated with the other shocks to consumption. The relevant question, however, is what information households' equity extraction (x_t^i) provides about the relationship between taste shocks and consumption. In particular, assume that a portion λ of a household's taste shock is financed by equity extraction, such that

$$x_t^i = \lambda \nu_t^i, \tag{6}$$

and the remaining $1 - \lambda$ of the shock is financed through other means, such as savings, unsecured debt, or borrowing from family members. If the econometrician includes equity extraction in equation 4 and estimates

$$c_t^i = b_0 + b_1 x_t^i + b_2 y_t^i + \epsilon_t^i + \nu_t^i \,, \tag{7}$$

then the estimate of b_1 equals the proportion of the transitory shock that is financed by equity extraction. In other words, $\hat{b}_1 = \lambda$.[12]

Adding equity extraction to the standard consumption function therefore potentially provides useful information about how households finance their consumption taste shocks. The ultimate goal of this paper is to determine how equity extraction impacts households' spending, conditional on their income. Equation 2 captures this relationship, and the discussion in this section suggests that the estimation approach is valid. The proportion of a household's taste shock that is financed by equity extraction is identified based on cross-sectional variation in observed equity extraction activity, including the households that do not extract equity but still consume.

An additional concern, not fully addressed by this approach, is potential endogeneity between equity extraction and consumption due to common macro shocks. Households may not just be extracting equity to finance taste shocks. Arguably, good news about the future could cause equity extraction and consumption to be higher, and thus appear positively related, even though some other factor (the news shock) is causing the empirically observed relationship. This issue would be a greater concern if the paper focused, for instance, on the relationship between consumption and house prices. News of future employment growth

[12]This analysis assumes that λ is constant across all households. It is possible, however, that different households finance varying amounts of their taste shocks with equity from their homes ($x_t^i = \lambda^i \nu_t^i$). In such a situation, the estimate of the equity extraction effect across all households is just the average of their individual financing proportions ($\hat{b}_1 = \bar{\lambda}$). In addition, there is potentially some noise in the amount of equity a household extracts to fund its taste shock,

$$x_t^i = \lambda \nu_t^i + u_t^i \,,$$

where u_t^i is some random error term. This situation does not impact the results, however, assuming u_t^i is uncorrelated with the amount of equity households extract as well as with their income.

shock could cause a rise in both house prices and consumption. Equity extraction, however, is one degree removed from house-price changes. Certainly higher house prices mean a greater opportunity for equity extraction, but households have to actually choose to extract equity and change their consumption. This variation in equity extraction decisions across households conditional on house-value fluctuations, is what helps to identify the relationship between consumption and home equity borrowing. Movements in equity extraction that lead to higher consumption because households feel better about the future, among other factors, is precisely what this paper seeks to examine. The standard endogeneity issues between house prices and consumption are therefore of less concern in this analysis.

2.2.2 Residential Investment

Households may also extract equity to finance home improvements and/or additions. Such spending may seem like consumption, but it is classified in the national accounts as residential investment. Indeed, extracting equity to pay for a new roof or new kitchen is different from, for instance, extracting equity to pay for a vacation or perhaps finance necessary spending. By replacing a roof or upgrading a kitchen, a household is essentially making a capital investment in its property that it hopes will generate a return in the long run and/or add to the longevity of its home. This compares with using equity to finance short-term spending needs or wants. This is not to say that one use of the funds from equity extraction is necessarily better or worse than the other; they just have different implications.

The PSID asks homeowners whether they have made additions or capital improvements to their home since the previous survey, and if so, how much money they spent. These data allow for investigating the relationship between equity extraction and residential investment in a manner similar to the empirical approach in equations 2 and 3. The exact empirical model is as follows:

$$hi^i_{t,t+1} = e_0 + e_1 x^i_{t,t+1} + e_2 y^i_t + e_3 w^i_t + e_4 h^i_t + \zeta \mathbf{R^i_t} + \gamma \mathbf{Z^i_t} + \epsilon^i_{t,t+1} \,, \tag{8}$$

where $hi^i_{t,t+1}$ is the amount spent on home improvements or additions between time t and time $t+1$, and $x^i_{t,t+1}$ is the amount of equity extracted over that same time horizon. The remaining variables were defined earlier, and they are dated as of the beginning of the equity extraction period to avoid any endogeneity issues.[13]

As with the consumption equations, equation 8 is estimated over the full sample, as well as subsamples. The subsamples include the 2007–2009 period, as there are home improvement spending data in the pre-release sample, but not consumption data. In addition, the home improvement expenditures data are bottom censored at $ 10,000 conditional on households'

[13]Changing the time does not noticeably impact the estimates of the equity extraction effect.

making home repairs. The estimates of equation 8 take this censoring into account.[14] If households indeed extract equity to help finance home improvement projects, then there should be a positive relationship between home equity borrowing and home improvement spending ($e_1 > 0$).

2.2.3 Balance Sheets

Households that borrow against their homes need not spend any or all of what they extract on consumption or home improvements. For instance, households may use their extracted equity to pay down their higher-cost noncollateralized debt.[15] Alternatively, households may borrow in order to invest in other assets, such as a second home. Households that refinance and cash out equity may also place some or all of the money in their savings account to spend as needed, especially if they cash out more than they intend to spend immediately. Regardless, if there are balance-sheet effects of equity extraction in addition to, or instead of, consumption effects, then one should observe dis-saving in housing and *increased* saving in other assets, and/or the repayment of noncollateralized debt.

The impact of equity extraction on households' balance sheets can be examined in a manner similar to the approaches for quantifying the home improvement and consumption effects. The relevant empirical model is:

$$s^{i,j}_{t,t+1} = f_0 + f_1 x^i_{t,t+1} + f_2 y^i_{t,t+1} + f_3 w^i_t + f_4 h^i_t + \alpha \mathbf{R^i_t} + \psi \mathbf{Z^i_t} + \epsilon^i_{t,t+1} \,, \tag{9}$$

where $s^{i,j}_{t,t+1}$ is a household's amount of active saving in asset type j (or saving across all assets) between between periods t and $t+1$, and $y^i_{t,t+1}$ is a household's real, after-tax income level between periods t and $t+1$. The rest of the variables were defined previously. The specification in equation 9 takes a similar consumption function approach to the one used for the consumption analysis, since consumption and saving are directly related. This particular setup controls for a household's level of financial wealth and housing wealth at the beginning of the saving period in case households' saving behavior varies based their existing asset levels. The empirical estimates of equation 9 also control for the potential endogeneity between household income and saving.

The asset classes available for analyzing saving in the PSID are: other real estate, businesses or farms, cash, stocks, bonds, vehicles, (reduced) noncollateralized debt, and IRA/401k accounts. The next section discusses the household saving data in more detail.

[14] The preferred estimation approach would be to include income contemporaneously in equation 8 and control for any endogeneity using an instrumental variable approach. This proves difficult with the censored regressor, however, as the IV estimates will not converge. As noted earlier, however, the timing of the independent variables does not seem to impact the equity extraction effect.

[15] Noncollateralized debt includes credit card debt as well as student loans and other unsecured debt.

To the extent that households extract equity and move the proceeds to other portions of their balance sheets, there should be a positive relationship between equity extraction and overall active saving as well as (a) positive relationship(s) between equity extraction and the particular asset category or categories that are affected by the balance-sheet reshuffling ($f_1 > 0$). Conceivably, households may also extract equity and *reduce* nonhousing saving. This may occur to the extent that households use equity extraction as an impetus for rethinking the overall allocation of their balance sheets.

3 Data

3.1 Data Construction

The PSID is a nationally representative, longitudinal survey of households and their offspring that began in 1968. The survey has been conducted annually between 1968 and 1997 and every other year since 1997. The most recent data are for 2007, although some data covering mortgages, foreclosures, and household wealth have been pre-released for the 2009 survey. Each wave asks homeowners to report their home values, the amount of any outstanding mortgage balances, and whether they have moved since the previous survey. The PSID also includes "wealth supplements" that contain detailed information on households' nonhousing financial assets in 1984, 1989, 1994, and 1999 onwards. As mentioned earlier, these assets include other real estate, businesses or farms, cash, stocks, bonds, vehicles, noncollateralized debt, and IRA/401k accounts. There are also data on households' so-called "active saving" in 1989, 1994, and 1999 onwards. Active saving measures households' net contributions to their various asset holdings between the wealth surveys. Active saving excludes capital gains and thus measures households' saving out of current income. These data are discussed in more detail below.

3.1.1 Equity Extraction

Households that extract equity are identified based on the mortgage and moving data in the PSID. The estimation sample for all the analysis in this paper is restricted to homeowners, since renters by definition do not have housing equity to borrow against. In particular, households that extract equity are either those households that did *not* move, but increased their mortgage debt or households that moved from one owner-occupied property to another and reduced the amount of equity in their new home relative to their old one. For example, a household that moves and had $ 30,000 of equity in its old home but has only $ 20,000 in its new home, extracts $ 10,000 of equity.

Let $E^i_{t,t+1}$ be an indicator variable for whether a household extracts equity from its home between periods t and $t+1$. In particular,

$$E^i_{t,t+1} = \begin{cases} 1 & \text{if } m^i_{t+1} > m^i_t \ \& \ \text{move}^i_{t+1} = 0 \\ 1 & \text{if } e^i_{t+1} < e^i_t \quad \& \ \text{move}^i_{t+1} = 1 \\ 0 & \text{otherwise} , \end{cases}$$

where m^i_t is the household's mortgage debt in period t, e^i_t is the household's amount of home equity in period t, and move^i_{t+1} is an indicator variable that takes a value of 1 if the household moves between t and $t+1$ and is 0 otherwise. A household's home equity is defined as the value of its house ($p^{h,i}_t$) less any outstanding mortgage debt (m^i_t)

$$e_t = p^h_t - m_t \ .$$

In addition, let x^i_t be the actual (dollar) amount of equity a household extracts:

$$x^i_{t+1} = \begin{cases} m^i_{t+1} - m^i_t & \text{if } E^i_{t,t+1} = 1 \ \& \ \text{move}^i_{t+1} = 0 \\ e^i_t - e^i_{t+1} & \text{if } E^i_{t,t+1} = 1 \ \& \ \text{move}^i_{t+1} = 1 \\ 0 & \text{otherwise} . \end{cases}$$

3.1.2 Household Saving

The PSID wealth supplements contain "active" saving data that can be used to calculate households' saving out of their current income. Active saving measures households' net contributions to various financial assets over time, *excluding* capital gains.[16] For example, households that pay off some of their outstanding mortgage principal have positive active saving. In contrast, housing wealth gains due to house-price appreciation do *not* count as active saving.

Starting in 1989, households report the amount they contributed to 401k or IRA saving plans since the previous wealth supplement, as well as the amount they withdrew from such plans. Other active saving categories include: investment in businesses or farms, checking and saving accounts, bond holdings, stock holdings, housing, other real estate, vehicles, and noncollateralized debt (NCD).[17] The approach for measuring active saving in this paper follows the one in Juster et al. (2005).

[16] One gray area in the PSID regarding the exclusion of capital gains from the active saving data involves households' bond holdings. Active saving in bond holdings is defined analogously to active saving in cash and is simply the difference in the amount of households' bond holdings between successive wealth years. Some bond holdings are subject to gains and losses like stocks, however, especially if they are not held until maturity.

[17] Other real estate includes vacation homes, rental properties, and land holdings.

Given the timing of the PSID wealth supplements, the active saving data cover the following years: 1984 and 1989, 1989 and 1994, 1994 and 1999, 1999 and 2001, 2001 and 2003, 2003 and 2005, 2005 and 2007, and 2007 and 2009. The exact definition of active saving between successive wealth years depends on the type of asset. See the appendix for additional details on these definitions and calculations.

3.1.3 Consumption and Income

The only spending data that are consistently available in the PSID since its inception are household expenditures on food at home and food away from home. Starting in 1999, however, the PSID added additional questions about household expenditures to obtain a more comprehensive picture of household consumption. The breadth of the spending data was further expanded in 2005. According to Charles et al. (2007), adding these data brought the expenditure data in the PSID roughly in line with the spending categories available in the Consumer Expenditure Survey (CEX), which is widely regarded as the best dataset on U.S. household level spending.

Starting in 1999, in addition to food consumption, the PSID contains data on households' health care expenses, transportation expenses, child care expenses, schooling costs, automobile costs, and utilities. Transportation expenses include public transit, cabs, and other costs of getting from one place to another. Automobile costs include monthly loan or lease payments, vehicle maintenance costs, and insurance costs. Down payment outlays on newly acquired vehicles are also included in this measure. The PSID also includes data on household mortgage payments and/or rental payments, along with homeowners' insurance. These data are excluded from the analysis, since households' mortgage payments and overall housing expenses should usually increase by definition when they extract equity.

The additional categories added in 2005 include home maintenance and repairs, home furnishings, recreation expenditures, clothing, and vacations. The home maintenance and repair expenditure data are different from the home improvement (investment) data available in the wealth supplements. These data focus on ordinary maintenance and repairs costs rather than longer-term home improvements and additions. Charles et al. (2007) provide a detailed discussion about the additional spending data added starting in 1999. In particular, they compare the PSID data with the CEX data and find that they line up reasonably well except perhaps for educational spending.

The income data used in this survey are households' total family income from the surveys. The data are converted to disposable income, using data on household taxes based on the NBER's Taxsim module. Both the consumption and income data are converted to real 2000 dollars using the PCE deflator from the national accounts published by the Bureau of Economic Analysis. Other dollar-valued variables are converted to real values using the

same deflators.

3.2 Summary Statistics

Table 1 reports the distribution of equity extraction over time, conditional on homeowners who borrowed. The analysis includes equity extraction based on the recently released 2007–2009 data. Equity extraction over this period excludes households that extracted equity when they moved, since the moving variable is not yet available. The results in Table 1 show that the average amount of equity extraction was relatively flat in the late 1990s and early 2000s and then increased steadily over time through the decade as house prices rose. The increasing amount of equity extracted is consistent with aggregate data reported in Greenspan and Kennedy (2007). Somewhat surprisingly, the average amount of equity extracted does not fall off between 2007 and 2009, even though real house prices declined sharply. These data are preliminary, however, so one should probably not make too much of the result for now.

The data also suggest that even though the amount of equity extraction rose somewhat between 2001-to-2003 and 2003-to-2005, and between 2003-to-2005 and 2005–2007, fewer households actually borrowed than during the 2001–2003 period. In other words, the data suggest that households extracted larger amounts of equity, conditional on borrowing, during the primary years of the housing boom, rather than more households' borrowing. In addition, the distribution of equity extracted relative to house values was relatively similar over time. This suggests that households were extracting additional amounts over time in line with house-price growth, but were not necessarily borrowing unprecedented amounts relative to their house values during the house-price boom. The mean and median of equity extracted relative to house prices do increase somewhat from 2007 to 2009, but this is consistent with falling house values.

Table 2 compares the sample means of various household demographic and financial variables for households that did and did not borrow against their homes. Overall, households that extracted equity in the early 2000s tended to have similarly aged household heads but somewhat larger family sizes than those that did not borrow. A much greater percentage of equity extractors were also married. Together, these results suggest that larger households with greater spending needs were the ones that borrowed against their homes. Larger households likely have a more difficult time coping with income shortfalls, and thus these statistics are broadly consistent with households' extracting equity to finance and smooth consumption.

In addition, households that extracted equity had higher loan-to-value (LTV) ratios, on average, than those households that did not borrow, but a somewhat smaller percentage of

extractors had less than 20 percent equity in their homes. The higher actual LTV ratio for borrowers suggests that they are potentially at a stage in their life cycle when they need to take on more debt. The fact that fewer extractors than nonextractors had extremely high LTV ratios, however, is consistent with the greater difficulty of borrowing against one's home when one has limited existing equity.

Households that extracted equity also had less liquid wealth than those households that did not.[18] This finding is broadly consistent with households' being more likely to borrow against their home when they lack other options, such as liquid savings, to finance their needed spending and investment. In contrast, households that extracted equity had much higher illiquid wealth holdings (excluding housing) than nonextractors. This result is further consistent with the idea that households choose to extract equity when they lack other liquid financing options. It is also worth noting, however, that the differences in liquid wealth holdings between equity extractors and nonextractors decreased a bit over time, suggesting that perhaps the alternative financing motive for equity extraction diminished somewhat during the house-price boom.

In addition, extractors had substantially higher amounts of noncollateralized debt on average than nonextractors (bottom panel-Table 2). This finding is broadly consistent with the idea that households borrowed against their homes to consolidate other, higher-cost debt. Equity extractors also tended to have higher-valued other real estate holdings as well, suggesting that they may be households with a higher desire to hold additional real estate beside their primary residence. Furthermore, the value of personal businesses was somewhat higher for households that extracted equity than for those that did not, especially between 2001 and 2007. This suggests that households that extracted equity during the main years of the house-price boom may have been somewhat more entrepreneurial than households that did not.

4 Results

4.1 Predictors of Equity Extraction over Time

Table 3 reports the results from estimating equation 1. Households must own a home at the beginning and end of the equity extraction period (for example, in both 2001 and 2003) in order to be included in the estimation sample. Extreme outliers, such as households that report over $2 million dollars of extracted equity, are eliminated from the sample. The coefficient estimates in Table 4, and for all of the binary, dependent-variable model results in this paper, report the *marginal* impact of the given variable on the dependent variable

[18] Liquid wealth is defined as cash holdings and stock market wealth net of any noncollateralized debt.

in question. These marginal effects are evaluated at the mean of the other independent variables.

In this case, the binary dependent variable in question is an indicator for whether or not households extracted equity over the relevant time period. For continuous variables, such as financial wealth, the coefficients report the impact of a small change in that variable on households' predicted probability of borrowing. For binary explanatory variables, the reported coefficients show the difference in households' predicted probability of equity extraction when the relevant covariate is true versus false. For example, the marginal impact of unemployment on equity extraction, $\hat{a}_7$, is defined as follows:

$$\hat{a}_7 = F(\bar{X}^i_{t+1} * b | U^i_{t+1} = 1) - F(\bar{X}^i_{t+1} * b | U^i_{t+1} = 0)\,, \tag{10}$$

where $F(\cdot)$ is the normal cumulative distribution function, $\bar{X}_t$ is the vector of the other independent variables evaluated at their means, b is the vector of coefficient estimates, and U^i_{t+1} is the indicator variable for whether or not a household is unemployed.[19] The results are similar when evaluating the marginal impact of the various covariates at the 25^{th} or 75^{th} percentiles of the other explanatory variables. These results are available upon request.

Overall, the results in Table 3 suggest that, as expected, households with higher levels of *liquid* assets had a somewhat lower predicted probability of extracting equity from their homes.[20] In particular, a $ 100,000 increase in households' liquid assets *reduces* their predicted probability of extracting equity by roughly 2 percentage points over the full sample. Given a predicted probability of equity extraction and an observational probability of around 30 percent, a 2-percentage-point increase is non-trivial. The negative relationship between liquid wealth holdings and equity extraction is particularly strong early in the sample. By the 2005-to-2007 period, the relationship is still negative, but the effect is not statistically different from zero. Overall, this pattern is broadly consistent with households' lack of liquid assets having a greater influence on their decision to borrow against their home early in the last decade than later. This implies that, as the housing boom progressed households perhaps had reasons for extracting equity other than as an alternative financing source .

In comparison, households' nonhousing illiquid wealth has a much smaller and less precisely estimated impact on their probability of borrowing. This reinforces the observation that liquid assets play a more important role in households' equity extraction decisions than illiquid ones, since liquid assets can be used more easily for needed or desired purchases. The negative overall relationship between illiquid assets and equity extraction is likely the result of households with high levels of liquid assets also having high levels of illiquid assets and having an overall lower need to borrow.

[19] When $\bar{X}_{t+1}$ includes additional dummy variables, they are evaluated at their mean value as well.

[20] Households' liquid assets equal their cash plus stock holdings less any outstanding noncollateralized debt.

The effect of income growth on households' equity extraction was negative in most periods, but all of the estimates lack precision. In other words, households with lower income growth were more likely to extract equity. This result is broadly consistent with the idea that households that experience negative income shocks are more likely to want to borrow to help smooth consumption. Similarly, households with heads who experienced a spell of unemployment were also more likely to extract equity, although the effect is again imprecise. Unemployed households should also want to borrow to help smooth consumption. The impact of a spouse's unemployment spells on equity extraction was more varied over time and also imprecisely estimated. The varied signed estimates of this effect are not overly surprising, however, since the head of the household tends to be the breadwinner, and thus his or her unemployment likely has a bigger impact on a household's need to smooth consumption.

Households whose house values were 1 percent higher than the mean were roughly 5 percentage points more likely to extract equity than other households. Higher house values often correlate with higher amounts of equity, so it is not surprising that such households were more likely to borrow, since they had the capacity to do so.[21] Households' existing leverage also impacted their predicted probability of equity extraction. In particular, households with LTV ratios above 0.8 had substantially lower predicted probabilities of extracting equity from their homes than households that were less leveraged. This result holds over time, and is consistent with highly leveraged households' facing increased borrowing costs. These households are also limited by having minimal amounts of equity should they want to borrow.

It is also worth noting that a marginal change in a household's actual leverage relative to the mean substantially *increases* the probability that the household borrows. This result likely captures the fact that households with higher LTV ratios have likely been in their homes a shorter amount of time, are likely younger, and are more likely to need or want to extract equity to finance home improvements or other expenditures. In contrast, households with LTV ratios near or at zero, own their homes outright. Having little or no mortgage debt likely means these households also have substantial other assets and on average have a very limited need to borrow additional funds.

Finally, households with college age children had a 4-percentage-point higher predicted probability of extracting equity overall than those households that did not have college age children. This finding is consistent with the idea that some households access the equity in their homes to invest in the human capital of their children. Somewhat interestingly, this effect was essentially nonexistent in the 2005–2007 period, when house prices were at their peak. Perhaps households' desire to fund their children's education expenses through home equity dropped off during the housing boom, especially if they had already exhausted their resources by borrowing early on. Alternatively, this seemingly anomalous result could be the

[21] Results using household equity instead of house values are similar.

result of noise in the data.

Overall, the results in Table 3 are broadly consistent with households' extracting equity from their homes to smooth consumption and/or finance other consumption and investment needs. In addition, the predictors of equity extraction do not appear to have varied much between the late 1990s and the 2000s. In other words, there is little evidence that households drastically changed their reasons for extracting equity during the height of the recent house-price boom.

4.2 Equity Extraction and Overall Household Spending

The top panel of Table 4 reports the estimates of equations 2 and 3. The results examine the impact of equity extraction on households' nonhousing consumption over the full sample and for selected subsamples. The full sample results use only the consumption data that are available consistently from 1999 forward.[22] The same is true for the 1999–2003 and 2005–2007 sample splits in the middle of the upper panel. The estimates for 2005–2007 in the last two columns of the table include the additional consumption data added to the PSID starting in 2005.

Overall, the full sample results show that a one-dollar increase in equity extraction led to a roughly 5-cent increase in nonhousing consumption over the full sample. This increase in spending by households that extracted equity was driven by those households that extracted equity but did *not* move. Such nonmovers spent nearly 8 cents of every additional dollar extracted on nonhousing expenditures compared with movers, whose spending was not impacted by their home equity borrowing. Households' spending patterns in response to equity extraction do not differ very much over the two subsamples of the data. The spending impact is slightly larger in magnitude for nonmovers over the 1999 to 2003 time horizon (roughly 9 cents per dollar increase in equity extraction), but is not significantly different from the 2005-to-2007 time period.

Households' spending response to equity extraction is somewhat larger in the 2005-to-2007 period when the additional consumption data are included in the analysis. In particular, the spending of nonmovers increases by about 12 cents per dollar increase in equity extraction, while the spending of movers remains unchanged. This slightly larger spending response is not surprising since the data provide a more comprehensive measure of household expenditures and include higher-cost items, such as home furnishings and vacations, that households may finance in part through equity extraction.

Table 4a shows the estimates of equation 3 by year. The results suggest that the impact of equity extraction on consumption was strongest from 2003 onward, although the effect

[22] In other words, these results exclude the data on home maintenance, home furnishings, recreation, clothing, and vacations.

diminished a bit in magnitude between 2005 and 2007. To the extent that households focused on equity extraction as a way of financing expenditures as their house prices continued to rise, it is not overly surprising that the impact of home equity borrowing on household spending was the largest during the later years of the house-price boom. Indeed, between the end of 2002 and the end of 2006, aggregate real house prices rose nearly 23 percent, before beginning to decline in 2007. Prior to the heart of the house-price boom, households perhaps extracted equity primarily for investment purposes or to consolidate other debts.

Section 4.5 considers the impact of equity extraction on disaggregated household expenditures. What is clear from the results in Table 4, however, is that only a relatively small portion of households' equity extraction went toward consumption expenditures. The impact of equity extraction on household spending was no more than 20 cents on the dollar, even in 2005 and 2007, when the PSID spending measures supposedly cover nearly all components of households' nonhousing expenditures. This suggests that on average households did not extract equity just to finance spending needs during the house-price boom. The data used in this analysis do not completely capture durable good expenditures, such as car purchases; however, the results are overall inconsistent with households' borrowing against their home just to finance large, one-time consumption needs.

4.3 Residential Investment (Home Improvements)

As noted earlier, the PSID asks whether a homeowner has made additions or other large-scale repairs or improvements to his or her house since the previous survey. Households that respond affirmatively are then asked a follow-up question about the actual amount they spent on such improvements, conditional on the amount being greater than $10,000. The results in Table 5 show the estimated impact of equity extraction on households' home improvement expenditures. The findings are conditional on households' saying they made residential investments, and take into account the data censoring.

The first column shows the results over the full sample, while the other columns report the results for the relevant two-year periods between PSID waves. Conditional on a household's making home improvements, nearly 17 cents per dollar it extracted went toward such residential investment. This effect is fairly large and very precisely estimated, given the relatively small portion of households in the sample (around 14 percent) that made home improvements between 1997 and 2009. The result is consistent with anecdotal evidence that suggests that households borrow against their homes and/or cash-out equity in order to finance home improvements.

Based on the bi-yearly data, the impact of equity extraction on home improvement spending was largest between 1997 and 1999, 2003 and 2005, and 2005 and 2007. In other

years, the effect was smaller and imprecisely estimated but still positive. The fact that there was a strong positive relationship between equity extraction and home improvement spending during the height of the house-price boom is not surprising, given the boom in construction and renovation spending that accompanied the rise in house prices. Between 1997 and 1999, house prices rose more modestly, however, so it is interesting to find such a large effect of equity extraction on residential investment. The prime rate of interest, to which most home equity loans and lines of credit are pegged, was also higher at the end of the 1990s than earlier in that decade or in the subsequent years. It may simply be the case that households focused on their existing equity rather than on house-price changes or interest rates when considering how to finance home improvements during that time. Indeed during that time, households' house values seem to have been an important predictor of equity extraction, so households with high housing wealth may have decided to make home improvements.

Overall, the results in Table 5 suggest that a good portion of each dollar of equity extracted went toward home improvements for households who made such investments. This finding further suggests that households also focused on bigger, longer-term projects in addition to their current spending needs when extracting equity from their homes.

4.4 Equity Extraction and Household Balance Sheet Effects

The top panel of Table 6 reports the estimates of the relationship between equity extraction and overall household saving (nonhousing investment) by period.[23] The relationship between equity extraction and the various components of household saving over time can be found in the appendix and are summarized at the bottom of Table 7. Overall, there appears to have been a positive relationship between equity extraction and household saving during the first three-quarters of the 2000s. This effect is particularly strong, and precisely estimated during the 2003–2005 and 2005–2007 periods. Once again, this timing coincides with the later years of the house-price boom, and the results confirm that even during the height of the house-price boom, households did not simply extract equity to fund consumption expenditures.

Equity extraction does, however, result in lower saving between 1999 and 2001. Looking at the disaggregated data suggests that this result was driven primarily by the negative impact of equity extraction on households' saving in bonds. It seems somewhat odd that households would borrow against their home and reduce their fixed income holdings at the

[23]The discussion in this section refers to households' saving in bonds and other financial assets. Often one thinks of households' "investing" in bonds or other assets, and saving can be used interchangeably with households' nonhousing investments. By investing, however, households are effectively "saving" out of their current income, which is why the term "saving" is used frequently in this section.

same time. If anything, risk-averse households might shift some savings into less risky assets when their debt burden increases, as a hedge against the inability to make payments in the future. Given that the PSID data ignore potential capital gains in bonds, the results might be picking up some of the turmoil in the financial markets at the turn of the century.

Households overall, as expected, tend to have a positive and relatively substantial marginal propensity to save out of their current income.[24] In addition, households with higher financial wealth ex ante, tend to save less over a given period. The regressions control for age, so this is not necessarily a life-cycle effect, but is likely capturing the fact that, on the margin, households with a higher existing stock of savings tend to save less out of their current resources. Overall, the saving equation results seem reasonable.

A potential concern with any saving analysis is that the saving of some households may be high because those households tend to be savers, while other households may save very little. The estimates in the bottom panel of Table 6 consider household saving behavior over multiple time periods and control specifically for household-specific fixed effects. If anything, the relationship between equity extraction and household saving becomes somewhat stronger after controlling for household-specific saving behavior. Over the entire sample, a one-dollar increase in equity extraction leads to roughly a 20-cent rise in household saving.

The disaggregated estimates in Table 7, which also control for household-specific effects, suggest that the most frequent saving destination for extracted equity in the early and late period was investment in other real estate. In particular, a one-dollar increase in equity extraction leads to 11 cents higher saving in other real estate. This finding is consistent with the idea that households may borrow against their primary residence to either help purchase additional real estate or make upgrades to other properties that they already own. Equity extraction also appears to lead to increased cash holdings. This may be the result of households' cashing out more equity than they wish to spend immediately and choosing to hold it temporarily as cash. Households between 2003 and 2007 also appear to have invested some of their extracted equity in personal businesses and farms.

Somewhat interestingly, equity extraction resulted in lower savings in retirement accounts in the early period. Savings in nonretirement stock and bond accounts, however, increased somewhat during this time period, so perhaps households that borrowed switched from retirement-based saving to nonretirement accounts. The bottom portion of Table 8 reports the estimated relationship between equity extraction and disaggregated household saving on a year-by-year basis without controlling for household-specific effects. The patterns of the results, which are summarized in the next section, are very similar. Overall, the equity extraction and household saving results further reinforce the idea that households used the money they borrowed against their homes for investment purposes and not just to finance

[24]The timing of the income data in the 2007-to-2009 analysis is slightly different, due to data availability.

potentially frivolous consumer expenditures.

4.5 Summary

Table 8 summarizes the destination of a dollar of equity extraction in the early 2000s, in terms of households' consumption, investment, or saving. Many of the results have already been discussed, but the table shows both the impact of equity extraction on disaggregated household expenditures and period-by-period, disaggregated, active saving. The spending data cover a one-year period, while the residential investment and saving results cover a two-year period. For example, the column headed "2001" includes spending data from 2000 to 2001, and saving and investment data from 1999 to 2001. All the results are annualized. Note, as well, that the spending results are for nonmovers. Table A.1 in the appendix has the same setup but includes the spending results for movers and nonmovers. Precisely estimated effects of equity extraction are shown in italics.

The table is useful for viewing both the disaggregated effects and the overall potion of equity extraction that went toward the household spending, investment, and savings categories, as tracked with the PSID. During the height of the house-price boom from 2005 to 2007, between roughly 45 and 60 cents of each dollar of home equity extracted went toward household expenditures, residential investment, or increased saving. In addition, the amount of extracted resources destined for longer-term investments, such as home improvements and saving, was roughly double the amount that went toward household expenditures. This suggests that during the house-price boom, households were borrowing against their homes with future-oriented investments in mind and not just borrowing to finance current consumption needs. The results in 2003 account for about 35 cents of each dollar of equity extracted, and the split between consumption and investment spending is more evenly split.

The results do a somewhat poorer job of explaining the destination of households' extracted equity in the late 1990s and early 2000s, although there is certainly still evidence that households borrow for home improvement and spending purposes. It is difficult to draw broad conclusions from this inability to capture where households' equity extraction dollars were headed, as there are no saving data to analyze for the 1997-to-1999 period. In addition, the negative impact of equity extraction on saving in the 1999–2001 period seems to have been driven primarily by a reduction in bond holdings. As discussed earlier, this could be the result of turmoil in the financial markets at that time and not a pure equity extraction effect, given the way active saving in bonds is measured in the PSID.

In addition, regardless of the exact time period studied, the destination of a somewhat sizeable portion of each dollar of equity extraction remains unaccounted for by the data. This could be the result of reporting error. Household-level spending and saving data are

inherently noisy in general, and the PSID asks households to remember their saving and investment decisions over two-year horizons, which can prove difficult. An alternative, and perhaps more likely, explanation is that the PSID data cannot distinguish households that extract equity and/or take on second mortgages to help finance the purchase of a new home. The results discussed earlier suggest that the equity extraction effect is higher for movers than for nonmovers in terms of consumption; however, this approach likely does not capture the full impact of households' extracting equity for existing or new home financing purposes, especially during the house-price boom.

In terms of the disaggregated saving data, it appears that households extract equity to invest in other real estate and personal businesses, as discussed earlier. Somewhat surprisingly, there is limited evidence of households' using equity extraction to pay down other noncollateralized debt (NCD), although the impact of equity extraction on NCD repayment is positive but small in four of the five years. This limited effect could be due to the timing of the data. The PSID does not capture exactly when households extract equity or adjust their saving, so it is possible that a household could extract equity to consolidate credit card debt at the beginning of a data period and then slowly build that debt back up as needs arise over the sample period. As a result, the household would appear not to have saved by paying down its NCD, and the estimated relationship between equity extraction and NCD would be zero.

Finally, the relationship between equity extraction and disaggregated household spending varies a good deal over time. The recurring theme of the results is that households extract equity to spend on nondiscretionary expenditures such as health care, transportation, food at home, home maintenance, and/or utilities. The positive relationship between equity extraction and automobile costs seems to be particularly strong. Since car costs include down payments for loans and leases, this finding suggests that perhaps households extracted equity from their homes to help finance vehicle purchases. Such behavior is consistent with households' focusing on bigger-ticket expenditures when extracting equity from their homes. In addition, since health care costs are often large and unexpected, it is also not surprising that there is a small, positive, but precisely estimated relationship between equity extraction and health expenses in three of the five years.

5 Conclusion

This paper examines the relationship between home equity extraction and household behavior during the 2000s and late 1990s, using data from the PSID. The goal is to analyze the factors that impact households' decisions to borrow against their homes and see whether these reasons for borrowing have changed over time. The paper also considers how equity

extraction impacts household expenditures, residential investment, and households' balance sheets. In particular, the paper tries to understand the reasons households extract equity from their homes and distinguish whether they borrow to meet their short-term spending needs versus borrow for investment purposes.

Overall, the results suggest that households' reasons for borrowing against their homes have changed little over time. Households that have lower levels of financial wealth are more likely to extract equity than are households with higher house values and college age children. The analysis suggests that households borrowed primarily to fund nondiscretionary consumption expenditures. The results are broadly consistent with households' using their equity to finance unexpected consumption shocks or to make up for income shortfalls.

The nonhousing consumption impact of equity extraction is also relatively small. One dollar of equity extracted leads to no more than 20 cents of increased household expenditures. In contrast, the amount of equity extracted that goes toward saving or home improvement investment is nearly double that of consumption during the 2003-to-2005 and 2005-to-2007 periods. As a result, the results are inconsistent with households' extracting equity only to fund consumption needs during the house-price boom. Indeed, the positive, and relatively substantial, empirical relationship between equity extraction and home improvement investment, as well as between equity extraction and increases in business and other real estate investment, suggests that households took advantage of rising home equity to invest in the future as well.

In addition, the results do not find evidence of large swings in household behavior with regard to equity extraction before versus during the house-price boom. In other words, households do not appear to have radically altered their motivation for extracting equity as house prices continued to rise in the mid-2000s. It will be interesting to see how household behavior with regards to home equity borrowing changes, now that prices have dropped and households' outstanding equity has generally declined. The pre-release 2009 data provide a glimpse of what may happen, but they are limited and thus it is difficult hard to draw strong conclusions. What little data there are suggest that some of the household saving patterns in response to equity extraction observed in this paper remain, but are perhaps less strong.

An additional question worth considering in future work is the extent to which the timing of the data matters for capturing the relationship between equity extraction and household spending and investment behavior. In particular, this paper does not find any empirical relationship between equity extraction and noncollateralized debt repayment, despite the potential cost savings for households and anecdotal evidence suggesting that households did indeed extract equity to consolidate other debt. The paper argued that this discrepancy could be due to the timing of the data in the PSID, and the larger question is whether one gains additional insight into household behavior by trying to pin down households' spending

and investment decisions at the exact moment they choose to extract home equity. It is not clear whether such data exist, however, and this issue is left for consideration in future work.

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Table 1

Distribution of Equity Extraction by Period

For Homeowners who Extract Equity

	1997-1999	**1999-2001**	**2001-2003**	**2003-2005**	**2005-2007**	**2007-2009**
mean	28107	27977	31246	36449	41337	66110
median	15698	18221	18479	19627	22121	33478
1^{st} Percentile	547	1012	973	493	885	837
5^{th} Percentile	1047	1012	1945	935	1770	1674
25^{th} Percentile	5756	6074	6808	6542	8406	8370
75^{th} Percentile	31397	35430	38904	45797	49550	87880
95^{th} Percentile	94191	89080	108930	130848	145850	230162
99^{th} Percentile	209312	172087	204244	275715	283144	399226
% Homeowners who Extracted Equity	23.0	21.7	27.0	24.2	23.1	30.5
N(Homeowners)[a]	4184	4482	4754	4778	4817	4685

Source: Author's calculations using PSID data. [a] Number of homeowners in sample. The sample is restricted to households owning a home at the beginning and end of the equity extraction period. Households that report more than 2 million dollars of equity extracted are also dropped.

Equity Extraction Relative to House Values

	1997-1999	**1999-2001**	**2001-2003**	**2003-2005**	**2005-2007**	**2007-2009**
mean	0.226	0.230	0.199	0.196	0.195	0.369
median	0.134	0.138	0.123	0.120	0.122	0.204
1^{st} Percentile	0.002	0.003	0.004	0.002	0.004	0.006
5^{th} Percentile	0.011	0.011	0.012	0.008	0.010	0.012
25^{th} Percentile	0.057	0.052	0.051	0.044	0.052	0.063
75^{th} Percentile	0.300	0.333	0.248	0.257	0.254	0.655
95^{th} Percentile	0.786	0.764	0.685	0.728	0.636	1.019
99^{th} Percentile	1.150	1.080	1.130	1.043	1.115	1.290
% Homeowners who Extracted Equity	23.0	21.7	27.0	24.2	23.1	30.5
N(Homeowners)[a]	4184	4482	4754	4778	4817	4685

Source: Author's calculations using PSID data. [a] Number of homeowners in sample. The sample is restricted to households owning a home at the beginning and end of the equity extraction period. Households that report more than 2 million dollars of equity extracted are excluded, as are those households with relative equity ratios above 1.5.

Table 2

Summary Statistics: Households Who Do and Do not Extract Equity

(Mean Values)

Household Demographics and Financial Assets

Variable	1997-1999		1999-2001		2001-2003		2003-2005		2005-2007		2007-2009	
	EE[a]	No EE[b]	EE[a]	No EE[b]	EE[a]	No EE[b]	EE[a]	No EE[b]	EE[a]	No EE[b]	EE[a]	No EE[b]
Age of Household Head	44.2	44.6	45.2	45.1	45.1	45.1	45.5	45.1	46.7	45.5	43.6	45.6
Number in Family Unit	3.3	2.8	3.3	2.9	3.2	2.8	3.1	2.8	3.1	2.7	2.9	2.6
Married (%)	76.6	51.8	75.3	51.2	76.2	48.7	74.4	48.6	74.3	48.4	71.0	51.6
Avg. Weeks Head Unemployed	0.5	1.4	0.6	1.4	0.7	1.4	0.7	1.4	0.9	1.4	0.9	1.4
Avg. Weeks Spouse Unemployed	0.3	0.6	0.7	0.6	0.7	0.7	0.5	0.7	0.9	0.7	0.7	0.7
Disposable Income	58667	41152	75538	52939	71208	47148	82045	52492	84225	55682	81385	56037
% Change Income	0.19	0.16	-0.10	-0.06	0.11	-0.01	-0.01	-0.05	0.01	0.02	N.A	N.A.
House Value	213054	213387	198770	229431	222018	253386	242502	262024	309066	316256	188086	108151
% Change House Prices	0.08	0.12	0.13	0.10	0.10	0.10	0.10	0.22	0.03	-0.04	-0.07	-0.16
% Change MSA House Prices	0.07	0.07	0.08	0.08	0.09	0.09	0.17	0.15	-0.01	-0.00	N.A.	N.A.
Home Equity	151722	140108	132283	142381	141076	178725	149344	182784	202728	227292	105771	66121
LTV Ratio	0.49	0.38	0.47	0.42	0.51	0.40	0.52	0.41	0.51	0.40	0.47	0.40
LTV Ratio ≥ 0.8 (% with)	15.9	17.8	16.3	19.5	16.2	19.0	18.5	20.0	19.0	17.8	17.3	18.3
Value of Liquid Assets	N.A	N.A	20764	47580	26924	30945	22082	32768	26684	29677	18903	21488
Value of Illiquid Assets[c]	N.A.	N.A.	101126	76137	109245	67324	97842	67511	101088	80626	58206	44786

Source: Author's calculations based on PSID data. N.A. Not available; [a]Households that extract equity; [b]Households that do not extract equity; [c]Excludes housing wealth. Homeowners who do and do not extract equity are identified as discussed in the text. All variables are measured at the beginning of each period and are in real 2000 dollars where applicable. The change in house prices and income is calculated over the equity extraction period. Illiquid assets exclude housing wealth.

Detailed Non-Housing Asset Positions

Variable	1997-1999		1999-2001		2001-2003		2003-2005		2005-2007		2007-2009	
	EE[a]	No EE[b]	EE[a]	No EE[b]	EE[a]	No EE[b]	EE[a]	No EE[b]	EE[a]	No EE[b]	EE[a]	No EE[b]
Other Real Estate	N.A.	N.A	28521	16609	27150	17720	26622	18387	29109	21637	31348	17071
Farm/Business Value	N.A.	N.A	24036	24446	32162	17938	26852	18740	29365	24926	-19275	-7443
Cash Holdings	N.A.	N.A	12141	10356	10872	12685	12388	12991	9505	13660	13770	13854
Stock Holdings	N.A.	N.A	18205	42064	25080	23816	18652	25623	27150	22530	17863	15311
Bond Holdings	N.A.	N.A	11755	6554	9182	5556	9671	5031	5901	6908	6412	5532
Vehicle(s)	N.A.	N.A	15303	10410	16653	9924	15216	9543	14745	9687	13279	9386
Noncollateralized debt	N.A.	N.A	9583	4840	9028	5556	8959	5846	9971	6513	12730	7676
IRA/Retirement Account	N.A.	N.A	21511	18118	24098	16186	19481	15810	21968	17468	26443	20240

Source: Author's calculations based on PSID data. N.A. Not available; [a]Households that extract equity; [b]Households that do not extract equity; [c]Excludes housing wealth. Homeowners who do and do not extract equity are identified as discussed in the text. All variables are measured at the beginning of each period and are in real 2000 dollars where applicable. The change in house prices and income is calculated over the equity extraction period. Illiquid assets exclude housing wealth.

Table 3

Predictors of Equity Extraction by Period
Probit Regressions

Regressor	Full Sample	1997-1999	1999-2001	2001-2003	2003-2005	2005-2007
% ΔIncome$_{t,t+1}$	0.020	−0.104	−0.022	−0.014	−0.091	0.086
	(0.037)	(0.092)	(0.069)	(0.083)	(0.073)	(0.092)
Liquid Fin. Wealth$_t$ [†]	−0.018***		−0.062***	−0.022**	−0.021	−0.009
	(0.007)		(0.019)	(0.011)	(0.014)	(0.008)
Illiquid Fin. Wealth$_t$ [†]	−0.005*		0.008	−0.003	−0.010*	−0.008
	(0.003)		(0.005)	(0.005)	(0.006)	(0.005)
ln(House Value)$_t$	0.049***	0.005	0.042**	0.064***	0.062***	0.034**
	(0.008)	(0.016)	(0.017)	(0.016)	(0.017)	(0.015)
% ΔHouse Prices$_{t,t+1}$ [‡]	0.079*	−0.010	−0.036	−0.077	0.101	−0.250*
	(0.046)	(0.226)	(0.202)	(0.146)	(0.080)	(0.151)
Head Unemployed$_{t,t+1}$ [a,b]	0.047	−0.081	0.043	0.077	0.021	0.048
	(0.038)	(0.067)	(0.093)	(0.077)	(0.075)	(0.071)
Spouse Unemployed$_{t,t+1}$ [a,b]	−0.002	−0.069	−0.063	0.061	−0.054	0.023
	(0.036)	(0.086)	(0.077)	(0.077)	(0.066)	(0.066)
LTV Ratio$_t$	0.298***	0.321***	0.158***	0.410***	0.301***	0.327***
	(0.021)	(0.045)	(0.041)	(0.046)	(0.042)	(0.042)
LTV $\geq 0.8_t$ [a]	−0.172***	−0.212***	−0.138***	−0.246***	−0.168***	−0.132***
	(0.014)	(0.026)	(0.029)	(0.026)	(0.028)	(0.028)
College Age Kids$_t$ [a]	0.040***	0.040	0.052**	0.042	0.042	−0.007
	(0.014)	(0.029)	(0.027)	(0.028)	(0.027)	(0.029)

[†] In 100000s; [‡] House-price data based on FHFA MSA-level house-price indexes; [a] Indicator variable that takes the value of 1 if the statement is true and is 0 otherwise; [b] Dummy variable equals 1 if head or spouse reports more than 13 weeks of unemployment over the relevant sample period. The table reports marginal effects evaluated at the mean of the other variables. Financial wealth data are unavailable in 1997 and are dropped from the analysis in column 3. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head and a dummy variable for the region of households' residences. Including additional demographic variables does not impact the overall results. Robust errors are in parentheses: * indicates significance at the 10-percent level, ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Table 4

Dollar Impact of Equity Extraction on Household Spending Over Time

Regressor	**Full Sample**		**1999-2003**		**2005-2007**		**2005-2007**[a]	
Amount Extracted $(AE)_{t,t+1}$	0.047^{***}	0.079^{***}	0.038	0.088^{*}	0.052^{***}	0.074^{***}	0.084^{***}	0.117^{***}
	(0.017)	(0.025)	(0.029)	(0.045)	(0.018)	(0.025)	(0.027)	(0.039)
$Income_{t+1}$	0.138^{***}	0.139^{***}	0.185^{***}	0.186^{***}	0.107^{***}	0.108^{***}	0.162^{***}	0.163^{***}
	(0.013)	(0.013)	(0.036)	(0.036)	(0.011)	(0.011)	(0.017)	(0.017)
Financial $Wealth_{t+1}$	−0.000	−0.000	−0.001	−0.001	−0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
House $Value_{t+1}$	0.006	0.005	−0.006	−0.007	0.012^{***}	0.011^{***}	0.022^{***}	0.021^{***}
	(0.005)	(0.006)	(0.017)	(0.017)	(0.003)	(0.002)	(0.004)	(0.003)
$Moved_{t+1}$		1009.2		-341.6		2826.5		6107.3^{*}
		(1661.7)		(1195.3)		(3351.6)		(3628.0)
Moved x $AE_{t,t+1}$		-0.083^{***}		-0.104^{*}		-0.075^{**}		-0.121^{**}
		(0.029)		(0.054)		(0.033)		(0.048)
Memo:								
AE Conditonal $Move_{t,t+1}$		−0.004		−0.016		−0.001		−0.003
		(0.016)		(0.027)		(0.003)		(0.030)
N	18323	18322	10729	10728	7594	7594	7154	7154

The dependent variable is households' consumption excluding housing over the period in question as reported in the PSID. [a] Spending measure includes additional consumption data available only from 2005 onward. The amount extracted is averaged over the relevant time period to be consistent with the coverage period for the spending measure. Income is treated as endogenous. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head as well as dummy variables for households' region of residence. Including additional demographic variables does not impact the overall results. Robust errors are in parentheses: * indicates significance at the 10-percent level , ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Table 4a

Dollar Impact of Equity Extraction on Household Spending by Year

Regressor	**1999**	**2001**	**2003**	**2005**[a]	**2007**[a]
Amount Extracted $(AE)_{t,t+1}$	0.021	0.049	0.179*	0.190**	0.100**
	(0.077)	(0.044)	(0.093)	(0.076)	(0.046)
$Income_{t+1}$	0.115***	0.230***	0.169**	0.218***	0.170***
	(0.019)	(0.028)	(0.074)	(0.034)	(0.025)
$Financial\ Wealth_{t+1}$	−0.000	−0.003	0.001	−0.006	−0.000
	(0.002)	(0.002)	(0.003)	(0.010)	(0.000)
$House\ Value_{t+1}$	0.015**	0.000	−0.017	−0.000***	0.018***
	(0.006)	(0.005)	(0.034)	(0.000)	(0.005)
$Moved_{t+1}$	-2.0e+03	931.3	403.9	3521.4**	1.0e+04
	(2314.3)	(1314.1)	(1766.7)	(1544.7)	(7624.2)
Moved x $AE_{t,t+1}$	0.047	−0.159	−0.211**	−0.167*	−0.107*
	(0.083)	(0.104)	(0.095)	(0.100)	(0.062)
Memo:					
AE Conditonal $Move_{t,t+1}$	0.069***	−0.110	−0.031	0.023	−0.007
	(0.023)	(0.095)	(0.028)	(0.043)	(0.046)
N	3279	3622	3827	3766	3484

The dependent variable is households' consumption excluding housing over the period in question as reported in the PSID. [a] Spending measure includes additional consumption data available only from 2005 onward. The amount extracted is averaged over the relevant time period to be consistent with the coverage period for the spending measure. Income is treated as endogenous. "Moved" is a dummy variable that takes a value of 1 if the household has changed residences since the previous survey, and is 0 otherwise. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head as well as dummy variables for households' region of residence. Including additional demographic variables does not impact the overall results. Robust errors are in parentheses: * indicates significance at the 10-percent level , ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Table 5

Effect of Equity Extraction on Residential Investment
Results Conditional on Households Making Home Improvements

Regressor	Full Sample	1997-1999	1999-2001	2001-2003	2003-2005	2005-2007	2007-2009
Amount Extracted $(AE)_{t,t+1}$	0.168^{***}	0.223^{***}	0.041	0.059	0.211^{***}	0.173^{***}	0.043
	(0.018)	(0.036)	(0.047)	(0.036)	(0.039)	(0.038)	(0.029)
Income_t	0.046^{***}	0.025	0.015^{*}	0.037^{***}	0.054^{***}	0.056^{***}	0.046^{***}
	(0.003)	(0.015)	(0.006)	(0.010)	(0.005)	(0.014)	(0.012)
$\text{Financial Wealth}_t$	0.002^{***}	0.001	0.008^{***}	0.004^{*}	0.005^{*}	0.007^{*}	-0.002
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
House Value_t	0.002^{*}	0.053^{***}	-0.004	-0.001	0.004^{*}	0.000	0.023^{***}
	(0.001)	(0.011)	(0.009)	(0.002)	(0.002)	(0.002)	(0.008)
N	2634	622	397	500	505	610	465

The data are bottom coded at $ 10,000 and the results are estimated taking into account this data censoring. The values reported in the table represent the marginal effect of the independent variable on the unconditional expected value of the amount spent on home improvements. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head. Including additional demographic variables does not impact the overall results. Robust errors are in parentheses: * indicates significance at the 10-percent level, ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.[d] noncollateralized debt.

Table 6

Dollar Impact of Equity Extraction on Household Saving Over Time

Regressor	**1999-2001**	**2001-2003**	**2003-2005**	**2005-2007**	**2007-2009**
Amount Extracted$_{t,t+1}$	-0.152^{*}	0.118	0.193^{**}	0.163^{**}	0.001
	(0.092)	(0.082)	(0.095)	(0.075)	(0.037)
Income$_{t,t+1}$	0.210^{***}	0.076^{**}	-0.012	0.122^{**}	
	(0.073)	(0.033)	(0.057)	(0.055)	
Income$_t$					0.112^{***}
					(0.030)
Financial Wealth$_t$	-0.043^{**}	-0.022	-0.025	-0.022^{**}	-0.000
	(0.017)	(0.020)	(0.024)	(0.009)	(0.000)
House Value$_t$	-0.000	0.000	0.000	0.001	0.002
	(0.036)	(0.001)	(0.001)	(0.019)	(0.013)
N	2506	2696	2914	3090	3653

The dependent variable is households' total active saving excluding housing over the period in question. To control for outliers, the top and bottom 1 percent of households in the active saving distribution in a given year are excluded from the analysis.The setup in column 5 is slightly different due to data availability and does not include households that extracted equity while selling one home and purchasing another between 2007 and 2009. In columns one through four, income is treated as endogenous. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head. Including additional demographic variables does not impact the overall results. Robust errors are in parentheses: * indicates significance at the 10-percent level , ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Dollar Impact of Equity Extraction on Household Saving Regressions that Control For Household-Specific Effects

Regressor	**1999-2007**	**1999-2003**	**2003-2007**
Amount Extracted$_{t,t+1}$	0.197^{***}	0.172^{*}	0.224^{***}
	(0.039)	(0.093)	(0.066)
Income$_{t,t+1}$	0.152^{*}	-0.094	0.112
	(0.082)	(0.066)	(0.091)
Financial Wealth$_t$	-0.078^{***}	-0.155^{***}	-0.070^{***}
	(0.005)	(0.012)	(0.007)
House Value$_t$	-0.001	-0.003	0.003
	(0.002)	(0.004)	(0.003)
N	13606	6307	7299

The dependent variable is households' total active saving excluding housing over the period in question. To control for outliers, the top and bottom 1 percent of households in the active saving distribution are excluded from the analysis. Income is treated as endogenous. All variables are in 2000 dollars where applicable. The households control for household-specific fixed effects and also include a cubic in the age of the household head. Including additional demographic variables does not impact the overall results. Robust errors are in parentheses: * indicates significance at the 10-percent level , ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Table 7

Dollar Impact of Equity Extraction on Household Saving by Type of Saving (1999-2003)
Regressions that Control for Household-Specific Effects

Regressor	Other Property	Business or Farm	Cash	Stocks	Bonds	Vehicles	Reduced Debt	IRA/ 401k
Amount Extracted$_{t,t+1}$	0.111***	0.005	0.089*	0.042	0.044	−0.062***	−0.005	−0.052***
	(0.027)	(0.013)	(0.043)	(0.072)	(0.052)	(0.024)	(0.019)	(0.011)
Income$_{t+1}$	−0.071***	−0.023*	−0.067*	0.028	0.020	0.053***	−0.021	−0.012
	(0.020)	(0.010)	(0.031)	(0.052)	(0.037)	(0.017)	(0.014)	(0.008)
Financial Wealth$_t$	0.015***	0.001	−0.065***	−0.076***	−0.024***	−0.007*	−0.004	0.004***
	(0.004)	(0.002)	(0.006)	(0.009)	(0.007)	(0.003)	(0.002)	(0.001)
House Value$_t$	−0.001	−0.001*	−0.003*	0.000	0.001	−0.000	−0.000	0.001*
	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)	(0.000)
N	6307	6307	6307	6307	6307	6307	6307	6307

Dollar Impact of Equity Extraction on Household Saving by Type of Saving (2003-2007)
Regressions that Control for Household-Specific Effects

Regressor	Other Property	Business or Farm	Cash	Stocks	Bonds	Vehicles	Reduced Debt	IRA/ 401k
Amount Extracted$_{t,t+1}$	0.114***	0.039***	0.058*	0.000	−0.018	−0.004	0.022	0.013
	(0.022)	(0.013)	(0.032)	(0.053)	(0.032)	(0.014)	(0.015)	(0.013)
Income$_{t+1}$	−0.015	−0.002	0.132***	−0.049	0.032	0.017	−0.001	−0.002
	(0.031)	(0.019)	(0.044)	(0.073)	(0.045)	(0.019)	(0.021)	(0.017)
Financial Wealth$_t$	−0.032***	0.008***	0.001	−0.014*	−0.026***	−0.005***	−0.006***	0.002*
	(0.002)	(0.001)	(0.003)	(0.006)	(0.003)	(0.001)	(0.002)	(0.001)
House Value$_t$	0.001	0.000	−0.001	0.001	0.000	0.001	0.001	0.000
	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)
N	7299	7299	7299	7299	7299	7299	7299	7299

The dependent variable is households' active saving in the relevant asset. To control for outliers, the top and bottom 1 percent of households in the active saving distribution are excluded from the analysis. Income is treated as endogenous. All variables are in 2000 dollars where applicable. The households control for household-specific fixed effects and also include a cubic in the age of the household head. Including additional demographic variables does not impact the overall results. Robust errors are in parentheses: * indicates significance at the 10-percent level , ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Table 8

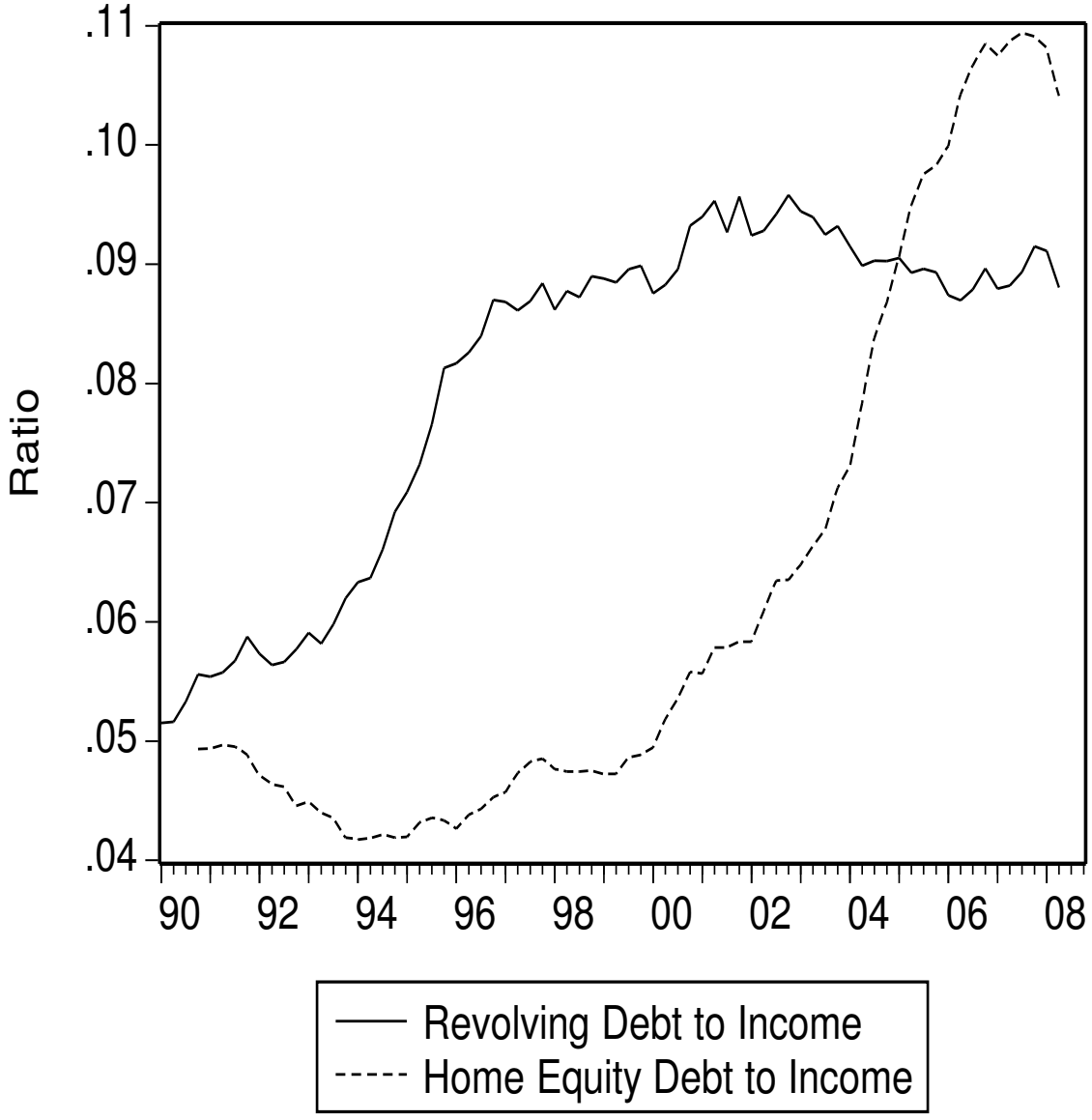
Destination for $ 1 of Equity Extraction

Item	1999	2001	2003	2005	2007	2009
Consumption (Nonmovers)						
Non-housing Expenditures[a]	0.021	0.049	*0.179*	*0.190*	*0.100*	N.A.
Health	*0.018*	*0.016*	*0.016*	0.008	0.000	N.A.
Transportation	*0.007*	0.008	*0.022*	*0.011*	0.018	N.A.
Childcare	*-0.006*	-0.001	0.001	-0.002	-0.004	N.A.
School	0.005	0.002	0.017	*0.040*	-0.005	N.A.
Automobile Costs[b]	*0.057*	0.002	*0.067*	0.034	0.014	N.A.
Utilities	0.002	*0.009*	0.006	*0.014*	*0.008*	N.A.
Food Expenditures	-0.053	0.008	0.024	*0.021*	*0.017*	N.A.
Food Home	*0.009*	-0.001	*0.012*	0.008	*0.014*	N.A.
Food Out	0.010	0.010	0.009	0.013	0.001	N.A.
Food Delivery	-0.073	-0.107	-0.000	-0.020	0.001	N.A.
Home Maintenance	N.A.	N.A.	N.A.	*0.035*	0.043	N.A.
Home Furnishings	N.A.	N.A.	N.A.	0.001	-0.004	N.A.
Recreation	N.A.	N.A.	N.A.	0.015	-0.003	N.A.
Clothing	N.A.	N.A.	N.A.	0.007	-0.003	N.A.
Vacation	N.A.	N.A.	N.A.	*0.010*	*-0.007*	N.A.
Residential Investment						
Home Additions and Improvement[c]	*0.233*	0.041	0.059	*0.211*	*0.173*	*0.043*
Saving						
Total Active Saving[a]	N.A	*-0.152*	0.118	*0.193*	*0.163*	0.001
Business/Farm Investment	N.A	-0.022	0.115	0.051	0.043	0.013
Other Real Estate	N.A	-0.005	0.005	0.028	*0.031*	*0.047*
Cash	N.A	-0.003	0.024	-0.025	*0.138*	-0.039
Stocks	N.A	0.028	-0.008	0.067	0.000	-0.035
Bonds	N.A	-0.083	0.017	*0.059*	-0.041	*0.040*
Vehicles	N.A	-0.049	*-0.024*	0.005	-0.008	0.000
NCD[d] Repayment	N.A	0.007	0.008	0.007	0.009	-0.013
IRA/401k	N.A	-0.010	*-0.018*	-0.002	-0.009	*0.013*

Estimates in italics are statistically significant at conventional levels—see earlier tables for additional information; The residential investment and saving data cover the period between waves of the survey (i.e., 2001 data cover 1999-2001); [a] Numbers may not add exactly due to rounding; [b] Automobile costs include vehicle down payments, monthly lease and loan payments, car insurance, maintenance, and other related frequent vehicle costs, but not purchase costs for households that buy a vehicle outright. [c] Results conditional on households that report such expenses. The data are bottom coded at $ 10,000 and the results are estimated taking into account this data censoring; [d] noncollateralized debt.

Figure 1

Home Equity and Credit Card Debt



Sources: Income - NIPA; Home Equity Debt - Federal Reserve Z.1 release; Revolving Debt - Federal Reserve G.19 release.

A Appendix

A.1 Detailed Active Saving Calculations

Calculating households' active saving in the PSID depends on the asset in question. In particular, active saving for assets with potentially large capital gain components, such as stocks, IRA accounts or annuities, other real estate, and investment in businesses or farms is defined as follows:

$$as^{i,j}_{t-1,t} = I^{i,j}_{t-1,t} - R^{i,j}_{t-1,t} \, , \tag{A.1}$$

where $as^{i,j}_{t-1,t}$ is active saving for household i in asset j, $I^{i,j}_{t-1,t}$ is the amount invested by household i in asset j between $t-1$ and t, and $R^{i,j}_{t-1,t}$ is the amount removed from asset j by household i over that same period.

For asset categories where capital gains are not a factor, active saving is simply the difference in a household's reported asset value in period t compared with its value in period $t-1$. These assets include: households' checking and saving account holdings, bond holdings, vehicle values, and noncollateralized debt. In particular,

$$as^{i,j}_{t-1,t} = V^{i,j}_{t} - V^{i,j}_{t-1} \, , \tag{A.2}$$

where V^{j}_{t} is the value of asset j at time t. The remaining active saving category is housing ($j = h$). The actual calculation of households' saving in housing depends on whether or not a household moves. Households that do not move "save" by paying down their mortgage principal, while households that move may potentially save or dis-save by altering the amount of equity in their homes. In particular,

$$as^{i,h}_{k-1,k} = \begin{cases} D^{i,h}_{k-1} - D^{i,h}_{k} & \text{if move } = 0 \\ E^{i,h}_{k} - E^{i,h}_{k-1} & \text{if move } = 1 \, , \end{cases} \tag{A.3}$$

where $D^{i,j}_{k}$ is a household's amount of outstanding mortgage debt in period k, $E^{i,j}_{k}$ is the amount of equity a household has in its home at time k, and *move* is an indicator variable that equals 1 if a household moved between $k-1$ and k and is 0 otherwise. I use k as the time subscript to represent the fact that the time horizon for active saving in housing is different than for the other assets. Prior to 1999, housing data are available yearly, and the difference between k and $k-1$ represents one year, while $t-1$ to t covers five years. After 1999, the housing and active saving data cover two-year horizons and $t = k$. More formally:

$$as^{i,h}_{t-1,t} = \begin{cases} \sum_{k=t-1}^{t} as^{i,h}_{k,k+1} & t \leq 1999 \\ as^{i,h}_{k,k+1} & t > 1999 \, . \end{cases} \tag{A.4}$$

I sum yearly active saving in housing prior to 1999 so it covers the same time horizon as the other active saving measures.

Total active saving for a given household is simply the sum of its saving in the individual asset components.

$$as^{i}_{t-1,t} = \sum_{j} as^{i,j}_{t-1,t} \, . \tag{A.5}$$

A.2 Equity Extraction Estimates with Transitory Consumption Shocks

Recall from Section 2.2 that the data-generating process of interest is

$$c^i_t = b_0 + b_2 y^i_t + \epsilon_t + \nu^i_t \, , \tag{A.6}$$

where ϵ_t is a macroeconomic shock and ν^i_t is a transitory shock to household spending. Suppose that the econometrician estimates the following regression

$$c^i_t = b_0 + b_1 x^i_t + b_2 y^i_t + u^i_t \, , \tag{A.7}$$

where x^i_t is the amount of equity extracted and u^i_t is the composite estimation error term ($u^i_t = \epsilon_t + \nu^i_t$).

For illustration purposes, assume that $b_0 = 0$ and $E[y^i_t u^i_t] = 0$, so that y^i_t can be dropped from the discussion for simplicity. The estimate of the equity extraction effect across all households, $\hat{b}_1$, is therefore defined as follows:

$$\begin{aligned} \hat{b}_1 &= (x'_t x_t)^{-1} x_t c_t \\ &= (x'_t x_t)^{-1} x_t (b_1 x_t + u_t) \, . \end{aligned} \tag{A.8}$$

Note that I drop the i superscripts because OLS averages across all households. Further suppose that $x_t = \lambda \nu_t$, which implies that $(1 - \lambda)$ of the transitory shock remains in the composite error term $u_t = \epsilon_t + (1 - \lambda)\nu_t$. This implies that

$$
\begin{aligned}
\hat{b}_1 &= (x_t' x_t)^{-1} x_t (b_1 x_t + \epsilon_t + (1-\lambda)\nu_t) \qquad \text{(A.9)} \\
&= b_1 + (x_t' x_t)^{-1} x_t \epsilon_t + (x_t' x_t)^{-1} x_t (1-\lambda)\frac{x_t}{\lambda} \\
&= b_1 + \frac{1-\lambda}{\lambda} + (x_t' x_t)^{-1} x_t \epsilon_t \\
\Rightarrow E[\hat{b}_1] &= b_1 + \frac{1-\lambda}{\lambda} \, .
\end{aligned}
$$

The last equation holds, since equity extraction is assumed to be uncorrelated with the macroeconomic shock and $E[x_t \epsilon_t] = 0$. This result implies that the estimate of the equity extraction effect is biased upward relative to the true value, assuming $\lambda < 1$.

Table A.1

Destination for $ 1 of Equity Extraction

(Consumption Results Include Movers)

Item	1999	2001	2003	2005	2007	2009
Consumption						
Nonhousing Expenditures[a]	0.035	0.001	0.062	*0.144*	*0.082*	N.A.
Health	0.010	0.007	0.003	0.005	-0.002	N.A.
Transportation	0.004	0.002	0.010	0.006	*0.015*	N.A.
Childcare	-0.005	-0.003	-0.004	-0.002	0.000	N.A.
School	*0.014**	0.002	0.004	*0.037*	-0.002	N.A.
Automobile Costs[b]	*0.055*	-0.008	0.028	0.021	0.010	N.A.
Utilities	0.001	0.003	0.001	*0.010*	*0.005*	N.A.
Food Expenditures	-0.040	-0.002	0.010	0.012	*0.022*	N.A.
Food Home	0.006	-0.002	0.003	0.004	*0.011*	N.A.
Food Out	0.005	0.003	0.007	0.009	0.011	N.A.
Food Delivery	-0.050	-0.069	-0.001	-0.014	0.001	N.A.
Home Maintenance		N.A.	N.A.	*0.031*	0.018	N.A.
Home Furnishings		N.A.	N.A.	0.000	0.006	N.A.
Recreation		N.A.	N.A.	0.012	-0.003	N.A.
Clothing		N.A.	N.A.	0.004	-0.001	N.A.
Vacation		N.A.	N.A.	*0.008*	-0.003	N.A.
Residential Investment						
Home Additions and Improvement[c]	*0.233*	0.041	0.059	*0.211*	*0.173*	*0.043*
Saving						
Total Active Saving[a]	N.A	*-0.152*	0.118	*0.193*	*0.163*	0.001
Business/Farm Investment	N.A	-0.022	0.115	0.051	0.043	0.013
Other Real Estate	N.A	-0.005	0.005	0.028	*0.031*	*0.047*
Cash	N.A	-0.003	0.024	-0.025	*0.138*	-0.039
Stocks	N.A	0.028	-0.008	0.067	0.000	-0.035
Bonds	N.A	-0.083	0.017	*0.059*	-0.041	*0.040*
Vehicles	N.A	-0.049	*-0.024*	0.005	-0.008	0.000
NCD[d] Repayment	N.A	0.007	0.008	0.007	0.009	-0.013
IRA/401k	N.A	-0.010	*-0.018*	-0.002	-0.009	*0.013*

Estimates in italics are statistically significant at conventional levels—see earlier tables for additional information; The residential investment and saving data cover the period between waves of the survey (i.e., 2001 data cover 1999-2001); [a] Numbers may not add exactly due to rounding; [b] Automobile costs include vehicle down payments, monthly lease and loan payments, car insurance, maintenance, and other related frequent vehicle costs, but not purchase costs for households that buy a vehicle outright. [c] Results conditional on households that report such expenses. The data are bottom coded at $ 10,000 and the results are estimated taking into account this data censoring; [d] noncollateralized debt.

Table A.2

Dollar Impact of Equity Extraction on Household Saving by Type of Saving: 2005-2007

Regressor	Other Property	Business or Farm	Cash	Stocks	Bonds	Vehicles	Reduced Debt	IRA/ 401k
Amount Extracted$_{t,t+1}$	0.043	0.031**	0.138**	0.000	−0.041	−0.008	0.009	−0.009
	(0.046)	(0.014)	(0.058)	(0.041)	(0.025)	(0.012)	(0.015)	(0.010)
Income$_{t,t+1}$	0.046	0.015	−0.040	0.032	0.037**	0.005	−0.000	0.027***
	(0.029)	(0.010)	(0.026)	(0.029)	(0.018)	(0.009)	(0.015)	(0.009)
Financial Wealth$_t$	0.001	−0.003	−0.003	−0.007	−0.007**	−0.002	−0.003	0.001
	(0.003)	(0.004)	(0.004)	(0.006)	(0.003)	(0.002)	(0.003)	(0.001)
House Value$_t$	0.024	−0.004	−0.003	−0.004	−0.009	0.002	−0.003	−0.002
	(0.015)	(0.004)	(0.013)	(0.016)	(0.006)	(0.003)	(0.005)	(0.003)
N	3089	3089	3089	3089	3089	3089	3089	3089

The dependent variable is households' active saving in the given category between 2005 and 2007. To control for outliers, the top and bottom 1 percent of households in the active saving distribution in a given year are excluded from the analysis. Income is treated as endogenous. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head. Robust errors are in parentheses: * indicates significance at the 10-percent level , ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Dollar Impact of Equity Extraction on Household Saving by Type of Saving: 2003-2005

Regressor	Other Property	Business or Farm	Cash	Stocks	Bonds	Vehicles	Reduced Debt	IRA/ 401k
Amount Extracted$_{t,t+1}$	0.051	0.028	−0.025	0.067	0.059*	0.005	0.007	−0.002
	(0.043)	(0.019)	(0.046)	(0.082)	(0.034)	(0.015)	(0.011)	(0.008)
Income$_{t,t+1}$	0.014	−0.024	0.038	−0.019	−0.053	−0.016	0.003	0.017**
	(0.013)	(0.019)	(0.027)	(0.039)	(0.081)	(0.010)	(0.009)	(0.007)
Financial Wealth$_t$	−0.010	0.013	0.003	−0.022*	−0.008	0.002	−0.002	0.003
	(0.008)	(0.011)	(0.004)	(0.013)	(0.007)	(0.003)	(0.001)	(0.004)
House Value$_t$	−0.000	−0.000	0.000	−0.000	0.000	0.000	0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
N	2914	2914	2914	2914	2914	2914	2914	2914

The dependent variable is households' active saving in the given category between 2003 and 2005. To control for outliers, the top and bottom one percent of households in the active saving distribution in a given year are excluded from the analysis. Income is treated as endogenous. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head. Robust errors are in parentheses: * indicates significance at the 10-percent level , ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Table A.3

Dollar Impact of Equity Extraction on Household Saving by Type of Saving: 2001-2003

Regressor	Other Property	Business or Farm	Cash	Stocks	Bonds	Vehicles	Reduced Debt	IRA/ 401k
Amount Extracted$_{t,t+1}$	0.115**	0.005	0.024	−0.008	0.019	−0.024*	0.008	−0.018**
	(0.052)	(0.007)	(0.036)	(0.059)	(0.031)	(0.014)	(0.012)	(0.008)
Income$_{t,t+1}$	−0.018	0.004	−0.034	0.104*	0.019	0.002	−0.013	0.013***
	(0.016)	(0.010)	(0.055)	(0.056)	(0.013)	(0.008)	(0.012)	(0.004)
Financial Wealth$_t$	0.017	−0.003	0.003	−0.028*	−0.012**	−0.002	0.003	0.001
	(0.011)	(0.004)	(0.012)	(0.015)	(0.005)	(0.002)	(0.002)	(0.001)
House Value$_t$	−0.000	−0.000	0.000	0.000	0.000	0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	2696	2696	2696	2696	2696	2696	2696	2696

The dependent variable is households' active saving in the given category between 2001 and 2003. To control for outliers, the top and bottom 1 percent of households in the active saving distribution in a given year are excluded from the analysis. Income is treated as endogenous. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head. Robust errors are in parentheses: * indicates significance at the 10-percent level , ** indicates significance at the 5-percent level, and *** indicates significance at the 1-percent level.

Dollar Impact of Equity Extraction on Household Saving by Type of Saving: 1999-2001

Regressor	Other Property	Business or Farm	Cash	Stocks	Bonds	Vehicles	Reduced Debt	IRA/ 401k
Amount Extracted$_{t,t+1}$	−0.022	−0.005	−0.003	0.028	−0.083*	−0.049*	0.007	−0.010
	(0.036)	(0.009)	(0.033)	(0.070)	(0.045)	(0.020)	(0.031)	(0.009)
Income$_{t,t+1}$	0.000	−0.000	0.000	−0.000*	0.000	0.000	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Financial Wealth$_t$	0.006	0.003*	0.006	−0.047***	−0.001	−0.002	−0.003	0.000
	(0.006)	(0.002)	(0.008)	(0.018)	(0.016)	(0.004)	(0.002)	(0.001)
House Value$_t$	0.041	−0.002	0.021*	−0.042	0.028	0.010	0.006	0.016***
	(0.035)	(0.005)	(0.011)	(0.039)	(0.024)	(0.007)	(0.006)	(0.004)
N	2886	2886	2886	2886	2886	2886	2886	2886

The dependent variable is households' active saving in the given category between 1999 and 2001. To control for outliers, the top and bottom one percent of households in the active saving distribution in a given year are excluded from the analysis. Income is treated as endogenous. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head. Robust errors are in parentheses: * indicates significance at the 10 percent level , ** indicates significance at the 5 percent level, and *** indicates significance at the 1 percent level.

Table A.4

Dollar Impact of Equity Extraction on Household Saving by Type of Saving: 2007-2009

Regressor	**Other Property**	**Business or Farm**	**Cash**	**Stocks**	**Bonds**	**Vehicles**	**Reduced Debt**	**IRA/ 401k**
Amount Extracted$_{t,t+1}$	0.013	0.047*	−0.039	−0.035	0.040*	0.000	−0.013	−0.013*
	(0.008)	(0.024)	(0.036)	(0.027)	(0.024)	(0.006)	(0.010)	(0.007)
Income$_{t+1}$	0.005	0.014	0.048*	0.007	0.011	0.002	0.009	0.017*
	(0.007)	(0.019)	(0.024)	(0.024)	(0.015)	(0.006)	(0.006)	(0.007)
Financial Wealth$_t$	0.000	−0.000	0.000	−0.000	0.000	0.000	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Value$_t$	−0.001	−0.006	0.015*	0.003	−0.001	−0.005*	−0.005*	0.002
	(0.002)	(0.006)	(0.008)	(0.012)	(0.005)	(0.002)	(0.003)	(0.003)
N	3653	3653	3653	3653	3653	3653	3653	3653

The dependent variable is households' active saving in the given category between 2007 and 2009. To control for outliers, the top and bottom one percent of households in the active saving distribution in a given year are excluded from the analysis. The setup for these equations is slightly different than in other years due to data availability and does not include households who extracted equity while selling one home and purchasing another between 2007 and 2009. All variables are in 2000 dollars where applicable. The regressions also include a cubic in the age of the household head. Robust errors are in parentheses: * indicates significance at the 10 percent level , ** indicates significance at the 5 percent level, and *** indicates significance at the 1 percent level.