

Borrowing From Yourself: 401(k) Loans and Household Balance Sheets

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Abstract

We examine 401(k) borrowing since 1992 and identify a puzzle: despite potential gains from borrowing against 401(k) assets instead of from other sources, most eligible households eschew 401(k) loans, including many who carry relatively expensive balances on credit cards and auto loans. We estimate that households with access to 401(k) loans could have saved about \$3.3 billion in 2004—about \$200 per household—by shifting debt to 401(k) loans. We find that liquidity constrained households are most likely to borrow against their accounts; however, the fastest growth has been among higher income, less liquidity constrained households. From 1992 to 2004, we do not find significantly different growth in wealth between households eligible for loans and those ineligible for loans. The recent tightening of terms and standards in mortgage and consumer lending has likely increased 401(k) borrowing, which could improve household balance sheets, if handled correctly. However, the improvement could be short-lived if the economic downturn leads to reduced contributions or significantly higher 401(k) loan defaults.

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1 Introduction

Over the last two decades, 401(k) accounts have become the dominant form of retirement plan for American workers, covering 65 million people and representing \$2.4 trillion in assets in 2005 (U.S. Dept. of Labor (2007)). A little-studied aspect of these plans is the loan feature, which allows many participants to borrow easily against their plan balances. Typically the loans are limited to the lesser of 50% of the vested plan balance or \$50,000 and are repaid over five years via payroll deduction (or in a lump sum upon separation from the employer).¹ Relative to other forms of borrowing, 401(k) loans offer a number of advantages. Most important are very low transaction costs (e.g., no credit check, and a typically very quick on-line request procedure), and repayment of principal and interest into the account rather than to an outside lender. Indeed, since the “borrowed” assets are already owned, a 401(k) loan is less a loan than a pre-retirement withdrawal coupled with a schedule of automatic account contributions. As long as the follow-up contributions are made, there are no penalties or taxes assessed on the withdrawal.²

Since a 401(k) borrower pays principal and interest to herself, the cost of the loan is just the foregone return on the borrowed assets over the repayment period. This cost will generally be uncertain at the time of the loan, and thus its utility value will depend on risk preferences as well as expected rates of return. We discuss below how we can value the uncertain payoff with risk-neutral pricing methods. But in general, we would expect households to tap 401(k) accounts before outside loans whenever they valued the foregone return less than outside borrowing costs (including transaction costs). For example, 401(k) borrowing would almost always be expected to dominate high-rate outside loans such as credit cards, and could easily be preferred to auto loans, general consumer loans, and even home-equity loans, depending on attitudes toward risk.³

Nonetheless, using household balance sheet data from the 1992-2004 waves of the Survey of Consumer Finances (SCF), we identify a striking puzzle with respect to 401(k) borrowing: the incidence of 401(k) borrowing is quite low (about 16% of eligible households in 2004); moreover, many eligible but non-borrowing households carry relatively high-cost debt on credit cards and other loans. Using risk-neutral pricing methods we estimate that in 2004 households with access to 401(k) loans could have saved about \$3.3 billion—about \$200

¹Loans for the purchase of a principal residence may generally be repaid over a longer period (e.g., 15 years). From 2005 to 2007, the loan limits were increased to the lesser of 100% of the vested plan balance or \$100,000 for qualified borrowers affected by Hurricanes Katrina, Rita, or Wilma.

²If the loan is not repaid, it is treated as an unqualified withdrawal, and subject to tax at the ordinary income tax rate plus (if the borrower is under age 59-1/2) a 10% penalty.

³Home-equity loans are different in that they typically feature longer maturities (which lowers payments while increasing total interest paid), are secured by real property, and may be tax-deductible. Thus whether 401(k) loans are preferred to home-equity loans will also depend on households’ attitudes over these characteristics.

per household—by shifting debt to 401(k) loans.⁴ On average, this represents a potential savings of about 14 percent in household interest payments. If households were to shift debt to 401(k) loans in this way, outstanding 401(k) loan balances could grow by as much as a factor of four.⁵

We propose several reasons why households might borrow less than expected from 401(k)s. One is that 401(k) borrowing is often discouraged by employers, financial advisers, and other commentators, who warn 401(k) participants against spending retirement assets on current consumption (e.g., see Weller and Wenger (2008)). Such warnings often (correctly) advise against using loans impulsively, defaulting on loans or reducing regular contributions, all of which could significantly reduce retirement wealth.⁶ However, these warnings typically fail to acknowledge that, for a given amount of current consumption to be financed, a properly handled 401(k) loan might well be the least costly source of funds.

A second reason households may not borrow against 401(k) assets is that households may (consciously or otherwise) use a “mental accounting” framework in which retirement accounts are considered a separate asset with an earmarked purpose (retirement finance) rather than a component of the overall household balance sheet. Such a framework might impede households’ ability to evaluate the effects of 401(k) borrowing vs. other forms of finance on their balance sheet as a whole.

A third explanation is that in recent years, housing debt has been relatively low cost and widely available as a source of finance. By this reasoning, the recent significant tightening of terms and standards in mortgage and consumer lending is likely to be accompanied by significant further growth in 401(k) borrowing. Indeed, as discussed below, this prediction has been borne out in recently released data from 401(k) provider surveys (Transamerica Center for Retirement Studies (2008)).

Finally, we investigate other aspects of 401(k) borrowing behavior, such as which households are most likely to borrow against their 401(k) assets, whether 401(k) borrowers tend to reduce their regular contributions to the plan, how 401(k) loans fit into household balance sheets, and whether households eligible to take 401(k) loans as a group appear to experience different trajectories of wealth over time compared to ineligible households. We find that liquidity- and borrowing-constrained households are most likely to tap their 401(k) accounts

⁴As described below, risk-neutral pricing does not actually impose risk-neutral preferences on households, but rather is a way of valuing risky assets without explicitly modeling risk preferences. Using “naive” pricing that does not account for risk, we estimate gains of \$1.5 billion to \$1.9 billion in 2004.

⁵Aggregate outstanding loans in 2005 totalled about \$40 billion, or less than 2 percent of 401(k) balances (U.S. Dept. of Labor (2007)). Note that in this exercise we are taking as given the household’s total amount of borrowing and simply noting that the debt could be restructured to reduce the total cost to the household.

⁶In July 2008, Senator Charles Schumer introduced a bill that would prohibit 401(k) loans made through “any credit card or any other intermediary” and would restrict the number of permissible outstanding loans to three. The bill was in response to the introduction by Reserve Solutions of a debit card linked to users’ 401(k) accounts (see Lieber (2008)).

for loans, though the fastest growth has been among less-constrained households. We also find that 401(k) borrowers have about the same regular contribution rates as those without 401(k) loans, suggesting that 401(k) loan repayments may not be leading to lower regular contributions.⁷ Looking at how 401(k) borrowing fits into household balance sheets, we find that, among those with 401(k) loans, the loans represent about 7 to 9 percent of income, a share which has remained quite stable over the past decade even as housing debt has exploded. We find that in recent years, households with 401(k) loans held a greater share of their financial assets in 401(k)s, and a smaller share in other assets, than households without the loans. Comparing loan-eligible 401(k) households to ineligible households, we do not find evidence of significantly different growth in wealth from 1992 to 2004, conditional on demographic differences and income class.

2 Previous Literature

As noted above, 401(k) loans have not yet been the subject of much academic research.⁸ However, a number of papers are similar in that they explore household-finance puzzles. For example, Amromin (2003), Barber and Odean (2004), and Bergstresser and Poterba (2004) find that households often do not optimally locate assets across their taxable vs. tax-preferred accounts, while Amromin, Huang, and Sialm (2007) show that many households could improve their balance sheets by increasing 401(k) contributions while slowing prepayments on mortgage debt. Gross and Souleles (2002) find that many households simultaneously hold expensive credit card debt and liquid checking account balances that bear very low nominal interest rates.⁹

Our study is also related to work showing that 401(k) loan provisions can increase participation and saving by making retirement accounts more liquid. The General Accounting Office (1997) investigated the effects of loan provisions in 401(k) plans, concluding that they do appear to encourage participation, but could reduce retirement security in some cases. Love (2006, 2007) shows that the availability of 401(k) loans increases 401(k) participation and contributions in a life-cycle model of consumption.

⁷Of course 401(k) loans could still be reducing regular contributions, if loans were concentrated among households who would otherwise have higher regular contributions than those without loans.

⁸We recently became aware of a forthcoming study analyzing 401(k) loan characteristics and usage in data from 401(k) providers (see Beshears, Choi, Laibson, and Madrian (2008)). Employee Benefit Research Institute (2007) provides descriptive data on 401(k) borrowing based on a large sample of account-level data.

⁹Telyukova (2007) and Telyukova and Wright (2008) show that households might carry credit card debt despite its high costs because they know they may need the liquidity later. This explanation does not apply in our context, because 401(k) balances are generally illiquid—indeed, loans are one of the few ways to make 401(k) balances liquid at all. Other ways of accessing 401(k) accounts before age 59-1/2 include hardship distributions (which must be accompanied by documentation of “immediate and heavy financial need”) and a withdrawal after separation from the employer (subject to taxes and penalties).

Finally, our work contributes to the fast growing literature on 401(k) plan participation. For example, Choi, Laibson, and Madrian (2004, 2006) find considerable inertia among households in 401(k) plan participation and investment behavior, and show that the framing of 401(k) choices affects the outcomes. Our paper adds new evidence that many households do not appear to manage their 401(k) accounts in the way that might be predicted from standard economic models of behavior.

3 When Should Households Take 401(k) Loans?

3.1 Conceptual Framework

In a classical life-cycle model of consumption, the demand for borrowing arises out of a household's desire to smooth the marginal utility of consumption over time in the face of rising earnings profiles with respect to age. In stochastic models, an additional incentive arises as households seek to borrow in order to maintain consumption after receiving negative income shocks. In models incorporating liquidity or borrowing constraints, constrained households are particularly likely to access all available forms of debt in order to help smooth the marginal utility of consumption across time. Since the transaction costs of 401(k) borrowing are so low—in particular, there is no credit check and the application procedure is essentially costless—we would expect constrained households to be especially likely to use 401(k) loans.

In addition, we would expect that the net cost of 401(k) borrowing would be a key consideration. That is, for a given amount of total debt, a household would borrow against its 401(k) accounts rather than from an outside lender if the cost of the 401(k) loan is less than the cost of the outside loan. For an outside loan, the cost is essentially its interest rate. For a 401(k) loan, as discussed above, the cost is the value of foregone returns on the account. In general, the household will prefer the 401(k) loan whenever it values the cost of the 401(k) loan (i.e., the foregone return) less than the cost of an outside loan.

We offer a few caveats about this analysis. Most importantly, note that we are only considering the question of how best to structure a given amount of debt—we are not considering the effect of the loan on any new consumption or debt. In a dynamic model of borrowing, the optimal restructuring of debt could in turn feed back into a higher level of supportable consumption, and/or a reallocation of consumption across time periods.¹⁰ Similarly, we are not modelling the effect of 401(k) borrowing on optimal contribution behavior. As noted by Love (2006, 2007), younger households who know they may want to borrow against 401(k) balances in the future may optimally increase their contributions,

¹⁰Moreover, in a behavioral sense, a 401(k) loan will not improve a household's balance sheet if it leads to a new spurt of consumption and debt that otherwise would not have occurred.

leading to higher balances. A final caveat is that a household whose motivation is to maximize contributions to the 401(k) (e.g., if they are constrained by the contribution limit) might prefer a 401(k) loan with a sufficiently high interest rate simply as a way to get more assets into the tax-favored account. For example, while the limit on 401(k) contributions is \$15,500 in 2008, a household could effectively get more into the account by taking a 401(k) loan if the loan carried an interest rate higher than the expected 401(k) return over the repayment period. In such a case, the loan would actually increase the amount of tax-favored saving.

3.2 Tax Considerations

401(k) loans are sometimes described as facing double taxation, because (unlike regular contributions) loan payments are made with after-tax dollars, and then account assets are taxed again upon withdrawal in retirement.¹¹ This argument turns out to be wrong, because in practice, the tax treatment of 401(k) loans does little to alter the tax-preferred, “consumption-tax” treatment of retirement accounts. To see why, consider the following illustration of the consequences of taking a 401(k) loan, from a consumption-tax perspective.

Traditional retirement accounts implement consumption-tax principles (i.e., that wages should be taxed when they are consumed rather than when they are earned) by offering a tax deduction for wages contributed to the account, and then taxing withdrawals of contributions and their earnings as ordinary income. Since the idea of a consumption tax is to tax consumption rather than saving, “traditional” consumption tax treatment of a 401(k) loan would be to tax the loan when it’s taken, but not the repayments. In the real world, the situation is reversed: loan proceeds are not taxed, but no deduction is offered for repayments. Thus the timing of tax deductions and payments for an account with a loan is exactly the same as one without a loan—a deduction is offered for the initial contribution, withdrawals in retirement are fully taxed, and no other deductions are offered in the interim.¹²

What about the charge that loan payments are “double-taxed”, once upon repayment and again upon withdrawal in retirement? This turns out to be a mirage: the loan principal is clearly taxed only once—when it is repaid with after-tax dollars. Since loan proceeds are not taxed when distributed, the tax on repayment is really just a delayed tax on the consumption of the loan proceeds. The “second” tax, upon withdrawal in retirement, is tax on the consumption of the *repayments* in retirement. Thus each dollar of consumption is taxed just once.

Loan *interest* payments, on the other hand, can indeed be considered double-taxed under

¹¹As described below, in this analysis we are considering traditional 401(k)s, rather than Roth 401(k)s.

¹²In either case account earnings are exempt from tax.

traditional consumption tax principles—since interest payments are like new contributions, they should be made with pre-tax dollars and then taxed upon withdrawal. In practice, however, the double-taxation of loan interest relative to a consumption tax is offset by the break borrowers get on the timing of their tax payments: recall that rather than paying taxes on loan proceeds when they are distributed (i.e., consumed), borrowers pay the taxes gradually over the following five years as they repay the loan with after-tax dollars. The time value of these delayed tax payments offsets the double taxation of interest—perfectly so, if the discount rate is the pre-tax rate of return; only partially if the discount rate is lower. An algebraic illustration of the taxation of 401(k) loans is provided in Appendix 1.

In the case of a Roth 401(k), it is even easier to see that loans are not double-taxed. Roth 401(k)s, like Roth IRAs, reverse the timing of tax payments by exempting withdrawals from tax rather than offering a deduction for contributions. The treatment is equivalent in present value under the assumption of constant tax rates and equal pre-tax returns inside and outside the accounts. In the case of a Roth 401(k), the initial contribution is made with after-tax dollars, and the loan proceeds are tax-free. Similarly, the loan repayments are made with after-tax dollars, and withdrawals in retirement are tax-free. Thus, the loan does not alter the favorable consumption-tax treatment of the 401(k).

4 Data and Descriptive Statistics

4.1 Sample Characteristics

We use the 1992-2004 waves of the Survey of Consumer Finances (SCF) to examine the evolution of 401(k) borrowing and its impact on household balance sheets.¹³ The SCF is a triennial nationally representative cross-sectional survey of household wealth and finances conducted by the Federal Reserve Board. The SCF is designed to oversample the high end of the wealth distribution in order to obtain more precise estimates of household wealth holdings.

We focus on households whose member (if single) or older spouse (if married) is between the ages of 21 and 60 and in which at least one member is working for pay. We exclude households in which any member reports self-employment or partnership income, as well as households reporting annual income of less than \$3,000 or greater than \$500,000, because these households can face very different financial environments than the “typical” households that we are considering.¹⁴

Table 1 shows the evolution of 401(k) plan participation and loan utilization from 1992

¹³We begin with the 1992 survey because earlier surveys did not include as much information about 401(k) loans.

¹⁴The income thresholds are roughly the first and 99th percentile of total annual income.

to 2004 for our sample.¹⁵ Participation in 401(k) plans grew from about a third to about a half of sample households from 1992 to 2001, before dropping back a bit in 2004, while access to 401(k) loans grew from about a fifth of sample households to about a third.¹⁶ Overall, the share of sample households holding 401(k) loans grew from about 2.3 percent in 1992 to 6.8 percent in 1998 (a year in which many households found access to credit to be more difficult), before declining a bit to about 5.3 percent in 2001 and 2004. Conditional on loan eligibility, borrowing peaked at 19 percent in 1998, falling to 16 percent by 2004.

Table 2 reports some characteristics of the sample of 401(k)-owning households that are eligible to borrow against their accounts. The average age is just over 40 years, just under half of the sample has a college degree, just under three-quarters are married, and about one in five are nonwhite. Median household income is about \$63,000 (in 2004 dollars) and median net worth is about \$107,000. The median 401(k) balance is about \$22,000.

4.2 401(k) Loan Detail

Table 3 provides some detail on the characteristics of 401(k) loans observed in the SCF.¹⁷ The median outstanding loan balance grew from about \$2,400 (in real terms) in 1995 to \$4,000 in 2004, with a bit of a spike in the “credit-crunch” year of 1998. The SCF does not ask about the initial loan amount, but does collect information on loan payments, which provides some evidence of how far along the repayment process is. Annual payments in the data are quite large relative to the outstanding balance, suggesting that the median observed loan is, not surprisingly, about midway through the repayment process. Indeed, our calculation of how many months would be required to pay off the balance at the current rate is about 24 months at the median, a figure that is essentially unchanged across the SCF waves.

As a measure of 401(k) loan utilization, we calculate the loan balance relative to the maximum allowable loan, which we define as the lesser of \$50,000 and 50% of the vested account balance.¹⁸ As shown in Table 3, about half of loans are less than a quarter of the maximum allowable size, and about three-quarters of loans are less than half the allowable size. Thus, even allowing for the fact that the median loan is about halfway repaid, we find that borrowing households seems to utilize 401(k) loans significantly less than they could.

¹⁵401(k) plans are the dominant, but not only, type of tax-preferred DC plan. We include SCF households reporting 401(k), 403(b), supplemental retirement annuity, thrift or savings plans, and profit-sharing plans, among others. We refer to all of these as “401(k) plans” in the text and tables. See Appendix 2 for details. The sample size is about 1,600 households in 1992 and about 1,830 in 2004.

¹⁶The slight declines in 2004 may reflect a change in the pension component of the survey questionnaire in that year, rather than actual declines in 401(k) participation or loan availability. See Appendix 2 for details.

¹⁷In this table, we begin with the 1995 wave because it is the first to provide as much detail about 401(k) loans.

¹⁸These parameters are defined in the Internal Revenue Code.

Beginning in 1998, the SCF asks households to identify the general purpose of the 401(k) loan. We group the responses into four broad categories, and find that the leading categories are home purchase or improvement, investment or debt consolidation, and vehicle or other durable good purchase. The “home purchase” share fell notably in 2004, which we attribute to the surge in that wave of home-secured loans such as cash-out refinances and home-equity lending. About a third of households report that the loan was used for “investment or debt consolidation”, which is of particular interest because this is a channel through which many households could favorably restructure their balance sheets.¹⁹

5 Potential Gains from Restructuring Household Debt

The key way a household could gain by using a 401(k) loan is by shifting high-cost debt, such as credit-card or auto-loan balances, to 401(k) loans.²⁰ Households for whom the opportunity cost of 401(k) borrowing (i.e., the value of the foregone return on 401(k) assets) is less than the cost of other debt could reduce debt payments by restructuring their balance sheets in this way.²¹ To get a sense of how important this might be empirically, we need a way to value the cost of a 401(k) loan—that is, the value of uncertain foregone returns on account assets—as well as a way to value the cost of outside borrowing. We value the cost of outside borrowing using each household’s observed rates and balances of credit-card and auto loans.²²

As noted above, we measure the opportunity cost of 401(k) borrowing with risk-neutral pricing. Risk-neutral pricing does not actually impose risk-neutral preferences on households, but rather is a way of valuing risky assets (typically options and other financial derivatives) without explicitly modeling risk preferences. Since our exercise is fundamentally an option-pricing problem (we are trying to value the household’s option to forgo uncertain future returns), risk-neutral pricing provides a natural tool.

Technically, risk-neutral pricing is a way of expressing uncertain future payoffs in terms of adjusted expected values and a risk-free discount rate (see, e.g., Jarrow and Turnbull (1996); Cochrane (2005)). The insight is that while a traditional asset-pricing model will

¹⁹The “investment” response includes business investment, financial or real estate investment, and cash reserves. The “debt consolidation” response includes bill or debt consolidation, tax and insurance expenses, legal judgements, vehicle repairs, unspecified personal items, gifts, charitable donations, loans to others, and unspecified personal or living expenses. Thus, this category includes general expenses as well as debt consolidation. Responses to a similar question on a different type of loan from an earlier wave showed that, in that case, “debt consolidation” made up most of this category. The category labelled “other” includes vacations, divorce, weddings, funerals, moving expenses, medical or legal expenses, and education expenses.

²⁰As noted above, whether 401(k) loans would be preferred to home-equity loans or lines of credit will depend on preferences over such loans’ different characteristics, such as longer maturities and the fact the home loans are secured by real property.

²¹Recall that in this analysis we are not considering the effect of any induced consumption or debt.

²²Because of their different properties, we do not include home-secured loans in this exercise.

define the price of an asset in terms of the probabilities of various outcomes and a discount rate that includes a risk premium, the price can alternatively be written as a function of an adjusted set of “risk-neutral” or “equivalent Martingale” probabilities and a risk-free discount rate. As pointed out by Cochrane (2005), the intuition is that risk aversion is equivalent to risk neutrality combined with slightly higher subjective probabilities of undesirable outcomes.

In our case, we implement risk-neutral pricing by valuing future 401(k) returns at 4.2 percent, which is our calculation of average long-term nominal Treasury yields over the relevant time period. While the *expected* return on an account that is invested in a mix of stocks and bonds will be higher, there is considerable variance around the expected return which must be valued as well. The insight of risk-neutral pricing is that a risk-averse household facing a risky return of, say, 8 percent will behave equivalently to a risk-neutral household facing a risk-free return whose expected value is reduced due to greater weight put undesirable outcomes.²³

While this concept of foregone 401(k) returns is our preferred measure (since it accounts for the riskiness of the returns), as a form of sensitivity analysis we also value 401(k) returns at alternative “naive” rates that do not account for risk. Specifically, we use a straight expected value based on the account portfolio and long-run average stock and bond returns, and an expected current-year return based on the survey year’s stock and bond returns. Since these measures do not account for risk, they produce higher opportunity costs of 401(k) borrowing, and thus lower estimates of potential gains from shifting debt to 401(k) loans.

The results for 2004 are shown in Table 4. Under risk-neutral pricing, 58 percent of households eligible for a 401(k) loan could have improved their balance sheets by shifting debt to the 401(k). In the aggregate these households could have shifted as much as \$91 billion in debt—about \$3,400 per household—or about a third of their total household debt. The shift would have saved households about \$3.3 billion in the aggregate, or about \$207 per household, representing about 14 percent of their annual debt payments.

As shown in the other columns, valuing 401(k) returns at their long-run or current-year means without regard to risk results in higher assumed opportunity costs of 401(k) borrowing, and thus smaller potential gains. However, even these “naive” measures shown significant gains from shifting debt to 401(k) loans. For example, using the long-run expected return on stocks and bonds, households could have gained \$1.5 billion in 2004, or

²³Another way to think of this risk-adjustment is as a way of comparing the risky future 401(k) returns to the essentially risk-free (from the household’s perspective) outside loan rate. Credit card loans, auto loans, and installment loans are typically fixed-rate loans. In limited circumstances, households can restructure or eliminate outside debt via bankruptcy proceedings. 401(k) loans are unaffected by bankruptcy except to the extent that tax charges and penalties for non-repayment of a 401(k) loan can sometimes be restructured in bankruptcy.

about \$150 per household—a 10 percent reduction in their annual debt payments. Thus, over a variety of assumptions on how to value the expected foregone returns on the account, we find significant amounts of potential gains to households from restructuring their existing debt with 401(k) loans.²⁴

6 Who Takes 401(k) Loans?

6.1 The Role of Liquidity and Borrowing Constraints

We turn next to other aspects of 401(k) borrowing behavior. One question is which households are most likely to borrow against their accounts empirically. The conceptual framework developed above suggested that we would expect liquidity- or borrowing-constrained households to demand more of all available types of debt, and 401(k) loans in particular because their transaction costs are so low. A traditional measure of liquidity constraints is the ratio of liquid assets to income (Zeldes (1989)). We use a variant of this measure in which we identify households with a liquid-asset-to-income ratio of under one percent as constrained. In addition to this measure, we add an indicator based on the household’s response to a question about how frequently they pay off their total credit card balance each month.²⁵ We also include two measures of borrowing constraints. The first is an indicator of whether the household has been declined credit in the past five years.²⁶ The second is an indicator of whether the household is near its total credit limit on credit cards.²⁷

Finally, we construct a summary index based on these four measures: if none of the four measures indicates a constraint, we classify the household as “unconstrained.” If only one constraint is identified, we classify the household as “somewhat constrained,” and if two or more constraints are identified, we classify the household as “highly constrained.”

Table 5 shows how our measures of liquidity and borrowing constraints vary between 401(k) borrowers and eligible non-borrowers, in 1992 and 2004.²⁸ In both 1992 and 2004, 401(k) borrowers are significantly more likely than eligible non-borrowers to indicate liquidity and borrowing constraints. However, the pool of 401(k) borrowers in 2004 is less constrained than the analogous pool in 1992—for example, about 45 percent of borrowers are “highly constrained” in 1992, while only 35 percent meet this criterion in 2004. By

²⁴As noted above, this calculation is made for a given level of debt. Gains to households could quickly disappear if restructuring were followed by running up new debt that would otherwise have not been accrued.

²⁵The three possible responses are “always or almost always,” “sometimes,” and “hardly ever.” We consider a household liquidity constrained if they report “hardly ever.”

²⁶Jappelli, Pischke, and Souleles (1998) and Amromin, Huang, and Sialm (2007) use a similar measure.

²⁷This is similar to the “utilization rate,” or borrowing relative to credit limit, used by Gross and Souleles (2002), except that they used account-level data and our data is household-level. We identify households with an aggregate credit card utilization rate of over 80% as borrowing constrained.

²⁸The intervening years are omitted for brevity.

comparison, the pool of eligible non-borrowers does not show the same change over time: about 17 percent are highly constrained in 1992, and about 15 percent in 2004.

Looking at the four constraint indicators individually, we see that most of the change between 1992 and 2004 has occurred in the credit-card measures. In particular, the share of borrowers who are close to “maxed out” on their credit cards fell by half, from 37 percent in 1992 to 18 percent in 2004, while the share among non-borrowers fell a much smaller amount, from 13 to 10 percent. That is, by 2004, 401(k) borrowing appears to have spread beyond highly constrained households and into the less-constrained population. The increasing prevalence of 401(k) borrowing among less-constrained households suggests 401(k) loans may have moved up in the pecking order of household borrowing, from a source of “last resort” to one that may substitute for other, higher-cost forms of borrowing, such as credit cards.

6.2 Regression Results

Table 6 shows the results from a probit regression of 401(k) borrowing (among eligible households) on household characteristics, pooling the data from the 1995 through 2004 waves.²⁹ We find that households with higher debt-to-income ratios are more likely to borrow on their 401(k) accounts—suggesting, not surprisingly, that households with a high demand for borrowing tend to borrow from all available sources. Moreover, as might be expected due to their low costs, we find that even conditional on total borrowing, households facing liquidity or borrowing constraints are much more likely to take 401(k) loans—somewhat constrained households are about 9 percentage points more likely than unconstrained households to tap their 401(k) assets, other things being equal, while highly constrained households are about 20 points more likely.

Next we examine a set of factors that may be correlated with a household’s subjective valuation of the net cost of 401(k) borrowing: an indicator of whether the 401(k) account is heavily invested in equities (which affects both expected returns and risk)³⁰, an indicator of the household’s risk aversion³¹, a measure of the household’s lowest outside borrowing

²⁹We exclude the 1992 wave in this case because it is missing information on credit-card interest rates, as described below.

³⁰The SCF asks each household about up to six current 401(k) plans, three for each spouse. We calculate the aggregate 401(k) stock allocation for each household as an asset-weighted average of the stock share for each plan reported by the household. Prior to 2004, the SCF question on 401(k) portfolio allocation allowed the following responses: “mostly or all stock,” “mostly or all interest earning,” or “split”. In 2004, the responses were changed to “all in stock,” “all in interest earning,” and “split,” and a followup question was added for households who report “split”: “About what percent is in stocks?”

³¹This measure is based on a survey question about household attitudes towards risk and returns (see Appendix 2 for details). A similar measure is used in Coulibaly and Li (2007) and Amromin, Huang, and Sialm (2007), who find that self-reported risk attitudes influence household choices about mortgages.

rate³², and an indicator of a short time horizon on the current job.³³

We find little correlation between any of these factors and the likelihood of 401(k) borrowing, suggesting that households may not be fully considering the opportunity costs of foregone returns (or that we are not able to measure it). We also find little correlation between 401(k) contribution rates (relative to earnings, and net of loan repayments) and 401(k) borrowing. This finding suggests little evidence that borrowers tend to reduce their contributions, though of course it is still possible that the borrowers' contributions would have been even higher in the absence of the loan.

We find that the household's account balance (here expressed relative to income) and total years in the plan are positively correlated with borrowing. This finding is not surprising because loans are typically limited to 50% of the account balance and borrowers often use the loans for lumpy expenditures. The tenure effect could reflect both larger dollar balances and greater familiarity with plan features among longer-tenure employees.

Looking at demographics, we find that households aged 31 to 50 are more likely to borrow than younger or older workers, and that college-educated households are less likely to borrow. Finally, we find that households in the top quartile of income are more likely to borrow from their 401(k)s, while those in the top quartile of net worth are less likely. The probit results show that the strongest cross-sectional predictor of 401(k) borrowing is the degree of liquidity or borrowing constraint. In the next section, we look at how 401(k) loans fit into households' balance sheets, and how they affect wealth accumulation over time.

7 401(k) Loans and Household Balance Sheets

7.1 The Role of 401(k) Loans in Household Balance Sheets

Table 7 shows how 401(k) loans fit into household balance sheets in 1992 and 2004. The table splits 401(k) households into two groups—those with 401(k) loans and those without—and expresses their balance sheet items relative to income. In both years, the net worth of the loan group was about 12 percent lower than the no-loan group (relative to income). The difference comes not from total assets—which are about the same size for the two groups—but from total debt, which is about 50 percent larger in the loan group. This is consistent with findings above that households with high demand for debt are the most likely to borrow from their 401(k)s.

³²We calculate the lowest outside borrowing rate for each household as the lowest rate it reports on any credit card balances or auto loans. Because information on credit-card rates was not collected in the 1992 survey, we focus this analysis on the 1995 through 2004 waves.

³³Recall that borrowers are typically required to repay outstanding loan balances upon separation from the employer.

Looking at the composition of assets, we find that the loan group had higher concentrations in their 401(k) accounts, and lower concentrations in other financial assets, than the no-loan group. This pattern is visible in 1992 but became much more prominent by 2004. Indeed, as shown at the bottom of the table, 401(k)s made up 42 percent of financial assets for the no-loan group in 2004, but represented 69 percent of financial assets for the loan group. In 1992, the shares were much closer for the two groups (38 percent and 42 percent, respectively). Thus, we find that in recent years, the 401(k) households most likely to use the loan feature of their plans are the households for whom the 401(k) accounts made up a majority of their financial assets.

Looking at the composition of debt, we see little difference between the loan group and no-loan group. For example, as shown in the bottom row, housing debt made up about 75 percent of total liabilities for both the loan group and the no-loan group in 1992. By 2004, these figures changed only slightly: increasing to 77 percent for the no-loan group while decreasing a bit to 73 percent for the loan group. Among households with 401(k) loans, the loans averaged about seven to nine percent of income—typically a bit larger than credit card debt, but smaller than other sources of borrowing.

Between 1992 and 2004 both groups saw significant growth in net worth relative to income—about 25 percent, on average.³⁴ The main driver of balance sheet growth was net housing wealth (reflected in “nonfinancial assets” and “housing debt.”) While both groups saw about a 35 percent increase in housing assets relative to income over this time period, the loan group experienced slightly slower growth in housing debt (about 44 percent vs. 54 percent for the no-loan group). To test more formally for differences in wealth growth between borrowers and non-borrowers, we turn next to a regression specification borrowed from a related literature on 401(k)s and saving.

7.2 401(k) Loans and the Evolution of Household Wealth

A key question with regard to 401(k) borrowing is whether it causally affects the evolution of wealth over time. For example, if households use 401(k) loans to borrow and spend more than they otherwise would, the loans could increase debt and erode wealth over time. On the other hand, if the loan option increases contributions, and/or if households use loans to reduce borrowing costs by restructuring debt, then loan eligibility could increase wealth over time. One way to examine this question is to look at changes in wealth over time among loan-eligible 401(k) participants relative to those who are not eligible to borrow, conditional on other changes. We focus on loan eligibility, rather than actual borrowing,

³⁴Recall that the SCF is a series of cross-sections, not a panel, so we are not observing changes in the same households’ balance sheets over time. Thus, we interpret the changes as group-level changes—e.g., “among households with 401(k) loans”—rather than changes at the household level.

because eligibility is plausibly less endogenous than borrowing.³⁵ This approach follows similar logic to an earlier literature on the effects of 401(k) eligibility on the evolution of household wealth (see Poterba, Venti, and Wise (1995); Engen and Gale (2000); Pence (2002)).

To see if we find any evidence of differential wealth growth rates between the eligibility groups conditional on income and other differences, we adapt the specification of Engen and Gale (2000) and estimate the following regression on a pooled sample of households with 401(k) plans from the 1992 and 2004 waves of the SCF:³⁶

$$\ln NWI = \alpha + ELIG * Y2004 + ELIG + Y2004 + \sum_{j=1}^5 \beta_j^X X_j + \sum_{j=1}^5 \beta_j^K X_j * ELIG + \varepsilon, \quad (1)$$

where NWI is the natural log of net worth relative to income, $ELIG$ is an indicator for loan eligibility, $Y2004$ is an indicator for an observation from 2004, and X_j is a vector of demographic variables including three age indicators (31-40, 41-50, and 51-60) and two education indicators (high school degree and college degree). We estimate separate regressions by income quartile.

The logic of the regression is to test for evidence of differential growth rates in wealth between the group of eligible households and the group of ineligible households.³⁷ The coefficient of interest is on $ELIG * Y2004$, which is interpreted as the *difference* in 1992-2004 wealth growth rates between the eligible group and the ineligible group, for each income class. Note that the growth-rate differences, if any, will be conditional on demographic differences between the groups and differential wealth growth by income class.³⁸

We follow Engen and Gale (2000) in conditioning on income class, since preferences for savings (and thus evolution of wealth) are likely to vary across income groups.³⁹ We

³⁵Borrowing is endogenous in the sense that unobserved factors correlated with the decision to borrow are likely to also be correlated with wealth. In particular, evidence from above suggests that 401(k) borrowing is significantly more prevalent among financially constrained households, who may also experience different trajectories of wealth than other households due to different tastes for savings or other mechanisms distinct from the causal effect of 401(k) borrowing per se. Eligibility to borrow is “less endogenous” because, while workers can choose jobs on the basis of 401(k) loan eligibility as well as other factors, the degree of choice over eligibility is likely to be less than the degree of choice over whether to actually borrow *conditional* on eligibility.

³⁶We omit household and income-quartile subscripts for notational simplicity.

³⁷Recall that the SCF is a repeated cross-section, not a panel, so we cannot follow the same households over time. Thus we are testing for differences at the group level.

³⁸As pointed out in Engen and Gale (2000), the same coefficients (though different standard errors) are obtained by estimating separate regressions of the form $\ln NWI = \alpha + Y2004 + \sum_{j=1}^5 \beta_j^X X_j + \varepsilon$ on eligible and ineligible households, and then differencing the coefficients.

³⁹Rather than include interaction terms with income class, we split the sample by income using the following breaks: <\$45,000, \$45,000-\$70,000, \$70,000-\$100,000, and >\$100,000, which roughly correspond to the sample-weighted quartiles of the pooled 1992 and 2004 sample, in 2004 dollars.

specify the dependent variable as the log of wealth relative to income in order to put wealth changes in relative (i.e., percentage) terms rather than dollar terms, since the two groups have different wealth levels in the “base” year of 1992.

Table 8 shows the regression results. The coefficients of interest, on $ELIG * Y2004$, are negative for all but the top quartile, suggesting that wealth growth was smaller for eligible than ineligible households; however, the effects are imprecisely estimated and none of these coefficient estimates is statistically different from zero.⁴⁰ Statistical significance aside, it is not clear how to interpret the negative coefficients on the variables of interest. One possibility is that households are using 401(k) loans in a way that reduces their wealth growth over time (i.e., households use 401(k) loans to “overconsume”). An alternative explanation is simply that eligibility to borrow “moved down the income distribution” between 1992 and 2004, causing the eligible group to have lower wealth growth from 1992 to 2004 not because their individual households’ wealth grew more slowly than those in the ineligible group, but because the “eligible” group itself was selecting lower-wealth households in 2004 than it was in 1992. There is some empirical evidence for this explanation: in the fifth decile of real income, for example, 79 percent of 401(k) households were eligible to borrow in 2004 vs. 63 percent in 1992; at the first decile the respective shares were 55 percent in 2004 vs. 47 percent in 1992.

In any case, we find no statistically significant difference between loan-eligible 401(k) households and loan-ineligible households in the growth of wealth from 1992 to 2004. Thus, we conclude there is little evidence that, in the aggregate, households eligible to borrow on their 401(k) accounts either increase or decrease their wealth over time, relative to their ineligible peers.

8 Conclusions

We find that despite potentially large financial gains from borrowing against 401(k) assets instead of from other sources, most eligible households eschew 401(k) loans, including many who carry high-rate debt on credit cards and auto loans. We estimate that households could enjoy aggregate gains of \$3.3 billion, or about \$200 per household, by shifting high-rate debt to 401(k) loans. Moreover, such “optimal” behavior could increase 401(k) borrowing by as much as a factor of four.

We find that in practice, liquidity- and borrowing-constrained households are the most likely to borrow against their accounts, though the fastest growth in 401(k) loans has been among higher-income, less liquidity-constrained households. This suggests that households

⁴⁰The sample sizes are quite small, but with the exception of the third quartile, the t-statistics are not even close to standard significance-test levels.

may be less likely to view 401(k) loans as “borrowing of last resort” and more likely to view them as a commonplace tool for reducing debt burdens. Looking at contribution rates (net of loan repayments), we find no significant difference between borrowers and non-borrowers.

We find that in recent years, households with 401(k) loans held a greater share of their financial assets in 401(k)s, and a smaller share in other assets, than households without the loans. We examine whether 401(k) loan-eligible households as a group have seen different patterns of wealth growth since 1992 than ineligible households, and find little evidence of differential growth, conditional on demographic differences and income class.

We suspect that the housing debt boom has restrained growth in 401(k) borrowing, and predict that the recent tightening of terms and standards in mortgage and consumer lending is likely to be accompanied by significant further growth in 401(k) borrowing. Indeed, Transamerica Center for Retirement Studies (2008) finds that the share of 401(k) participants reporting a loan increased to 18 percent in 2007, after staying close to 11 percent in each of the previous three years. The same survey found changes in the reason for borrowing: the share responding “to pay down debt” increased significantly from 27 percent to 49 percent, while the share reporting loans for other purposes declined. If these patterns are borne out in other sources, we might conclude that households are learning to use their retirement assets to help improve their balance sheets. However, the improvement could be short-lived if the economic downturn leads to significantly higher 401(k) loan defaults, which could expose households to additional taxes and penalties while reducing their long-term savings.

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Table 1: 401(k) Plans and Loans

	1992	1995	1998	2001	2004
<i>Percent of Households which:</i>					
Has a 401(k) Plan	33.5	43.2	48.7	48.9	46.1
Can Take a Loan	20.2	28.3	36.0	36.8	32.4
Has a 401(k) Loan	2.3	4.5	6.8	5.4	5.3
Loan Rate Among 401(k) HHs	6.9	10.4	14.0	11.0	11.5
Loan Rate Among Elig. HHs	11.4	15.9	18.9	14.7	16.4

Table 2: Characteristics of Loan-Eligible Households

Mean Age (Years)	41.5
College Degree (% of HHs)	47
Married (% of HHs)	72
Nonwhite (% of HHs)	22
Median Income (th. 2004 \$):	62.6
Median Net Worth (th. 2004 \$):	107.1
Median 401(k) Balance (th. 2004 \$):	20.7
Sample Size (households)	2,363

Pooled sample of 1992, 1995, 1998, 2001, and 2004 waves of the SCF.

Table 3: 401(k) Loan Detail

	1995	1998	2001	2004
Median Values:				
Loan Balance (th. 2004 \$)	2.4	3.5	3.2	4.0
Annual Payment (th. 2004 \$)	1.4	1.8	1.3	2.3
Months to Pay Off ¹	24	25	25	23
Utilization Rate: ² (% of HHs)				
<.25	49	41	53	51
.25-.50	27	31	18	25
.50-.75	8	16	14	15
>.75	16	12	15	9
Loan Purpose: (% of HHs)				
Home Purchase or Improvement	n.a.	34	35	25
Investment or Debt Consol.	n.a.	31	31	36
Vehicle or Durable	n.a.	11	23	18
Other	n.a.	24	11	21

¹Number of months required to pay off the loan at the current rate.

²Utilization rate is the ratio of the actual 401(k) loan to the maximum allowable loan.

Table 4: Potential Gains from Restructuring Household Debt in 2004

	<i>401(k) Return Assumption</i>		
	Risk-Neutral	Long-Run Average	Current Rate
Assumed 401(k) Return (%)	4.2	8.7	7.8
Households who could gain (%)	58	37	42
<u>Shiftable Amount:</u>			
Aggregate (bill. 2004 \$):	91	40	51
Average (th. 2004 \$):	3.4	1.5	1.9
Share of Total Debt (%):	33	15	18
<u>Annual Gain:</u>			
Aggregate (bill. 2004 \$):	3.3	1.5	1.9
Average (2004 \$):	207	150	166
Reduction in Int. Payments (%):	14	10	11

Table 5: Liquidity and Borrowing Constraints Among Loan-Eligible Households

	<i>Percent of Households</i>			
	1992		2004	
	401(k) Loan	No 401(k) Loan	401(k) Loan	No 401(k) Loan
Liquidity Constraint Indicators:				
1. Liquid Assets < 1% of Income	15.9	10.2	13.2	8.7
2. Hardly Ever Pay Off Cards	45.9	22.4	41.5	22.9
Borrowing Constraint Indicators:				
3. Declined Credit in Past 5 Years	33.6	19.7	34.9	21.0
4. Card Balances > 80% of Agg. Limit	36.6	13.0	17.5	10.3
Constraint Index				
Unconstrained	31.7	58.4	38.5	57.6
Somewhat Constrained	23.6	24.2	26.7	27.1
Highly Constrained	44.7	17.4	34.6	15.4

Unconstrained=indicators 1-4 all zero; Somewhat Constrained=only one indicator; Highly Constrained=2 or more indicators

Table 6: Probit Regression of 401(k) Borrowing Among Eligible Households

	Coeff. (S.E.)	Marg. Effect
Intercept	-1.975*** (0.199)	
Debt-Income Ratio	0.121*** (0.034)	0.026
Somewhat Constrained	0.374*** (0.103)	0.088
Highly Constrained	0.737*** (0.106)	0.198
Min. Outside Rate	0.011 (0.008)	0.002
401(k) All Stocks	-0.073 (0.078)	-0.015
Plan Balance	0.111** (0.051)	0.024
Years in Plan	0.035*** (0.009)	0.007
Contribution Rate	0.299 (0.928)	0.064
Short Time	0.012 (0.100)	0.003
Low Risk Aversion	0.172 (0.154)	0.040
Age 31-40	0.250** (0.120)	0.056
Age 41-50	0.266* (0.138)	0.059
Age 51-60	0.067 (0.149)	0.015
College	-0.248*** (0.088)	-0.053
Top Income Quartile	0.224** (0.115)	0.050
Top Net Worth Quartile	-0.396*** (0.114)	-0.078

Sample size is 2,144 households. Standard errors corrected for multiple SCF imputations. Significance levels: * 10%, ** 5%, and *** 1%. Mean dependent is 0.156. Other controls include survey year, race and marital status.

Table 7: 401(k) Loans and Household Balance Sheets in 1992 and 2004

	Mean % of Income in 1992		Mean % of Income in 2004	
	No Loan	401(k) Loan	No Loan	401(k) Loan
Net Worth	233	208	294	256
Assets	330	330	438	433
Nonfinancial	214	215	294	291
Fin. excl. 401(k)	71	66	83	44
401(k)	44	49	61	98
Liabilities	96	121	144	177
Housing Debt	72	90	111	129
Credit Cards	3	5	5	7
401(k) Loans	0	7	0	9
Other Debt	21	20	28	32
Selected Ratios				
401(k)-to-Fin. Assets	.38	.43	.42	.69
Hous. Debt-to-Liab.	.75	.74	.77	.73

Table 8: Median Regressions of Log Net Worth Relative to Income on 401(k) Loan Eligibility, by Income Quartile

	Quartile 1 Coeff. (S.E.)	Quartile 2 Coeff. (S.E.)	Quartile 3 Coeff. (S.E.)	Quartile 4 Coeff. (S.E.)
Intercept	-0.922 (0.674)	-0.438 (0.489)	-0.093 (0.539)	0.480 (0.422)
Elig*Year=2004	-0.604 (0.510)	-0.301 (0.372)	-0.515 (0.345)	0.102 (0.275)
Elig	0.604 (0.792)	0.465 (0.620)	0.405 (0.667)	-0.408 (0.564)
Year=2004	0.035 (0.409)	0.248 (0.324)	0.110 (0.284)	-0.313 (0.224)
Age 31-40	0.200 (0.567)	-0.323 (0.404)	0.296 (0.499)	0.133 (0.418)
Age 41-50	0.675 (0.529)	0.387 (0.455)	0.866* (0.491)	0.331 (0.381)
Age 51-60	1.363** (0.579)	1.138** (0.498)	1.331** (0.526)	0.559 (0.383)
High School	0.257 (0.532)	0.342 (0.375)	-0.435 (0.438)	0.344 (0.438)
College	0.550 (0.598)	0.464 (0.428)	-0.030 (0.382)	0.621* (0.338)
Elig*Age 31-40	0.067 (0.755)	0.319 (0.532)	-0.105 (0.606)	0.310 (0.467)
Elig*Age 41-50	-0.087 (0.705)	0.053 (0.551)	-0.159 (0.607)	0.405 (0.470)
Elig*Age 51-60	-0.039 (0.774)	0.373 (0.637)	-0.024 (0.676)	0.671 (0.449)
Elig*High School	-0.110 (0.681)	-0.587 (0.500)	0.259 (0.534)	-0.411 (0.532)
Elig*College	-0.287 (0.728)	-0.349 (0.551)	0.208 (0.482)	-0.251 (0.396)
Sample size	300	342	275	393

Elig=Eligible for 401(k) loan. Sample is households with 401(k)s, pooled 1992 and 2004 waves. Standard errors corrected for multiple SCF imputations. Significance levels: *10%, **5%, and ***1%.

Appendix 1: Example of Tax Treatment of 401(k) Loans

Imagine a 401(k) participant who is considering a loan. To help track the evolution of account balances and taxes, we can break the participant's career into four periods: in the first period, she contributes, in the second she borrows, in the third she repays, and in the fourth she retires and withdraws her account balance for consumption. Say she earns \$2 each working period and contributes \$1 in the first period. Imagine the case in which she does not take a loan, illustrated in the top panel of Table 9. In the first period, her balance is \$1, she pays taxes of \$ t (she is not taxed on the dollar she contributed), and she consumes \$ $(1 - t)$. Her account balance grows at rate r , so that in retirement she withdraws \$ $(1 + r)^3$ and pays taxes on the withdrawal. The key thing we want to pay attention to is the present value of total taxes paid and the present value of consumption. If we discount at the rate of return, r , the present value of taxes is:

$$PV_{taxes} = t + \frac{2t}{(1+r)} + \frac{2t}{(1+r)^2} + \frac{t(1+r)^3}{(1+r)^3} = 2t \sum_{j=0}^2 \frac{1}{(1+r)^j} = 2td \quad (\text{A-1})$$

where $d = \frac{R^3 - 1}{R - 1}$ by the formula for a finite series of a geometric sum, and $R = \frac{1}{(1+r)}$. This leaves $2(1 - t)d$ for consumption.

Now consider the effect on total taxes paid if she takes a loan and is taxed under a "true" consumption tax, which taxes withdrawals but exempts contributions. As shown in the middle panel, the first period is the same, but in the second period she borrows the account balance $1 + r$, triggering an additional tax liability of $t(1 + r)$. In the third period she repays the loan with interest, contributing $(1 + r)^2$ back into the account. Under consumption tax rules her taxes are reduced by the contribution. The fourth period is identical to the "no-loan" case above. The key point of this exercise is that the present value of taxes and consumption are identical in the "loan" case and the "no-loan" case.

Finally, consider the effect of a loan under "real-world" taxation, rather than true consumption taxation. As mentioned above and shown in the bottom panel, the timing of deductions and tax payments is identical to the "no-loan" case: in the first period she contributes \$1 and deducts \$ t . In the second period, she takes a loan and consumes the proceeds, but no tax is triggered. In the third, she repays the loan with interest and receives no deduction for those contributions. In the fourth, she withdraws the balance and is fully taxed. Again, we see that the present value of taxes and consumption is the same: the real-world tax treatment of the 401(k) loan does nothing to reduce the tax advantage of the 401(k) account.⁴¹

⁴¹If the discount rate is lower than the rate of return, the real-world treatment is a tiny bit worse than consumption tax treatment. For example, if the tax rate is .28, the discount rate is .02 and the rate of return is 0.10, then the present value of taxes paid in the four-period model is 1.718 in the real-world case and 1.695 under the consumption tax. Analogously, if the discount rate is higher than the rate of return, then the real-world treatment is a tiny bit better than the consumption tax.

Table 9: Tax Treatment of 401(k) Loans

Period	(1) Income	(2) Contribs	(3) Balance	(4) Taxes	(5) Cons=(1)-(2)-(4)
<i>No Loan</i>					
1. Contribute	2	1	1	t	$1 - t$
2. Borrow	2	0	$1 + r$	$2t$	$2(1 - t)$
3. Repay	2	0	$(1 + r)^2$	$2t$	$2(1 - t)$
4. Withdraw	0	$-(1 + r)^3$	0	$t(1 + r)^3$	$(1 + r)^3(1 - t)$
Present Value:	$2d$	0		$2td$	$2(1 - t)d$
<i>“True” Consumption-Tax Treatment</i>					
1. Contribute	2	1	1	t	$1 - t$
2. Borrow	2	$-(1 + r)$	0	$2t + t(1 + r)$	$2(1 - t) + (1 + r)(1 - t)$
3. Repay	2	$(1 + r)^2$	$(1 + r)^2$	$2t - t(1 + r)^2$	$2(1 - t) - (1 + r)^2(1 - t)$
4. Withdraw	0	$-(1 + r)^3$	0	$t(1 + r)^3$	$(1 + r)^3(1 - t)$
Present Value:	$2d$	0		$2td$	$2(1 - t)d$
<i>Real-World Tax Treatment</i>					
1. Contribute	2	1	1	t	$1 - t$
2. Borrow	2	$-(1 + r)$	0	$2t$	$2(1 - t) + (1 + r)$
3. Repay	2	$(1 + r)^2$	$(1 + r)^2$	$2t$	$2(1 - t) - (1 + r)^2$
4. Withdraw	0	$-(1 + r)^3$	0	$t(1 + r)^3$	$(1 + r)^3(1 - t)$
Present Value:	$2d$	0		$2td$	$2(1 - t)d$

Note: Let $d = \frac{R^3 - 1}{R - 1}$ and $R = \frac{1}{1 + r}$ (from the equation for a finite sum of a geometric series, discounting at the rate of return r) See text for details.

Appendix 2: Details of Our Sample and Survey Questions

Retirement Plans Included in Our Sample

As noted in the text, we use the term “401(k) plan” to refer to a number of types of employer sponsored defined contribution retirement accounts. The SCF survey was changed in 2004 to capture more information from households who might not know how to classify their plan. Prior to 2004, the SCF question was “I would like to know what general type of plan this is. In one common type of pension or retirement plan, the monthly retirement benefit paid is based on a formula usually involving age, years of service, and salary. In other plans, money is accumulated in an account until retirement. Is this plan like the formula plan or account plan?” If the respondent answered “account plan”, the follow-up was “Can you tell me a little more about this plan? Is it a thrift or savings plan, a 401(k), Supplemental Retirement Annuity (SRA), a profit-sharing plan, or what?” We include as a “401(k) plan” plans identified as thrift or savings, 401(k)/403(b)/SRAs, profit-sharing plans, SEP and SIMPLE IRAs, (unidentified) defined contribution plans, TIAA-CREF,

and money purchase plans. Not all of these types of plans allow loans.

In 2004, the question was changed to “There are two general types of pension plans. In one type, a worker is entitled to receive regular retirement payments for as long as the worker lives, which are most often determined by a formula as a percentage of final or average pay. In the other type of plan, money accumulates in an account designated for a worker, and that money may be paid out in a variety of ways depending on the plan or the worker’s choice. Some plans may be like both of these types. Which type of plan is yours? (Is it the type that gives regular retirement payments, is it the type that accumulates an account balance, or is it like both?)” If the respondent answers “account plan,” the follow-up question is “Is it a 401(k) or 403(b) account, a profit sharing plan, a supplemental retirement annuity, a thrift/savings plan, a ”cash balance” plan, or something else? (What does your employer call it?)” For 2004, we include the plan as a “401(k) plan” if it is identified as a 401(k) plan, 403(b), thrift/savings plan, profit sharing plan, supplemental retirement annuity, SEP or SIMPLE IRA or money purchase plan.

Beginning in 2004, households were asked questions relevant to account-type plans (e.g., balances, loans, etc.) regardless of the response to the first “type of plan” question.

The SCF survey asks about as many as three plans for the head and three for the spouse, for as many as six plans per household. We construct annual household aggregate values of contributions, plan balances, loan balances and loan payments.

Risk Attitudes

Since 1992, the SCF has collected information about attitude toward financial risks. The question is, “Which of the statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?”

1. Take substantial financial risks expecting to earn substantial returns
2. Take above average financial risks expecting to earn above average returns
3. Take average financial risks expecting to earn average returns
4. Not willing to take any financial risks.

We indicate “low risk-aversion” households as those who report option 1.