401(k) LOANS AND HOUSEHOLD BALANCE SHEETS

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We show in a simple model that households will choose 401(k) loans over other consumer loans if the opportunity cost of 401(k) loans — i.e., the foregone asset returns — is less than the cost of other loans, and that few households would carry high-cost consumer debt without first utilizing 401(k) loans. Using data from the Survey of Consumer Finances, however, we find that households typically turn to 401(k) loans only after utilizing more expensive credit. About half of our sample households could benefit from shifting debt to 401(k) loans, generating average savings of about $200 to $275 per year, or 10 to 15 percent of interest costs.

I. INTRODUCTION

Over the past two decades, 401(k) accounts have become the dominant form of retirement plan for private-sector American workers, covering 72 million people and representing $3 trillion in assets in 2007 (U.S. Dept. of Labor, 2009). Many such plans offer a loan option, allowing participants to borrow against their account balance. One of the key distinctions of a 401(k) loan relative to other types of consumer loans is that the interest on a 401(k) loan is paid into the 401(k) account instead of to an outside lender. Thus, the true economic cost of a 401(k) loan is not the loan's contract interest rate but the foregone returns on plan assets while the loan is outstanding.[1]

To date, 401(k) loans have been studied descriptively (e.g., VanDerhei, Holden, and Alonso, 2009), but have received relatively little academic attention until recently (Beshears et al., 2008), leaving many key questions unanswered. Our paper fills some of this gap by addressing the following questions: What factors would be expected to

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[1] As we show below, there are no significant tax consequences from 401(k) loans unless they are not repaid, in which case they are subject to income tax and (in some cases) a 10 percent penalty tax. Repayments are typically made "automatically" by payroll deduction; defaults can occur, however, when borrowers fail to repay loans after separation from the employer.

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affect households' decisions to take a 401(k) loan? Can we measure the empirical importance of these factors? What types of households do we observe taking 401(k) loans? Do households appear to use the loans efficiently? If not, how much could households gain by changing their use of 401(k) loans?

We find that, as with many such questions, whether 401(k) loans strengthen or weaken household balance sheets depends on what we choose as the counterfactual scenario. A household that would otherwise finance consumption using high-interest consumer loans — say credit card debt — could strengthen its balance sheet by consolidating debt into a 401(k) loan instead. On the other hand, a household earning a high return on 401(k) assets and eligible for a low-rate loan from outside the 401(k) — say a tax-deductible home equity loan or line of credit — could be better off avoiding the 401(k) loan.[2]

We show that rational consumers would choose 401(k) loans over outside loans when the opportunity cost of the 401(k) loan (i.e., the expected rate of return on 401(k) assets) is less than the cost of outside borrowing. One implication is that empirically 401(k) borrowing should be negatively correlated with its opportunity cost and positively correlated with the cost of alternatives. In addition, we would expect few households to carry high-cost consumer debt without utilizing available 401(k) loans.

However, using the most recent waves of the Survey of Consumer Finances, we do not find direct correlations between 401(k) borrowing and cost measures (though we do find correlations with overall debt and indicators of borrowing constraints). Moreover, we find a large number of households carrying high-cost consumer debt without utilizing 401(k) loans. We estimate that, taking into account outside interest rates and expected returns on 401(k) assets, about half of our sample of loan-eligible households could strengthen their balance sheets by shifting outstanding consumer debt to 401(k) loans.[3] Taking the year 2007 as an example, depending on the assumption of future 401(k) returns, the aggregate annual gain to households from consolidating debt this way could be as high as $1 billion to $2 billion dollars, or $200 to $275 per household, net of borrowing costs — a 10 to 15 percent reduction in interest payments, on average.

Several factors could potentially explain why the empirical findings do not support the predictions of a fully rational model without uncertainty. Primary among these is risk. For example, households may be averse to the risk of losing their jobs and having to pay back the loan in a short time frame.[4] They may factor in the ability to reduce consumer debt in bankruptcy.[5] They may be particularly optimistic about future 401(k) returns, or particularly averse to the risk of missing out on high returns. Another

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[2] Another possibility, which is largely outside the scope of this paper, is that there could be behavioral effects from 401(k) loan programs. For example, in a mental-accounting framework, a 401(k) loan option could erode the mental wall between retirement assets and other savings, leading households to consume more than they otherwise would. In this paper, we focus on households' problem of financing a given amount of consumption at the lowest cost.

[3] As discussed below, this calculation is based on a sample of households with limited access to home equity borrowing, which could be preferable to 401(k) borrowing in some cases.

[4] Outstanding 401(k) loan balances are typically due within 90 days of separation from the employer.

[5] Unlike consumer debt, 401(k) loans are not discharged in bankruptcy; even if they were, it would not improve a household's balance sheet (since 401(k) wealth would be reduced).

potential factor is limited self-control — households may acknowledge self-control problems in spending by voluntarily limiting themselves from using the 401(k) loan option. Finally, households may simply be making a mistake — they may be unaware of the 401(k) loan option or misunderstand the implications of 401(k) borrowing, or they may "accidentally" carry expensive credit card balances despite their intention to pay them off in full every month.

In this paper we do not attempt to formally test any of these hypotheses against others. Rather, we address the question of which households *do* take 401(k) loans, and what their balance sheets look like. We find that about 15 percent of eligible households held 401(k) loans in 2007, roughly the same percentage that we have seen since 1995. Demographically, 401(k) borrowers look similar to eligible non-borrowers with respect to age, income, marital status and race. However, 401(k) borrowers have significantly different balance sheets — in particular, they have more debt, lower net worth, and relatively fewer non-401(k) financial assets. We find that 401(k) borrowers are also significantly more likely to show signs of liquidity and borrowing constraints, such as low liquid assets relative to income, having been declined for credit, and carrying credit card balances close to limits. All told, our findings suggest that households tend to turn to 401(k) loans when other sources of borrowing are less available, rather than substituting 401(k) borrowing for higher-cost consumer loans.

These findings suggest that many households could potentially strengthen their balance sheets by substituting 401(k) loans for higher-cost consumer debt, rather than tapping 401(k) loans after exhausting other borrowing — i.e., that 401(k) loans may be, in this sense, under-utilized. From this perspective, the findings suggest that it would be in the interest of 401(k) participants to carefully weigh the costs and benefits of 401(k) borrowing as an alternative to other types of borrowing. To that end, greater outreach to 401(k) participants about *prudent* 401(k) loan use could be beneficial. We discuss possible policy "nudges" toward prudent 401(k) loan use in the conclusion.

II. 401(k) LOAN RULES

One of the defining characteristics of 401(k) accounts is that the plan contributions and their earnings are tax-deferred until withdrawal.[6] According to the tax code, 401(k) loans are not treated as withdrawals, and hence are not taxable, as long as certain requirements are met. In particular, the maximum size of a tax-free 401(k) loan is the lesser of $50,000 or 50 percent of the vested plan balance.[7] A second requirement is that

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[6] In this paper we focus on traditional 401(k) plans, which are the type owned by the majority of 401(k) participants. Roth 401(k) plans, introduced in 2006, do not offer tax deductions for contributions; however, withdrawals are tax-free.

[7] The 50-percent cap is technically subject to a floor of $10,000; that is, a participant with a balance of $10,000 or less can borrow all of it. However, Beshears et al. (2008) report that this provision is rarely implemented by plan administrators, out of concern for violating other regulatory provisions. Note that from 2005 to 2007, the loan limits were increased to the lesser of 100 percent of the vested plan balance or $100,000 for qualified borrowers affected by Hurricanes Katrina, Rita, or Wilma. As noted below, many plans also impose minimum loan amounts.

loans must be repaid within five years, though loans for the purchase (not refinance) of a principal residence may be repaid over a longer period (e.g., 15 years or more).[8]

Other rules regarding 401(k) loans are set by the plan. For example, the loan interest rate is typically set equal to the prime rate or prime plus one percentage point.[9] Loan repayments, both principal and interest, are typically made via payroll deduction, which effectively eliminates nonpayment among current workers. If borrowers lose or change their jobs, they are required to repay 401(k) loans upon separation from the employer. Most plans allow a 90-day grace period before designating the loan as in default. A defaulted 401(k) loan is treated as a withdrawal for tax purposes, subject to income tax and (if the borrower is under age 55) a 10 percent penalty.

Plan administrators can also specify additional parameters, such as minimum loan sizes, application and/or annual maintenance fees, number of permissible loans, and amortization periods. Using a survey of 401(k) plans, Beshears et al. (2008) report that most plans do impose minimum loan sizes, with the vast majority setting the minimum size at $1,000 or less. They also find that more than 80 percent of plans charge application fees, with a median amount of $60.[10] They report that about half of plans allow more than one loan at a time (typically two). Finally, they find that more than three quarters of plans set amortization periods for standard (non-residence) loans at five years, with the remaining quarter using slightly shorter amortization periods.

III. PREVIOUS LITERATURE

In addition to the Beshears et al. (2008) study, several papers have explored various features of 401(k) borrowing. VanDerhei, Holden, and Alonso (2009) provide descriptive statistics based on a large sample of 401(k) accounts, finding that about 18 percent of eligible participants had outstanding loans in 2008. This rate is close to those observed in earlier years, suggesting that the recent financial crisis did not appear to significantly affect 401(k) loan usage. The average loan size was about 16 percent of the remaining account balance. They also find that borrowing increases steeply with plan tenure up to about 10 years and that the ratio of loan amounts to account size fall monotonically with account size.

Other studies have shown a positive relationship between loan provisions and contribution rates, presumably because the extra liquidity can accommodate precautionary as well as retirement savings motives. Mitchell, Utkus, and Yang (2007) and Holden and VanDerhei (2001) find that participants who could borrow from their accounts contributed about 0.6 percent more of their salaries than participants without a loan option. Munnell, Sunden, and Taylor (2002) estimate this effect at about one percent,

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[8] Beshears et al. (2008) report that residence loans make up a very small percentage of outstanding 401(k) loans.

[9] Mechanically, loans are typically implemented by liquidating a portion of plan assets and sending a check to the borrower. Repayments, including interest, are treated in a similar fashion as new contributions.

[10] Beshears et al. (2008) also report that about 28 percent of plans charge annual loan maintenance fees, with a median amount of $25.

and the U.S. Government Accountability Office (1997) reports an effect of about three percent. Note that these estimates must be interpreted cautiously, since plans offering loans may be systematically different than those not offering loans (e.g., they may draw from employee populations with very different tastes for saving, financial sophistication, etc.). Nonetheless, Love (2006, 2007) shows that in a dynamic stochastic life-cycle model of consumption, the availability of 401(k) loans can increase 401(k) participation and contributions, particularly among younger workers with precautionary motives.

A number of other papers are similar in spirit to ours in that they explore household-finance puzzles. For example, Amromin (2003), Barber and Odean (2004), and Berg-stresser and Poterba (2004) find that households often do not optimally locate assets across their taxable versus 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 checking account balances that bear very low nominal interest rates, raising the question why households would not use their liquid balances to pay down credit card debt. Telyukova and Wright (2008) and Telyukova (2008) provide an explanation in which households carry credit card debt despite its high costs and their available liquidity because they know they may need the liquid assets for later transactions of certain types (e.g., rent payments). This explanation does not apply as cleanly to 401(k) loans, because unlike checking accounts, 401(k) balances are generally illiquid. One might argue that a household could prefer to keep a higher-rate auto loan on its balance sheet in order to keep its 401(k) borrowing options open for emergencies. But this story would make less sense with respect to credit card borrowing, since the household could pay off its credit card balance with a 401(k) loan, and then use the credit card for any emergency borrowing.

IV. WHEN SHOULD HOUSEHOLDS TAKE 401(k) LOANS?

A. Conceptual Framework

In a typical life-cycle model of consumption, consumers may borrow to smooth the marginal utility of consumption across time and states of the world. In models incorporating liquidity or borrowing constraints, constrained households are particularly likely to access all available forms of credit in order to help smooth marginal utility.

For households considering a 401(k) loan, we expect that the net cost of 401(k) borrowing would be a key consideration in the decision. That is, for a given amount of total debt, a household would borrow from its 401(k) accounts rather than an outside lender if the cost of the 401(k) loan were less than the cost of the outside loan. For an outside loan, the cost is essentially its after-tax interest rate. For a 401(k) loan, the cost is the value of foregone returns on the account.[11]

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[11] In the real world, borrowing costs can be increased by loan fees. We include an assumed 401(k) loan application fee of $50 in the empirical analysis to follow, but we abstract from fees in the present conceptual analysis in order to focus clearly on the key underlying relationships.

We offer a few caveats about this conceptual analysis before introducing a simple model. Most importantly, we are (for now) being intentionally vague about risk. As we will discuss in more detail below, a risk-averse household may avoid an option with a higher expected value if there is sufficient risk of a negative outcome. Second, note that here we are only considering the question of how to structure a given amount of debt most economically — we are not considering the effect of the 401(k) loan program itself 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. Similarly, as noted above, younger households who know that they may want to borrow against 401(k) balances in the future may optimally increase their contributions, leading to higher balances.

As a final caveat, we note 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 $16,500 in 2010,[12] 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.[13] In such a case, the loan itself would increase the amount of tax-favored saving.

B. Simple Model

The key considerations in deciding whether to take a 401(k) loan versus an outside loan can be illustrated in a simple deterministic three-period model. For simplicity, consider a single-member 401(k)-owning household with linear preferences who is "impatient" in the sense of Deaton (1991) — i.e., who has a high discount rate relative to interest rates, and thus wishes to borrow against future income in order to smooth consumption. Compare the case in which she borrows from an outside lender with the case in which she takes a 401(k) loan.

Begin with the outside-lender case. In the first period, suppose she earns $2 and borrows $1 from an outside source. In the second period her earnings rise to $4 and she repays the loan at an interest rate of i. In the third period, she retires and consumes her after-tax 401(k) balance. Denote the 401(k) return as r_1 in the first period and r_2 in the second.[14] Denote the tax rates in each of the three periods as t_1, t_2, and t_3, respectively. Finally, normalize the 401(k) balance to $1 at the start of the first period and denote her discount rate as d.

The upper panel of Table 1 illustrates this household's income, 401(k) balance, outside loan balance, and after-tax consumption in each period. In the first period, she

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[12] The limit is $22,000 for participants aged 50 or older in 2010.

[13] The logic is that 401(k) loan interest payments are essentially new contributions to the plan. Note that for the loan to be preferred as a means of increasing new contributions, the 401(k) loan interest rate would have to be high enough that the benefits of additional contributions outweigh the loss of the tax-preferred status of the 401(k) return relative to the loan interest.

[14] There is no return in the third period because the household withdraws the account at the beginning of the period.

Table 1

A Simple Borrowing Model

Period	(1) Income	(2) 401(k) Balance	(3) Loan Balance	(4) After-Tax Consumption
Outside Loan				
1. Borrow	2	1	1	$3 - 2t_1$
2. Repay	4	$1 + r_1$	0	$3 - 4t_2 - i$
3. Withdraw	0	$(1 + r_1)(1 + r_2)$	0	$(1 + r_1)(1 + r_2)(1 - t_3)$
401(k) Loan				
1. Borrow	2	0	1	$3 - 2t_1$
2. Repay	4	$1 + k$	0	$3 - 4t_2 - k$
3. Withdraw	0	$(1 + k)(1 + r_2)$	0	$(1 + k)(1 + r_2)(1 - t_3)$

borrows from an outside source, receiving a total cash flow of $3 (including the $1 loan), which affords after-tax consumption of $3 − 2t_1$. In the second period, she repays the loan, resulting in after-tax consumption of $3 − 4t_2 − i$.[15] In the third period, she retires, receiving an income of $(1 + r_1)(1 + r_2)$ from the 401(k), affording after-tax consumption of $(1 + r_1)(1 + r_2)(1 - t_3)$.

Now compare this to the stream of after-tax consumption she can afford when she takes a 401(k) loan instead of an outside loan, as shown in the lower panel of Table 1. In the first period, she borrows from the 401(k), receiving a cash flow of $3 (including the loan), which affords after-tax consumption of $3 − 2t_1$ (the same as when she borrows from an outside lender). In the second period, she repays the 401(k) loan at an interest rate of k, resulting in after-tax consumption of $3 − 4t_2 − k$.[16] In the third period, she retires, receiving an income of $(1 + k)(1 + r_2)$ from the 401(k), affording after-tax consumption of $(1 + k)(1 + r_2)(1 - t_3)$.

Compare these two scenarios by computing the present value of the stream of after-tax consumption under each. Dropping the first period (which is the same under each scenario) and discounting at the rate d, we have:

$$(1) \quad PV_{outside} = 3 - 4t_2 - i + \frac{(1 + r_1)(1 + r_2)(1 - t_3)}{1 + d}$$

$$(2) \quad PV_{401(k)} = 3 - 4t_2 - k + \frac{(1 + k)(1 + r_2)(1 - t_3)}{1 + d}$$

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[15] Note that the outside interest payment is not tax-deductible in this example (she still pays the full tax bill of $4t_2$). See below for how the results change when the outside interest payment is deductible.

[16] Note that the 401(k) interest payment is not tax-deductible, i.e., the tax bill is still $4t_2$.

Note that the only differences are that the 401(k) borrower pays an interest rate of k instead of i on the loan (the third term), and the 401(k) borrower earns a return of k instead of r_1 on the account (the first term in the numerator of the quotient). Now equate the two and solve for the threshold level of i above which the 401(k) loan would be preferred to the outside loan:

$$(3) \quad i^* = k + \frac{(1+r_2)(1-t_3)}{1+d}(r_1 - k).$$

Intuitively, the 401(k) loan is better when the outside loan rate i is high enough to overcome the cost of the 401(k) loan, which has two components: the direct cost of the interest paid on the 401(k) loan (i.e., k, which reduces consumption in the repayment period), and the net opportunity cost of the foregone return r_1 during the period the loan is outstanding (the second term). Note that the first-period opportunity cost $r_1 - k$ is compounded by the after-tax account returns in the later period.[17]

Looking at the comparative statics when $r_1 > k$ (i.e., the "typical" case of positive opportunity costs), note that i^* increases with the 401(k) returns r_1 and r_2, which positively affect the opportunity cost of a 401(k) loan, and decreases with the tax rate t_3 and the discount rate d, which negatively affect the opportunity cost by reducing the value of 401(k) balances in retirement.[18] Since the 401(k) borrower is also a 401(k) lender, the 401(k) loan rate k has opposing effects on i^* — a higher k hurts the borrower in the repayment period (increasing i^*), but helps the borrower in the retirement period by offsetting the opportunity cost of the foregone return (decreasing i^*). On net, whether i^* increases or decreases with k depends on the other opportunity cost parameters: r_2, which compounds the opportunity cost, t_3, which reduces it, and d, which discounts it. For households with a relatively large r_2 and a relatively small t_3 and d, the opportunity cost could outweigh the direct cost, and thus i^* would decrease with k. For other households — specifically, those for whom $(1 + r_2)(1 - t_3) < 1 + d$ — the more likely case with an impatient household — the direct cost would dominate, and i^* would increase with k.[19]

C. Taxes

The simple model illustrates why 401(k) loans are not really double-taxed, as is sometimes argued (Dugas, 2007). The argument for double taxation is that 401(k) loan

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[17] As an illustration, when $k = .06$, $r_1 = r_2 = .07$, $t_3 = .15$, and $d = .08$, then $i^* = .068$. That is, households facing outside loan rates above 6.8 percent would be expected to prefer the 401(k) loan, all else equal.

[18] That is, retirement-period taxes actually encourage 401(k) borrowing relative to outside loans by reducing the opportunity cost of foregone account earnings.

[19] Note that when opportunity costs are negative ($r_1 < k$), foregoing 401(k) returns becomes a benefit rather than a cost (e.g., as occurred in 2008), and i^* will be significantly lower. In terms of comparative statics, i^* still increases with r_1, but now decreases with r_2, which amplifies the negative opportunity cost of 401(k) borrowing (i.e., encourages 401(k) borrowing), and increases with t_3 and d, which diminish the negative opportunity costs (i.e., discourage 401(k) borrowing). The comparative statics with respect to k are unchanged (i.e., the signs of the derivatives are unchanged), since r_1 and k do not enter into the inequality $(1 + r_2)(1 - t_3) < 1 + d$.

repayments are not deductible and yet they are taxed upon withdrawal in retirement. But the reality of double taxation is much less than it first appears. Under a consumption tax, which is the appropriate conceptual basis for analyzing retirement account taxation, each dollar of consumption should be taxed once. Recall that loan proceeds (which come from pre-tax dollars in a traditional 401(k)) are not taxed upon receipt. Thus, repaying the loan with after-tax dollars is simply an indirect way to ensure that the consumption of loan proceeds is taxed once. The tax at withdrawal, in turn, ensures that the consumption of the repayments is also taxed once. Thus, the loan principal is not taxed twice. Interest payments, on the other hand, are taxed twice, since they are taxed at withdrawal and not deductible when made. However, in practice the effect of this excess tax (relative to a consumption-tax benchmark) is essentially offset by a countervailing tax break: the time value of the deferral of tax on the consumption of the loan. Recall that loan repayments are typically made over a five-year period. Since in reality taxes are effectively paid upon repayment of the loan, rather than its receipt, borrowers enjoy a tax break by spreading out the tax payments over time. For typical parameter values, this nearly completely offsets the double taxation of interest.[20]

In the context of the model introduced above, it is clear that taxes will not typically discourage 401(k) borrowing. In the model, as in reality, the 401(k) loan principal and interest payments are not deductible, and the withdrawal in retirement is fully taxed. This does not disadvantage the 401(k) loan relative to the outside loan because the outside loan faces the same treatment: consumer-loan principal and interest payments are generally not deductible.

In some cases, however, interest payments on outside loans are deductible — as is true, for example, for many mortgages and home-equity loans or lines of credit. Introducing deductible outside interest into the model, after-tax consumption in the second (i.e., repayment) period becomes $3 - 4t_2 - i(1 - t_2)$, and the equation defining i^* becomes:

$$(4) \quad (1 - t_2)i^* = k + \frac{(1 + r_2)(1 - t_3)}{1 + d}(r_1 - k).$$

That is, the comparison is the same as before, except the after-tax outside interest rate is used to measure against the threshold, resulting in a higher i^* (and thus discouraging 401(k) borrowing) relative to the benchmark case of non-deductible outside interest.[21]

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[20] In the model, tax payments are $2t_1$ in the first period and $4t_2$ in the second — i.e., the loan is not taxed and the repayments are not deductible. Under a "true" consumption tax, tax payments would be $3t_1$ in the first period and $(4 - (1 + k))t_2$ in the second period — i.e., the loan would be taxable and the repayment (including interest) deductible. As a result, the present value of the difference in taxes paid in the model versus a true consumption tax is $[(1 + k)/(1 + d)]t_2 - t_1$. As an illustration, when $t_1 = t_2 = .15$, $k = .06$, and $d = .08$, the difference is $-.0028$ — i.e., about three-tenths of a percentage point of a tax break, relative to the true consumption tax. This small break could flip to a small excess tax (relative to a true consumption tax) if $t_2 > t_1$ (e.g., if tax rates are higher in the higher-income period). However, note that in the model, repayments are made in a single year; since the time value of deferral increases with longer amortization periods, the difference will be smaller (indeed, essentially zero) over a typical five-year loan.

[21] As an illustration, if $k = .06$, $r_1 = r_2 = .07$, $t_2 = .20$, $t_3 = .15$, and $d = .08$, then $i^* = .086$, compared to $i^* = .068$ in the benchmark case.

In this case, taxes have two effects on the attractiveness of a 401(k) loan: as before, retirement-period taxes (t_3) reduce the opportunity cost of foregone returns, encouraging 401(k) loans, but now repayment-period taxes (t_2) reduce the direct cost of the outside loan, discouraging 401(k) loans. The net effect of taxes on 401(k) loans in the case of deductible outside interest payments depends on the relative tax rates across time. If tax rates are constant over time (i.e., $t_2 = t_3$), the discouraging effect is always stronger than the encouraging effect, since the discouraging effect is more direct (i.e., not diluted by other parameters) — that is, on net, taxes reduce the attractiveness of 401(k) loans. If tax rates fall in retirement (i.e., $t_2 > t_3$), as is often supposed, the discouraging effect is even stronger. If tax rates rise sufficiently in retirement, however, 401(k) loans could be encouraged by taxes even in the case of deductible outside interest payments.

D. Risk

The simple model outlined above illustrates a few key factors theoretically affecting the choice between a 401(k) loan and an outside loan. In particular, it highlights a number of reasons households might choose to avoid 401(k) borrowing: they might expect a high 401(k) return over the repayment period, falling tax rates in retirement, or tax-deductible interest on outside borrowing choices. The introduction of uncertainty would add additional factors that could discourage 401(k) borrowing, including aversion to the risk of job loss (requiring loan repayment in a low-income state) and aversion to the risk of unexpectedly high opportunity costs (e.g., surprisingly high 401(k) returns or surprisingly low outside interest rates). In addition, the choice between 401(k) borrowing and outside borrowing could be influenced by the household's overall exposure to risk. A household opting for an outside loan in order to preserve equity investments in the 401(k) plan is essentially taking a leveraged position in 401(k) stocks.[22] Since a bad draw on stock returns could leave the household with both a smaller retirement account and less non-retirement wealth (due to the outside loan), a risk-averse household might prefer the 401(k) loan in part to avoid this outcome.

In general, we lack the data to test the predictions of the simple model directly. However, we do have the data to examine which types of households utilize 401(k) loans, how the loans fit into the overall household balance sheet, and how much households might gain by restructuring their balance sheets to reduce borrowing costs.

V. DATA AND DESCRIPTIVE STATISTICS

We use the 1995–2007 waves of the Survey of Consumer Finances (SCF) to examine 401(k) borrowing and its impact on household balance sheets.[23] The SCF is a trien-

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[22] We thank the editor, Bill Gentry, for this insight.
[23] Some limited information about 401(k) loans was also collected in 1992. We include the 1992 data in Tables 2 and 3 below, but not in later tables.

nial nationally representative cross-sectional survey of household wealth and finances conducted by the Federal Reserve Board.[24]

We select households between the ages of 21 and 60 (using the older spouse's age if married) and in which at least one member is working for pay. We exclude households in which the head or spouse reports self-employment or partnership income, since these households generally face different financial environments and different retirement plans than non-self-employed workers.[25]

Table 2 shows 401(k) plan participation and loan utilization from 1992–2007 in our sample.[26] Participation in 401(k) plans grew from about one-third to near one-half of sample households from 1992–2007, while access to 401(k) loans grew from about one-fifth of sample households to above one-third. Overall, the share of sample households holding 401(k) loans grew from 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), after which it declined slightly to 5.1 percent in 2007. Conditional on loan eligibility, borrowing peaked at 18.9 percent in 1998, falling subsequently to 14.9 percent by

Table 2

401(k) Plans and Loans

	1992	1995	1998	2001	2004	2007
Percent of households that:						
Have a 401(k) plan	33.5	43.2	48.7	48.9	46.1	48.5
Can take a 401(k) loan	20.3	28.3	36.0	36.8	32.4	34.1
Have a 401(k) loan	2.3	4.5	6.8	5.4	5.3	5.1
Loan Rate among:						
All 401(k) households	6.9	10.5	14.0	11.1	11.4	10.5
Loan-eligible households	11.4	16.0	18.9	14.7	16.3	14.9
Sample size	1,518	1,816	1,798	1,914	1,880	1,831

Source: Authors' calculations from the Survey of Consumer Finances (SCF).

[24] The SCF is designed to over-sample the high end of the wealth distribution in order to obtain more precise estimates of aggregate household wealth holdings. We use the survey's sample weights to make the results representative of the population. Note that the weights are constructed to make the SCF representative of all households, and not necessarily 401(k) holders or borrowers as subgroups.

[25] This cut eliminates 4,592 observations, or about a third (on an unweighted basis) of the working sample aged 21–60.

[26] 401(k) plans are the dominant, but not the 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 for details.

2007. Broadly speaking, the share of eligible households taking 401(k) loans has been relatively stable since 1995, with a bit more borrowing in the "credit-crunch" year of 1998.

The SCF provides a rich set of balance sheet information for sample households. For balance sheet measures such as assets, debt, and net worth, we apply the definitions used in the Federal Reserve Bulletin articles that accompany each SCF survey release.[27] Assets are defined as the sum of financial and nonfinancial assets,[28] and debt refers to the sum of real estate debt and all other debt.[29] Finally, net worth is defined as assets less debt.

Table 3 reports key characteristics of the 3,411 401(k)-loan-eligible households in our pooled sample, breaking the sample into those with and without 401(k) loans at the time of the survey. The top panel shows that many of the demographic characteristics (age, marital status, and race) of 401(k) loan borrowers are generally quite similar to those of the eligible non-borrowers, though borrowers are a bit more likely to be non-white and quite a bit less likely to have a college degree.

The middle panel shows that more pronounced differences appear when we look at 401(k) borrowers' balance sheets, relative to eligible non-borrowers. Borrowers have only slightly lower median incomes, but their median net worth is about 23 percent lower than that of non-borrowers. Borrowers hold about 13 percent less in total assets, at the median, with about 10 percent lower nonfinancial assets (and, in particular, substantially lower home equity) as well as about 20 percent lower financial assets.[30] Nonetheless, borrowers' 401(k) balances are more than 50 percent higher, despite their roughly similar ages and incomes. As a result, the shares of financial assets held in 401(k) accounts are notably higher among those with 401(k) loans.

On the liability side of household balance sheet, the median total debt held by 401(k) borrowers is about 21 percent higher than that of eligible non-borrowers. The 401(k) borrowers hold more of all major types of debt. For example, median mortgage debt is about 18 percent higher among 401(k) borrowers, mean home equity loans are 18 percent higher, [31] and median credit card balances are more than three times higher

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[27] For example, see Bucks et al. (2009) for a summary of the 2007 survey. The SAS code used to generate the summary balance sheet variables for the bulletin article is available at http://www.federalreserve.gov/pubs/oss/oss2/bulletin.macro.txt.

[28] Financial assets include liquid assets (checking, saving, and money market accounts, plus any call accounts at brokerages) plus CDs, non-money-market mutual funds, stocks, bonds, retirement accounts, savings bonds, the cash value of whole life insurance, other managed accounts (trusts, annuities, etc.) and other financial assets (loans, royalties, etc.). Nonfinancial assets include vehicles, real estate, businesses, and other miscellaneous assets (e.g., collections).

[29] Real-estate debt includes mortgages, home-equity loans and lines of credit, and other residential property loans. Non-real-estate debt includes credit card balances, installment loans (including vehicle loans), other lines of credit, and other debt (including 401(k) loans, life-insurance loans, and margin loans).

[30] Borrowers and non-borrowers have very similar home-ownership rates of about 75 percent (not shown in the table).

[31] We report mean home equity loans, rather than median, because median home-equity borrowing is zero for both 401(k) borrowers and eligible non-borrowers.

Table 3

Characteristics of 401(k) Loan-eligible Households

	Without 401(k) Loans	With 401(k) Loan
Demographics		
Mean age (years)	41.7	42.6*
Married (%)	71.9	71.3
Non-white (%)	21.9	26.4*
College degree (%)	50.1	37.9*
Balance sheet measures ($thousands, 2007)		
Median income	76	71*
Median net worth	144	111*
Median assets	252	219*
Median nonfinancial assets	166	150*
Median home equity	41	25*
Median financial assets	66	53*
Median 401(k) balance	21	33*
401(k) share of financial assets (%)	48	69*
Median debt	80	97*
Median mortgage	60	71*
Median home equity loans	5.7	6.7*
Median credit card debt	0.4	1.3*
Liquidity and borrowing constraint indicators		
Liquid assets <1% of income (%)	9	18*
Hardly ever pay off credit cards (%)	24	39*
Declined credit in past 5 years (%)	21	38*
Credit card balances >90% of limit (%)	7	18*
None of the above (%)	61	36*
Two or more of the above (%)	14	36*
Sample size	2,902	509

Notes: Data are a pooled sample of the 1992, 1995, 1998, 2001, 2004, and 2007 waves of the SCF. Asterisks denote statistically significant difference at the 5% level.

among borrowers than among non-borrowers. Overall, these statistics paint a picture of a typical 401(k) borrower as having significantly more debt and fewer non-401(k) assets than the typical non-borrower.

The finding of higher debt among 401(k) borrowers suggests that households tend to use 401(k) loans in addition to, rather than instead of, alternative sources of financing. For example, some households may have turned to 401(k) loans after exhausting other financing options. To test this, we explore whether 401(k) borrowers are more likely to show liquidity and borrowing constraints. We create several indicators for each household. Our first indicator identifies households whose liquid assets are less than 1 percent of their income.[32] Our second indicator identifies households who respond "hardly ever" to a question about how frequently they pay off their total credit card balance each month.[33] Our third indicator reveals whether the household reports being declined credit in the past five years.[34] The fourth indicator identifies households near their combined credit limit on their credit cards.[35]

As shown in the lower panel of Table 3, for each of our four measures of liquidity and borrowing constraints, 401(k) borrowers are significantly more likely to be constrained than non-borrowers — in some cases twice as likely. Looking at the indicators as a group, we see that only 36 percent of 401(k) borrowers report being unconstrained by all four measures, compared to 61 percent among non-borrowers. At the same time, 36 percent of 401(k) borrowers meet two or more constraint criteria, while only 14 percent of non-borrowers meet two or more criteria.

The findings of higher debt, lower net worth, and higher prevalence of liquidity and borrowing constraints among 401(k) borrowers indicate that 401(k) loans are more heavily used by households that have already made use of outside borrowing opportunities; i.e., that 401(k) loans are among the last, rather than the first, sources of borrowing for households seeking financing. This pattern suggests that households consider 401(k) loans to be something of a last resort, rather than a lower-cost alternative to outside borrowing, as described in the theoretical model. To explore these empirical patterns a bit further, and to test the significance of theoretically important variables such as outside interest rates, expected 401(k) returns, and measures of consumption-smoothing motives, we estimate a simple probit model of 401(k) borrowing among eligible households.

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[32] Many empirical studies of household liquidity constraints use the liquid-assets-to-income ratio as the constraint indicator; see, e.g., Zeldes (1989).

[33] The other possible responses are "always or almost always" and "sometimes."

[34] Jappelli, Pisckle, and Souleles (1998), Amromin, Huang, and Sialm (2007), and Johnson and Li (2010) use a similar measure.

[35] This is the "utilization rate," or credit card borrowing relative to credit limit, used by Gross and Souleles (2002), except that they used account-level data and our data are household-level. Like Gross and Souleles we specify a utilization-rate threshold of 90 percent as being borrowing constrained. Gross and Souleles find 14 percent of accounts constrained using this definition; we find 8 percent of households meet this criterion.

VI. 401(k) BORROWING REGRESSION AND LOAN DETAIL

A. The Probit Model

The goal of the probit model is to illustrate the empirical relationship between selected balance sheet measures and 401(k) borrowing, as well as to quantify the importance of a few key variables from the theoretical model. For ease of interpretation, we report marginal effects from the probit regression of 401(k) borrowing on household characteristics, using a sample of 401(k)-loan-eligible households from the 1995–2007 waves of the SCF. The marginal effects are calculated at the mean for continuous variables, and as the discrete change in the probability of 401(k) borrowing for indicator variables. The marginal effects and their standard errors are adjusted for the SCF's multiple imputation procedure.[36]

As shown in Table 4, households with a college degree are about 6 percentage points less likely to borrow from their 401(k) plans, but there is no significant relationship between 401(k) borrowing and income. Perhaps somewhat surprisingly, the level of home equity, which often provides an alternative low-cost source of borrowing, also has no significant relationship with 401(k) borrowing, after conditioning on other balance sheet variables. The size of the 401(k) account balance, in contrast, has a substantial effect on 401(k) borrowing.

We measure the 401(k) account balance as a share of financial assets in order to capture the importance of the 401(k) account to the overall balance sheet. Because these shares are growing over time as households accumulate wealth in their 401(k) accounts, we have to be careful when we pool several years of data.[37] What we are particularly interested in is the cross-sectional variation in the 401(k)-to-assets ratio, in order to identify households that are particularly "401(k)-rich" relative to the population. To focus on cross-sectional variation, we identify households with an above-average 401(k) asset share, where the average is defined for each wave. As shown in Table 4, households with an above-average 401(k) asset share are about 11 percentage points more likely to borrow from their 401(k) accounts, which is the largest marginal effect in the regression.

Looking at the liability side of the household balance sheet, we find that a one percent increase in real debt (excluding 401(k) loans) is associated with about a one percentage point increase in the likelihood of 401(k) borrowing. This is consistent with the

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[36] The SCF provides five imputations of missing values for each observation; failure to correct for the additional records would overstate the precision of the estimates. We use the correction procedure suggested in the 2007 SCF codebook. The procedure runs five separate regressions (one for each set of imputations) and reports the average marginal effects and standard errors adjusted to account for the difference between each estimated marginal effect and the average. See the codebook for details and sample computer code (available online at http://www.federalreserve.gov/pubs/oss/oss2/2007/codebk2007.txt).

[37] For example, the median ratio of 401(k) wealth to financial assets grew from 0.33 in 1995 to 0.58 in 2007. In (real) dollar terms over this period, median balances grew from about $15,000 in 1995 to about $35,000 in 2007.

Table 4

Probit Regression of 401(k) Borrowing on Characteristics of Eligible Households

Variable	Marginal Effect (std error)
College Degree	−0.060** (0.021)
Log of Real Income	0.007 (0.012)
Log of Real Home Equity	−0.002 (0.001)
Above Average Ratio of 401(k) to Financial Assets	0.106** (0.013)
Log of Real Debt (excl. 401(k) loans)	0.009** (0.003)
Liquid Assets <1% of Income	0.027 (0.023)
Declined Credit in Past 5 Years	0.093** (0.029)
Credit Cards Near Limit	0.069** (0.020)
Hardly Ever Pay off Cards	0.055** (0.016)
Above Average Years in Plan	0.068** (0.015)
Lowest Outside Interest Rate	0.086 (0.121)
Expected 401(k) Return	−0.003 (0.006)
College*Age≤35	0.035 (0.025)
Income < 80% of Normal	−0.008 (0.029)

Notes: Data are a pooled sample of 1995–2007 waves of the SCF. Asterisks denote significance at the 1% (**) and 5% (*) levels. SCF wave indicators are also included in regression. The sample size is 3,406. Standard errors are corrected for multiple imputation. The mean dependent is 0.150. The Pseudo-R2 is 0.108.

descriptive evidence above that households using 401(k) loans are likely to have used other sources of borrowing first. Looking at the indicators of liquidity and borrowing constraints, we find that three of the four measures have statistically significant positive relationships with 401(k) borrowing. The estimated effect of low liquidity on 401(k) borrowing is about three percentage points, but imprecise. Being declined credit sometime in the past five years has a large marginal effect — about 9 percentage points on the probability of having a 401(k) loan. Households meeting the Gross and Souleles criterion for binding credit card constraints are about 7 percentage points more likely to borrow from their 401(k) plans, while those reporting that they hardly ever pay off their credit card balances are about 5.5 percentage points more likely to take a 401(k) loan. Given that the mean of the dependent variable is about 15 percentage points, these balance sheet effects are quite large.

Tenure in the 401(k) plan also has a significant effect. Tenure can affect the likelihood of borrowing because it is correlated with vesting (longer-tenured participants are more likely to be fully vested), and also because longer-tenured participants are more likely to be more familiar with the rules of the plan, including borrowing provisions.[38] Because average plan tenure, like the average balance, increases over time, we again measure the statistic relative to the mean observed in the observation's wave.[39] We find that households with above-average tenure in their 401(k) plan are about 7 percentage points more likely to borrow from the plan.[40]

In addition to quantifying the effects of balance sheet variables and tenure on the likelihood of 401(k) borrowing, another goal of the probit regression is to test the empirical importance of some of the key variables as identified in the model. In the model, households borrow from their 401(k), rather than an outside source, when the opportunity cost of 401(k) borrowing (i.e., foregone returns) is lower than the benefit (i.e., saved outside interest payments). In addition, borrowing from all sources should increase with the strength of the consumption-smoothing motive — e.g., among households facing particularly steep age-income profiles, or those experiencing temporary negative income shocks.

However, we do not find strong empirical evidence for these theoretical relationships. As reported in Table 4, our measure of outside interest rates — the lowest interest rate reported on existing home equity loans or lines of credit, auto loans, or credit card loans — is uncorrelated with 401(k) borrowing.[41] Similarly, the expected return on 401(k) assets, which we define according to reported 401(k) portfolios and long-run

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[38] Plan participants are always fully vested in their own contributions, but employer contributions (including matches) often require three to five years to vest fully.

[39] In our sample median plan tenure increased from five years in 1995 to seven years in 2007.

[40] This estimate is little changed when age is included separately in the regression, and age does not have a significant independent effect on 401(k) borrowing.

[41] Note that we do not observe the variable we would actually like to measure, which is the lowest rate available on a hypothetical new loan. Households without any current loans are assigned the market average interest rate published by Bank Rate Monitor. We obtain similarly insignificant results when we include separate measures for credit card, auto loan, and home-equity loan rates.

averages of stock and bond returns, has no significant relationship with 401(k) borrow-ing.[42] Thus, we do not find empirical support for the hypothesis that households trade off 401(k) borrowing and outside borrowing opportunities as described in our model. These findings may be due in part to measurement problems — both our outside inter-est rate measure and our expected return measure are at best rough indicators of the underlying quantities we wish to capture — but the findings are also consistent with our earlier evidence that households appear to use 401(k) borrowing as an instrument of last resort, or a conceptually distinct type of borrowing, rather than a source of funds to be priced alongside outside sources, as in the model.

One source of funds that is similar to 401(k) borrowing in some respects is home-equity borrowing. Like 401(k) loans, home-equity loans or lines of credit are a way for a household to borrow against its own illiquid assets rather than borrow someone else's liquid assets, and in many cases home-equity loans are tax deductible. The transaction costs of a home-equity loan, however, are likely to be higher than that of a 401(k) loan, since home-equity borrowing requires a credit review from an outside lender. Similarly, application and maintenance fees are likely to be at least as large for home-equity loans as for 401(k) loans. In any case, we find little empirical relationship between home-equity borrowing and 401(k) borrowing. In alternative specifications in which we include imputed home-equity loan interest rates and/or the presence of a home-equity loan, the estimated marginal effects are small and statistically insignifi-cant. Thus, despite the conceptual similarities, 401(k) borrowing does not appear to be as correlated with home-equity borrowing as with credit card and auto borrowing.

In addition, broad measures of consumption-smoothing motives do not appear to correlate directly with 401(k) borrowing. In our sample, young, college-educated households face the steepest age-income profiles, but as indicated in Table 4 these households are not more likely to borrow from their 401(k) plans. We do find that they have significantly higher debt-to-income ratios in a regression of debt-to-income on household characteristics (not shown), consistent with the stronger borrowing motive. In our sample, the mean debt-to-income ratio is 1.24; the estimated effect of being a college-educated household under age 35 is to increase that ratio by 0.35. Other age-education groups, such as high-school educated households under 35 or households over 35 have significantly lower debt-to-income ratios. Thus, we find that the consumption-

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[42] The SCF asks each household about up to six current 401(k) plans. We calculate the household-level 401(k) stock allocation as an asset-weighted average of the stock share for each plan reported by the household. Prior to 2004, the portfolio question allowed the responses "mostly or all stock," "mostly or all interest earning," or "split." Beginning in 2004, the responses were changed to "all in stock," "all in interest earning," and "split," with the last response followed up with "About what percent is in stocks?" For survey years before 2004, we assign households responding "mostly or all stock" a stock share of 100 percent and those responding "mostly or all interest earning," a stock share of zero. For pre-2004 households responding "split," we impute the stock share using coefficients from a regression of 401(k) stock share on household characteristics (including age, education, marital status, race and net worth) among households who answered the follow-up question in 2004 and 2007. To estimate expected returns, we apply a 10 percent nominal return to the stock component and a 7 percent return to the remainder.

smoothing motive does affect total borrowing, but not 401(k) borrowing. Since 401(k) borrowing is correlated with total borrowing, there may be an indirect relationship between consumption-smoothing motives and 401(k) borrowing, but we do not find strong evidence for a direct effect.

Similarly, households reporting "unusually low" income in the SCF (i.e., this year's income is low relative to "normal" income) are not more likely to borrow from their 401(k) plans. Again, we find that such households do have higher debt-to-income ratios, though in this case the effect could be mechanical, since income is in the denominator. A better measure in this case might be the ratio of debt to assets, which is not significantly different from other households — i.e. we do not find evidence of greater total borrowing among households reporting unusually low income. Finally, we note (not shown in the table) that we do not find any significant wave-specific effects in the probability of 401(k) borrowing, conditional on the balance sheet and other factors discussed above.

B. 401(k) Loan Detail

The results of the probit model suggest that households do not necessarily use 401(k) loans to smooth consumption over time or states of the world, nor do they seem to trade off 401(k) loan costs against the cost of other loans. How then are 401(k) loans used in our sample? Table 5 provides some details on the characteristics of the 401(k) loans we observe in the SCF. First, we see that loans are relatively small — the median outstanding loan balance in the sample is about $3,700 (in 2007 dollars); by comparison, the median consumer debt in the sample is about $21,000 in real terms.[43] 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, assuming a standard loan period of five years. The median annual payment is about $1,600, or nearly half the median loan balance, suggesting that the median observed loan is, perhaps not surprisingly, about midway through the repayment process.[44] Indeed, our calculation of how many months would be required to pay off the balance at the current rate is about 25 months at the median, a bit less than half of the standard five-year loan period.

As a measure of 401(k) loan utilization, we calculate the loan balance relative to the estimated maximum loan allowed, which we define according to the tax code as the lesser of $50,000 and 50 percent of the account balance. As shown in Table 5, the median 401(k) utilization rate is about 27 percent, suggesting that, even allowing for the fact that the median loan is about halfway repaid, borrowing households seem to utilize 401(k) loans significantly less than they could. Some of this could be due to vesting restrictions (generally loans cannot be taken against unvested balances), but among 401(k) borrowers with more than five years of plan tenure (and thus presumably fully vested), the median 401(k) loan utilization rate is about the same.

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[43] Our finding of $3,700 as a median loan amount is similar to the $3,500 reported in Beshears et al. (2008).

[44] Beshears et al. (2008) report a median monthly loan payment of $118, or $1,416 at an annual rate.

Table 5

401(k) Loan Detail

Median Values:	
Loan balance ($thousands, 2007)	3.7
Annual payment ($thousands, 2007)	1.6
Months to pay off	25
Utilization rate[1]	27
Loan Purpose (percent):	
Bills and debt consolidation	34
Home purchase or construction	17
Medical or educational expenses	12
Vehicles	12
Home improvements	11
Special expenses[2]	8
Financial investments[3]	4
Appliances and electronic equipment	3

Note: Data are a pooled sample of 474 outstanding 401(k) loans from 1995–2007 SCF.
(1) Ratio of 401(k) loan balance to estimated maximum loan
(2) Divorce, separation, travel, vacation, wedding, funeral, moving, etc.
(3) Stocks, bonds, IRAs, gold, investment real estate, cash, businesses, etc.

Since 1998, the SCF has asked households to report the general purpose of the 401(k) loan. Consistent with the evidence reported above that households tend to use 401(k) loans as a "last resort" after running up other sources of debt, nearly a third of respondents say they took the 401(k) loan to pay bills or consolidate debt. The remainder point to specific new expenses, such as home purchases or construction, medical and education expenses, vehicle purchases, and home improvements. Relatively few households report the loan being used for special expenses such as vacations or weddings, or for household appliances or financial investments. Overall, the reported purpose of the loan is consistent with the evidence that many households are using 401(k) loans to cope with accumulated debt, rather than as an alternative source of financing for new consumption.

In general, the loan purposes reported in Table 5 have been relatively stable across waves. One exception, however, is a notable trend away from borrowing for home purchases or construction since 2001, and a commensurate increase in the share reporting borrowing for bill payment and debt consolidation. We attribute the decline in home-purchase 401(k) borrowing to increases in home-secured credit availability during the housing boom years. The increase in 401(k) borrowing for debt consolidation was particularly notable in the 2007 wave, as highly leveraged households apparently

looked to 401(k) loans to help them cope with debt payments.[45] Nonetheless, as reported above, the overall share of eligible households taking 401(k) loans has remained quite stable across waves, and recent studies based on administrative data show no increase in 401(k) borrowing in 2008 (VanDerhei, Holden, and Alonso, 2009).

VII. POTENTIAL GAINS FROM RESTRUCTURING HOUSEHOLD DEBT

A. Conceptual Issues in Estimating Potential Gains

The results above are generally consistent with the hypothesis that many 401(k) borrowers are using the loans as "last resort" sources of finance to help cope with accumulated bills and consumer debt. However, 401(k) loans tend to be small relative to outstanding consumer debt or the maximum allowed 401(k) borrowing. One question raised by these findings is how beneficial it would be for households to increase 401(k) borrowing in order to consolidate other more expensive outstanding consumer debt. To address this question, we estimate the potential net balance sheet gains from reshuffling household debt out of existing consumer loans and into 401(k) loans.

A key issue in this exercise is the treatment of home-equity loans and lines of credit. Many households potentially have access to loans backed by home equity, which could provide an alternative tool for strengthening their balance sheets (i.e., by consolidating higher-rate consumer debt into home-equity loans). At the same time, in some cases it could be beneficial for households to shift home-equity debt over to 401(k) loans. This could be the case, for example, if the home-equity borrowing is at a relatively high after-tax interest rate while the expected 401(k) returns are low. Because we lack the data to make precise estimates regarding the relative advantages of home-equity versus 401(k) borrowing, we restrict the current exercise to two classes of households for whom new home-equity borrowing is presumably unavailable — renters, and homeowners with relatively high loan-to-value ratios.[46] With this restricted sample, our focus is on estimating the potential gains from shifting consumer debt from auto loans, installment loans, and credit card loans to 401(k) loans.

An important factor that is not easily captured with this approach is the effect of debt reshuffling on the household's exposure to financial risk. Shifting debt from consumer loans to 401(k) loans could affect risk exposure in a number of offsetting ways, since all types of household borrowing expose the household to financial risk. As noted above, two important risks associated with 401(k) borrowing include uncertain foregone returns (e.g., the risk of large opportunity costs if 401(k) returns are particularly high during the loan repayment period), and an uncertain repayment schedule (i.e., the risk of a

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[45] The median debt-to-income ratio of households holding 401(k) loans increased from 1.07 in 2001 to 1.59 in 2007; for those without loans, the median rose from 0.92 to 1.30.

[46] We exclude homeowners with an LTV greater than 60 percent, which is roughly both the mean and median LTV in the sample. As a sensitivity test, we imposed a threshold of 80 percent, which is roughly the 75th percentile; the resulting estimated gains were a bit smaller, but not qualitatively different.

large required lump-sum repayment in the event of a separation from the employer, potentially coinciding with a negative income shock). An additional risk factor that could be important in some cases is the loss of the ability to escape or reduce liabilities through bankruptcy filing. On the other hand, non-401(k) debt carries similar risks: as noted above, increasing outside debt in order to preserve 401(k) stock investments is a form of leveraged investing, which increases the negative consequences of a bad draw on stock returns (i.e., higher outside debt payments combined with reduced retirement wealth).[47] Thus, the net effect of reshuffling debt on risk is difficult to evaluate, and naturally the utility value of any risk changes would depend on household preference parameters. For the most part, our analysis abstracts from risk considerations; however, we will partially address risk by using risk-adjusted rates of return in one of our measures of expected opportunity costs.

As discussed above, the opportunity costs of a 401(k) loan include the foregone return on account assets and any transaction costs. For the latter, we assume a one-time fee of $50, which is in line with Beshears et al. (2008). We net this assumed fee out of all of our calculations of potential savings reported below.[48] The value of the foregone return will generally be uncertain at the time the loan is made.[49] To value this opportunity cost, we proceed in two steps. First, we use survey questions on 401(k) portfolio allocation to estimate the share of each 401(k) account invested in stocks versus fixed-income investments (which we treat as bonds).[50] Second, we apply a variety of alternative expected-return assumptions to these components to value the opportunity cost. Because the opportunity cost is so fundamental to valuing the potential gains of taking a 401(k) loan, we construct four different opportunity cost measures, each based on a different assumption of future returns.

Our first measure applies typical long-run average rates of return to stocks and bonds — in our case, 10 percent for stocks and 7 percent for bonds. This type of long-run average is often used to predict future returns over long periods of time, though this approach may be less appropriate for short-term forecasting (i.e., the next five years, which is the typical time frame for 401(k) loans). Moreover, this measure is not a function of current or recent market conditions. As a second measure, we apply a five-year trailing average of stock and bond returns. This approach is a function of current and recent market conditions, and we use it as a proxy for the type of forecasting that households might actually do when making near-term financial decisions, though of course it does not account for any forward-looking information households might use in forecasting expected returns. Our third measure is a direct indicator of household expectations, which is the median response to a Gallup survey question about expected stock and

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[47] One way to see this point clearly is to consider that 2008 was a fortuitous year to have held a 401(k) loan instead of outside debt.

[48] Of course non-401(k) borrowing, such as credit card or auto loans, can also come with associated fees. Nonetheless, we explicitly include the $50 401(k) fee here in order to err on the side of understating, rather than overstating, the potential gains from shifting debt to 401(k) loans.

[49] A possible exception is if the 401(k) assets are entirely invested in stable-value assets such as a Guaranteed Investment Contract, though even these returns may be uncertain over a five-year period.

[50] See footnote 42 above for details on the survey's 401(k) portfolio questions.

bond returns in the near term.[51] Our fourth approach is simply to use the risk-free rate as a measure of risk-adjusted expected stock and bond returns to partially adjust for the uncertainty of future stock returns. The four measures and their return assumptions in 2007 are summarized in Table 6. For 2007, the measures imply expected future 401(k) returns ranging from 4.5 percent to 9.0 percent annually.

B. Estimates of Potential Gains from Shifting Debt to 401(k) Loans

For each of the four expected-return measures, we search for SCF households who carry consumer debt at rates in excess of the resulting measure of opportunity costs and who have unused 401(k) loan capacity.[52] First we calculate the share of 401(k)-loan-eligible households that meet these criteria.[53] Then we calculate how much consumer debt they could shift to a 401(k) loan, assuming they start with the highest-rate debt and keep going until either their higher-cost consumer debt is completely replaced by 401(k) loans or their 401(k) loan limit is reached. We measure the shiftable amount in the aggregate (i.e., weighting up households using the SCF weights), for an average household, and relative to total debt for the average household. Finally we estimate the net interest savings from the shift — i.e., interest savings less expected foregone 401(k) returns and transaction costs — that would accrue over the following three years.[54] We estimate both the aggregate net gain and the average across households.

As shown in Table 7, a relatively large share of 2007 households could benefit from shifting higher-rate consumer debt to 401(k) loans, though the average net savings are

Table 6

Measures of Expected 401(k) Returns as of 2007 (Percent)

	Long-Run Average	Five-Year Trailing	Gallup Survey	Risk-free Rate
Expected stock return	10.0	5.2	7.8	4.5
Expected bond return	7.0	4.4	4.4	4.5
Expected portfolio return	9.0	5.0	6.7	4.5

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[51] The UBS/Gallup Survey of Investor Optimism is a monthly survey of 1,000 households with at least $10,000 of investable assets. The questions we use relate to the respondents' expectations of returns over the next year.

[52] Recall that in identifying potential savings, we net out an assumed loan fee of $50, in order to account for typical application fees associated with 401(k) loans. That is, savings must exceed foregone returns plus $50 in order for the household to be identified as one that could potentially gain from a 401(k) loan.

[53] In doing this exercise, we assume that households would make no other changes to their portfolios. Some households could reduce opportunity costs, for example, by increasing stock exposure in their non-401(k) accounts to offset reduced stock exposure in the 401(k); we ignore such potential behavior in calculating opportunity costs.

[54] We use three years because most credit cards impose a minimum payment requirement that will pay off the current balance within three years. Car loan contracts are typically five years; however, taking into account the seasoning of loans, it seems reasonable to assume that roughly three years remain, on average. We estimate the present value of interest savings, using the assumed 401(k) return as the discount rate.

Table 7

Potential Gains from Shifting Consumer Debt to 401(k) Loans in 2007

	Long-Run Average	Five-Year Trailing	Gallup Survey	Risk-free Rate
Households who could gain (%)	42.4	63.9	54.0	65.1
Shiftable Amount:				
Aggregate ($billion 2007)	32	64	47	67
Average ($thousand 2007)	6.6	8.7	7.6	8.8
Average share of cons. Debt (%)	37.4	51.5	44.6	52.1
Net Savings over 3 Years:				
Aggregate ($billion 2007)	3.1	5.8	4.7	6.2
Average ($2007)	640	791	756	826
90th percentile ($2007)	1,240	1,850	1,578	1,863

Notes: The sample is restricted to renters and homeowners with LTV over 60 percent. An assumed loan fee of $50 is netted against potential savings from 401(k) borrowing. Thus, potential gains must exceed foregone returns by at least $50 for a household to be included in table.

relatively modest. Depending on the measure of expected 401(k) returns, about 42 to 65 percent of sample households could benefit from shifting some consumer debt.[55] In the aggregate, these households could shift $32 billion to $67 billion to 401(k) loans — a relatively large amount compared to the roughly $48 billion of outstanding 401(k) loans in 2007 (U.S. Department of Labor, 2009). On average, this shifted amount would represent about $6,600 to $8,800 of consumer debt per household, which is about 40 to 50 percent of consumer debt of these households.

The net gains to this debt reshuffling are estimated to be $3 billion to $6 billion over three years, or $1 billion to $2 billion annually. On average the savings would be about $200 to $275 per household per year, net of borrowing costs, or about 10–15 percent of annual interest costs. Of course, net gains will be larger for some households: as shown in the table, the 90th percentile of gains ranges from $1,240 to $1,863 over three years, or $400 to $600 per year. The households with the largest potential gains are the households with the highest outside interest rates and largest shiftable debt (i.e., large consumer debt balances and high 401(k) balances).

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[55] Recall that the sample is restricted to renters and high-LTV homeowners, in order to abstract from potential home-equity borrowing.

As a final exercise, we use the earlier surveys (i.e., 1995–2004) to simulate what would have happened to households who "optimally" shifted consumer debt to 401(k) loans in prior years.[56] For the four different measures of expected 401(k) returns, we identify households in each wave that would optimally shift consumer debt to 401(k) loans — i.e., those who would expect to save more in interest costs than they forgo in 401(k) returns. We then calculate how much consumer debt these households could shift, given their outstanding debt and 401(k) balances. Finally, we apply to their 401(k) accounts average realized stock and bond returns over the following three years, and calculate the ex-post net gain or loss from shifting the consumer debt to a 401(k) loan.

Table 8

Realized Outcomes if Households Had Shifted Debt "Optimally" in Prior Years

	Actual	Long-Run Average	Five-Year Trailing	Gallup Survey[1]	Risk-free Rate
Three-year stock returns (%)					
1995	24.9	10.0	7.5	NA	5.1
1998	−1.0	10.0	15.8	10.7	4.8
2001	3.5	10.0	14.3	7.9	1.4
2004	8.2	10.0	−0.3	7.6	4.2
Success rate[2] (%)					
1995		29	24	NA	23
1998		100	100	100	100
2001		100	100	100	100
2004		100	74	99	74
Avg. net savings over three years ($2007)					
1995		−295	−583	NA	−539
1998		1,097	1,202	1,097	1,036
2001		883	953	902	776
2004		707	278	578	269

Notes:
(1) The Gallup survey of household expectations is not available for the 1995 wave.
(2) The success rate is the share of debt-shifting households that would realize net savings given actual stock returns.

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[56] We thank an anonymous referee for suggesting this exercise.

In essence, this exercise is tabulating the effects of deviations of actual stock returns from expected returns over the three years following each survey wave.[57]

The results are shown in Table 8. The patterns are broadly similar across the four measures of expected returns, though the magnitudes differ somewhat. In general, the "success rate," or percentage of ex-ante-optimal debt moves that turn out to be beneficial ex-post, is essentially 100 percent except when realized stock returns significantly outpace expectations. This occurred in 1995, when realized three-year stock returns were about 25 percent. It also occurred in 2004 for two of the four measures, not because actual returns were unusually high in that year (they were about 8 percent), but because they were sufficiently higher than expected stock returns (negative 0.3 percent under the five-year trailing average measure, and 4.2 percent under the risk-free measure). Looking at dollar amounts, the average net gain from shifting debt to 401(k) loans increases in the difference between expected returns and realized returns; thus average gains were higher in 1998 (when realized returns were –1 percent and expected returns were 10 percent or more) than in 2004 (when realized returns were about 8 percent and expected returns ranged from zero to 10 percent). This table thus highlights one of the sources of upside and downside risk from 401(k) borrowing, namely, uncertain stock returns.

VIII. CONCLUDING REMARKS

We have shown that in a simple model of household borrowing, households would choose 401(k) loans over outside loans if the opportunity cost of 401(k) borrowing — i.e., foregone returns — were less than the cost of outside borrowing. The model generates two testable implications: first, 401(k) borrowing should be negatively correlated with measures of expected 401(k) returns and positively correlated with measures of outside borrowing costs; second, few households should carry high-cost consumer debt without utilizing available 401(k) loans. Using the 1995–2007 waves of the SCF, we do not find empirical evidence for either of these propositions; rather, we find no relationship between 401(k) borrowing and our cost measures, and we find fairly widespread occurrence of households carrying high-rate consumer debt without making use of available 401(k) borrowing. Indeed, we find that about half of our sample of loan-eligible households could benefit from using 401(k) loans instead of carrying consumer debt, and they could profitably shift about half their consumer debt, saving an average of about $200 to $275 per year on net, or 10 to 15 percent of annual interest costs. We find that households that do hold 401(k) loans have more debt, fewer non-401(k) assets, and higher incidence of liquidity and borrowing constraints than households without 401(k) loans, suggesting that households tend to use 401(k) loans as borrowing of last, rather than first, resort.

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[57] Clearly deviations of realized stock returns from expectations will affect the household balance sheet more broadly than through the 401(k)-loan channel; this exercise is just meant to summarize the 401(k)-loan effects. Note that realized net losses do not make debt shifting ex-ante suboptimal (relative to our simple framework), but they do illustrate the risks associated with the strategy. Again, a more sophisticated model would formally value the risks associated with the various types of debt financing.

We conclude that this apparent puzzle — why households would not take the opportunity to reduce their interest costs by 10–15 percent — is an indication of either a willingness to pay to avoid the risks of 401(k) borrowing, or a common financial mistake. Households may be averse to the risk of losing their jobs and having to pay back the loan in a short time frame. They may be expecting higher 401(k) returns than the after-tax interest they are paying on outside loans (or averse to the risk of such a scenario). They may acknowledge self-control problems in spending by walling off 401(k) assets in a separate mental account that is unavailable for current consumption. Or, they may simply be making a mistake — they may be confused about the potential advantages of 401(k) borrowing, or they may carry a credit card balance despite their intention to pay off balances every month.

What do our findings imply for policy? We conclude that, despite risks, there are potential gains from the prudent use of 401(k) loans, and that it would be in the interest of 401(k) participants to carefully weigh the costs and benefits of 401(k) borrowing as an alternative to other types of borrowing. To that end, greater outreach to 401(k) participants about prudent 401(k) loan use could be beneficial. Financial education is one tool for this — e.g., the costs and benefits of 401(k) borrowing could be featured in program newsletters and other literature. Moreover, in recent years, significant progress has been made in encouraging 401(k) participation and contributions through the use of policy "nudges" such as automatic enrollment and automatic escalation (Thaler and Sunstein, 2008; Madrian and Shea, 2001; Choi, Laibson, and Madrian, 2004, 2006; Saez, 2009). Could there be any way to nudge 401(k) participants toward the prudent use of 401(k) loans, while nudging them away from imprudent borrowing? Thaler and Sunstein (2008) conclude that the most successful "nudge" policies do two things: they expect participants to make errors, and they address common errors through improved "choice architecture," e.g., by framing choices appropriately, providing carefully chosen default choices, and offering feedback on the consequences of participant's choices.

In the context of 401(k) loans, some possible errors include not fully considering the potential benefits of a 401(k) loan as an alternative to an outside consumer loan, reducing regular contributions while a 401(k) loan is being repaid, and not repaying 401(k) loans upon separation from the employer. The first could be partially addressed by framing the loan option in program literature as a tool for reducing outside consumer debt, i.e., emphasizing the use of 401(k) borrowing as an alternative to other borrowing, or a way to strengthen the household balance sheet. Another framing option might be some type of checklist for potential 401(k) borrowers, encouraging borrowers to confront questions about the costs of alternative borrowing options, their ability to maintain regular 401(k) contributions, and their ability to repay the loan after a separation.

Feedback could also be helpful to potential 401(k) borrowers, e.g., online modeling tools for comparing the expected gains and losses from 401(k) borrowing versus other types of borrowing. A direct type of feedback might be calculations of reduced retirement wealth provided to 401(k) borrowers who made the mistake of reducing their regular contributions during loan repayment. Another policy change that could be helpful would be to allow gradual repayment of 401(k) loans after separation from the employer, rather than requiring full repayment within 90 days. For example, perhaps

employees could roll over loan balances (as well as 401(k) balances) to a new employer, or perhaps separated borrowers could continue making monthly repayments to the plan after separation. A number of administrative difficulties would likely have to be resolved before such a system would be feasible, but it could significantly reduce one of the major risks of 401(k) borrowing to households. Given that 401(k) loan programs exist, in part to encourage participation and contributions, it seems appropriate to design them in a way that encourages participants to use them wisely and that minimizes financial risks.

ACKNOWLEDGEMENTS

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APPENDIX: DETAILS OF SAMPLE AND SURVEY QUESTIONS

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 plans. 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 question 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 the plan as a "401(k) plan" if it is 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 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.