

# Financial Liquidity and Savings: Evidence from 401K Loans

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# Motivation

- Previously illiquid assets becoming more liquid
  - Credit cards
    - 1970: 7% of U.S. households have a credit card
    - 2002: 90% of U.S. households have a credit card
    - ~60% of household do not repay in full each month
  - Home equity loans
  - Defined benefit pension lump-sum payouts
  - Defined contribution plan loans



# Motivation

- Previously illiquid assets becoming more liquid
  - Credit cards
  - Home equity loans
    - 1977: 5% of homeowners had a home equity loan
    - 2004: 19% of homeowners had a home equity loan
  - Defined benefit pension lump-sum payouts
  - Defined contribution plan loans



# Motivation

- Previously illiquid assets becoming more liquid
  - Credit cards
  - Home equity loans
  - Defined benefit pension lump-sum payouts
    - 1991: 14% of DB pension plans offer lump sum
    - 2005: 52% of DB pension plans offer lump sum
  - Defined contribution plan loans



# Motivation

- Previously illiquid assets becoming more liquid
  - Credit cards
  - Home equity loans
  - Defined benefit pension lump-sum payouts
  - Defined contribution plan loans
    - 1993: 42% of DC participants in plans with a loan option
    - 2005: 85% of DC participants in plans with a loan option



# Research Question

- How does asset liquidity impact savings outcomes and wealth accumulation?
- 401(k) loans
  - Data availability
  - Current relevance
    - 401(k) debit card
    - Senators Kohl and Shumer have recently proposed regulation to restrict 401(k) loan availability



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### Program Benefits

ReservePlus Highlights  
and Benefits

### Help/FAQs

Questions Answered  
about ReservePlus



# The Headlines...

## Robbing Tomorrow to Pay for Today

*Economically Squeezed Families Are Turning  
to Their 401(k)s to Make Ends Meet*

<http://www.americanprogress.org/issues/2008/07/pdf/401k.pdf>





# The Headlines...

The Basics

**Warning: 401(k) loans are hazardous to your wealth**

Borrowing from your 401(k) plan should be your last solution, not your first, when you need a loan fast. Here's a look at the pros and cons.

<http://moneycentral.msn.com/articles/retire/basics/4714.asp>



# Critical Assumptions

- What would individuals do *without* a 401(k) loan option?
  - What would happen to ... participation?
  - What would happen to ... contribution rates?
  - What would happen to ... expenditures?
  - Would employees use other loans?
  - Would other financing sources be more/less costly?
    - Credit cards?
    - Hardship withdrawals?
    - Default?
  - Do participants maintain contributions after a loan?



# Aims of this paper

- Explain how 401(k) loans are regulated
- Describe loan provisions offered by plans
- Calibrate impact on wealth accumulation
- Assess how savings plan participants utilize 401(k) loans

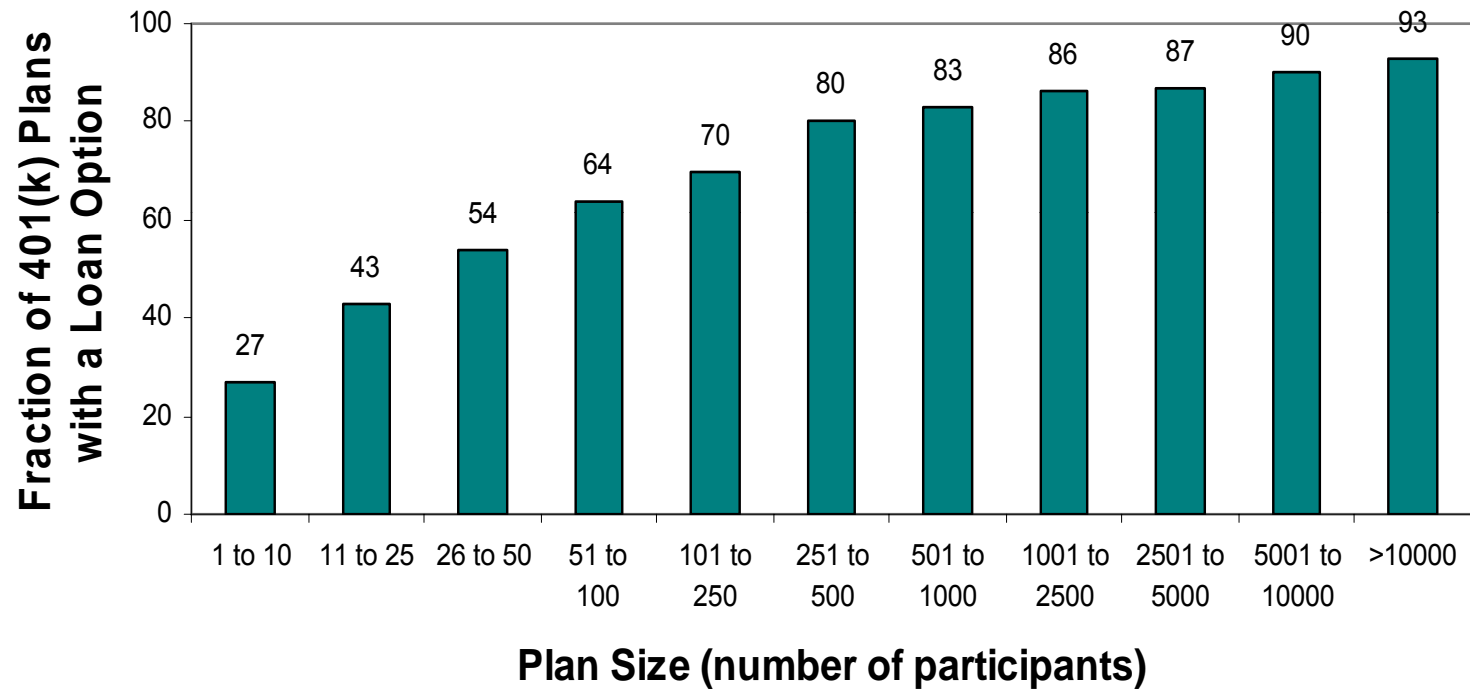


# 401(k) Loans: The Basics

- Plans permitted to offer loans, but not required
  - 50% of plan have a loan option (EBRI/ICI)
  - 85% of participants in a plan with a loan option (EBRI/ICI)
- Loans regulated by Treasury and DOL
- Terms of the loan set by the plan within certain regulatory bounds



## 401(k) Loan Availability by Plan Size: EBRI/ICI (2006)





# Loan Terms: Purpose & Amount

- Loan purpose—most (82%) plans have no restrictions on loan use (PSCA, 1999)
- Loan size—lessor of:
  - 50% of vested account balance
  - \$50,000
  - Plans can set lower maximums if desired
- Minimum loan amount usually \$500-\$1000



# Loan Terms: Number and Repayment Period

- Number of loans—no regulatory restrictions

- 1 loan            52% of plans
- 2 loans            36% of plans
- 3+ loans          12% of plans

- Repayment period (Hewitt plan descriptions)

- General purpose loans—5 year maximum
- Primary residence loans—longer term allowed



# Loan Terms: Repayment

- Repayment

- After-tax

- Principal + “reasonable” interest (Hewitt)

- Prime 27% of plans
    - >Prime to prime+1 59% of plans
    - >Prime+1 to prime+2 6.2% of plans
    - Other 5% of plans
    - Not specified 2%

- Interest payments credited to participant accounts





# Loan Terms: Default

- Default treated as a taxable distribution
  - Outstanding balance subject to:
    - Ordinary income taxes
    - 10 percentage point tax penalty
- Terminated employees must repay loans in full to avoid default (60-90 days)
- Default **NOT REPORTED** to credit agencies (default to self)



## Economics:

# Advantages of a 401(k) loan


- Cited advantages of 401(k) loans
  - Less paperwork than other forms of credit
  - Lower interest rates (e.g., vs. credit card)
  - Interest paid to self rather than third party
  - Interest earned may provide higher rate of return than other assets in the plan (e.g. money market fund)



## Economics:

# Disadvantages of a 401(k) loan

- Cited disadvantages of 401(k) loans
  - “Easy money” → increased consumption
  - Erodes retirement income security
  - Borrowed money does not earn an investment return
  - Repayments made with after-tax dollars
  - Default → tax penalty



# Economics—Question #1: 401(k) loan vs. other sources of credit

## ■ Two period model

- Denote  $B$       401(k) balances before loan
- $L$               Loan amount
- $r_P$               Rate of return on plan assets
- $r_L$               401(k) loan interest rate
- $r_A$               Interest rate for other credit
- $Y$               Second period income
- $\tau$               Tax rate

# Economics—Question #1: 401(k) loan vs. other sources of credit

- Second period consumption with 401(k) loan

A    After-tax account balance

After-tax  
income  
↓


Loan  
payment  
↓

Non-loan balance  
(incl. t=2 return)  
↓

Loan  
repayment  
↓

$$C_L = Y(1 - \tau) - L(1 + r_L) + [(B - L)(1 + r_p) + L(1 + r_L)](1 - \tau)$$

$$= Y(1 - \tau) + (B - L)(1 + r_p)(1 - \tau) - L(1 + r_L)(\tau)$$




# Economics—Question #1: 401(k) loan vs. other sources of credit

- Second period consumption with alternative loan

After-tax income	Loan payment	After-tax account balance (incl. t=2 return)
↓	↓	↓

$$C_A = Y(1 - \tau) - L(1 + r_A) + B(1 + r_P)(1 - \tau)$$




## Economics—Question #1:

### 401(k) loan vs. other sources of credit

- 401(k) loan dominates alternative credit if equation (3)  $>0$ :

$$\begin{aligned}C_L - C_A &= (B - L)(1 + r_p)(1 - \tau) - L(1 + r_L)\tau + L(1 + r_A) - B(1 + r_p)(1 - \tau) \\ &= -L(1 + r_p)(1 - \tau) - L(1 + r_L)\tau + L(1 + r_A) \\ &= L[1 + r_A - (1 + r_L)\tau - (1 + r_p)(1 - \tau)] \\ &= L[(r_A - r_p) + \tau(r_p - r_L)]\end{aligned}$$



## Economics—Question #1:

### 401(k) loan vs. other sources of credit

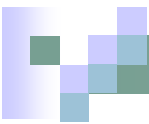
- 401(k) loan dominates alternative credit if

$$L [(r_A - r_p) + \tau(r_p - r_L)] > 0$$

- Sign is ambiguous

- $\uparrow r_A$  makes 401(k) loan more attractive
- $\uparrow r_p$  makes 401(k) loan less attractive
- $\uparrow r_L$  makes 401(k) loan less attractive
- $\uparrow \tau$  ambiguous





## Economics—Question #1:

### 401(k) loan vs. other sources of credit

- 401(k) loan dominates alternative credit if

$$L [(r_A - r_p) + \tau(r_p - r_L)] > 0$$

- Special cases

- $\tau = 0$  → 401(k) loan preferred if  $r_A > r_p$
- $r_p = r_L$  → 401(k) loan preferred if  $r_A > r_p$

- In general,  $\tau(r_p - r_L)$  likely to be small relative to  $(r_A - r_p)$

- $\tau$  small for many households (and  $< 0$ )
- $r_p$  close to  $r_L$  after adjusting for risk

## Relative Advantage of 401(k) Loan to Alternative Sources of Credit

### Alternative Source of Credit

**Home Equity  
Loan**  
 $r_A = 5\% * (1 - \tau)$

**Personal Bank  
Loan**  
 $r_A = 7\%$

**Credit Card**  
 $r_A = 20\%$

**$\tau = 0$**

$r_P = 3\%, r_L = 5\%$

2.00%

4.00%

17.00%

$r_P = 7\%, r_L = 5\%$

-2.00%

0.00%

13.00%

$r_P = 10\%, r_L = 5\%$

-5.00%

-3.00%

10.00%

**$\tau = 15\%$**

$r_P = 3\%, r_L = 5\%$

0.95%

3.70%

16.70%

$r_P = 7\%, r_L = 5\%$

-2.45%

0.30%

13.30%

$r_P = 10\%, r_L = 5\%$

-5.00%

-2.25%

10.75%

**$\tau = 35\%$**

$r_P = 3\%, r_L = 5\%$

-0.45%

3.30%

16.30%

$r_P = 7\%, r_L = 5\%$

-3.05%

0.70%


13.70%

$r_P = 10\%, r_L = 5\%$

-5.00%


-1.25%

11.75%



## Economics—Question #1: 401(k) loan vs. other sources of credit

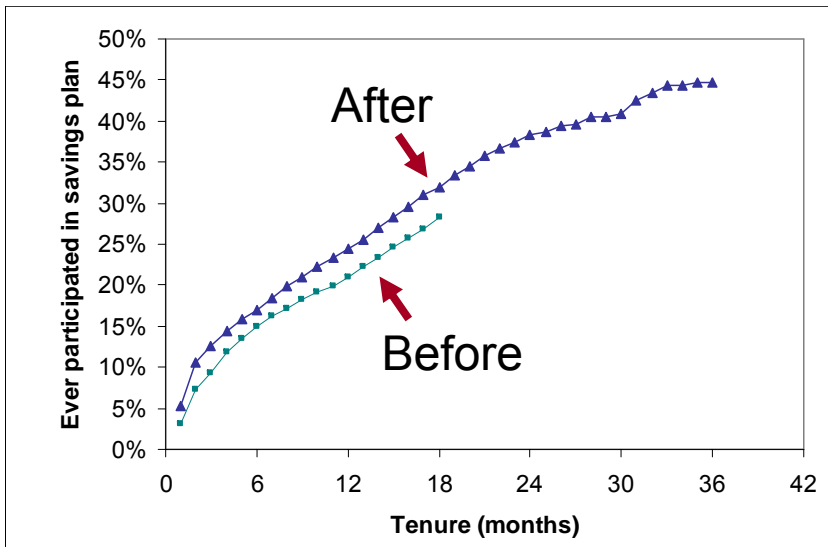
- Li and Smith (2008)
  - Use SCF data on 401(k) loan availability, 401(k) loan utilization, and debt
  - Estimate that the average household with access to 401(k) loans could save ~\$200 per year by shifting debt to a 401(k) loan



# Economics—Question #2: 401(k) loans and wealth formation

- Enrollment effect (+)
  - GAO (1997): 6 pp. higher participation in plans with a loan option
    - Form 5500 data from 1992 (7000+ plans)
    - Cross sectional aggregate plan-level data
  - Mitchell, Utkus and Yang (2007): no effect
    - Vanguard participant-level data (500+ plans)
    - Cross sectional (2001)
  - Preliminary Hewitt data
    - Plan with added a loan option in July 2002
    - Pre/post loan comparison
    - Participation higher by 4-7 percentage points
- Calibration assumptions: 0% and 6%

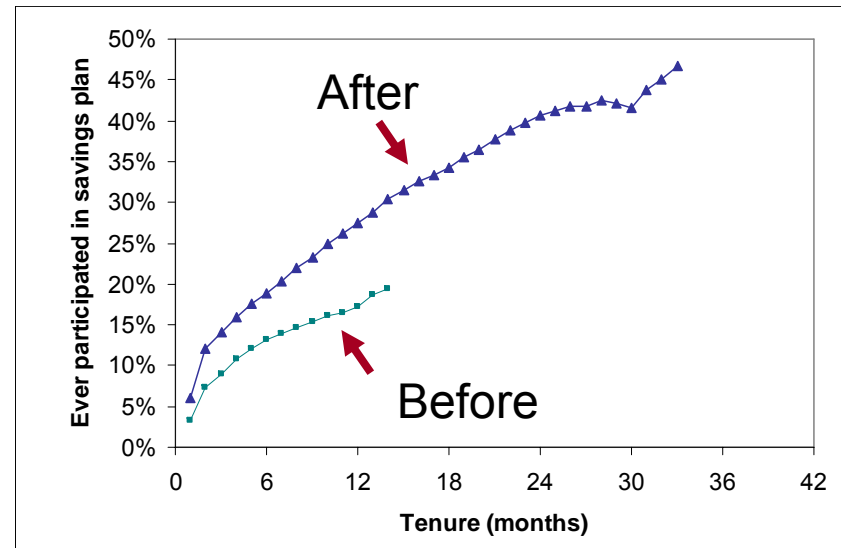
# The Impact of Loan Availability on Savings Plan Participation



**Before:** Hired July 2000-December 2001

**After:** Hired July 2002-December 2003


**Average Difference: +3.5%**



**Before:** Hired 2001


**After:** Hired 2003

**Average Difference: 7.2%**




# Economics—Question #2: 401(k) loans and wealth formation

- Contribution effect (+)
  - GAO (1997): contributions 35% higher in plans with a loan option
    - Form 5500 data from 1992 (7000+ plans)
    - Cross sectional aggregate plan-level data
  - Mitchell, Utkus and Yang (2007): contributions 10% higher in plans with a loan option (6.1% to 6.7% of pay)
    - Vanguard participant-level data (500+ plans)
    - Cross sectional (2001)
  - Munnell, Sunden and Taylor (2000): contributions higher by 1% of pay in plans with a loan option
  - Holden and VanDerhei (2001): contribution rates higher by 0.6% of pay in plans with a loan option
- Calibration assumptions: 0.6% and 1.0%



## Economics—Question #2: 401(k) loans and wealth formation

- Crowd-out (-)
  - Poterba, Venti and Wise (1995): most incremental 401(k) saving is new saving
  - Engen and Gale (2000): not much incremental 401(k) saving is new saving
  - Pence (2001): little incremental 401(k) saving is new saving
- Calibration assumptions: 50% and 25%



# Economics—Question #2: 401(k) loans and wealth formation


- Borrowing cost effect (+/-)
  - 401(k) loan interest rate may reduce the cost of borrowing
  - This could increase or decrease savings
    - Borrow more because its cheaper → lower savings (substitution effect)
    - Pay lower interest → higher savings (income effect)
- Credit availability effect (-)
  - 401(k) loan availability may increase the likelihood of borrowing because 401(k) assets are more liquid
  - Calibration Assumption: 50% and 10%





**TABLE 8. Reasons For Obtaining a 401(k) Loan**

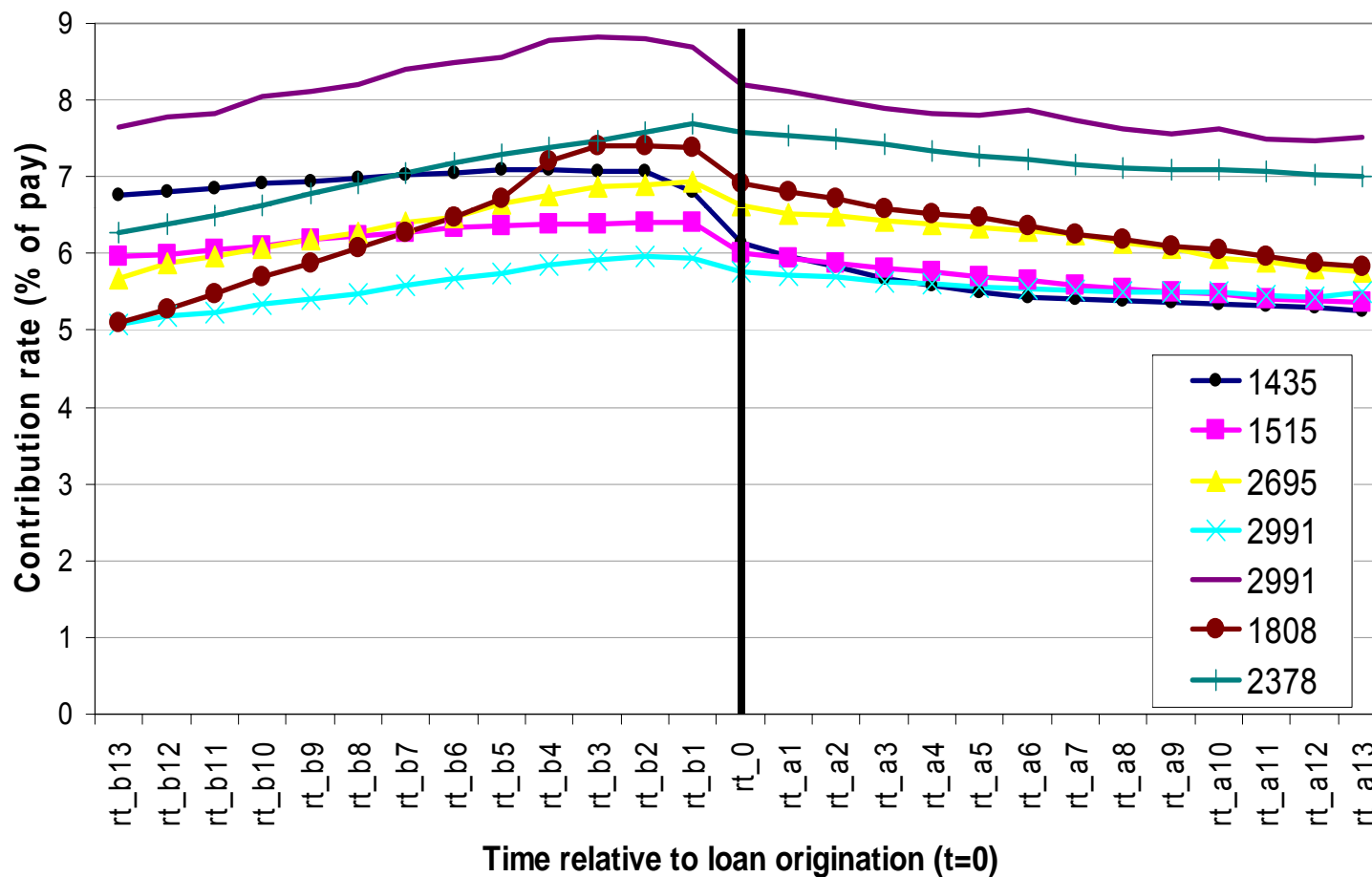
<b>Reason</b>	<b>1998</b>	<b>2001</b>	<b>2004</b>
Home purchase	25.2%	24.3%	14.6%
Home improvement	6.0%	12.5%	12.7%
Vehicles	9.1%	11.5%	14.6%
Goods and services	28.5%	25.9%	35.7%
Investments and other real estate	2.5%	6.8%	2.6%
Education, medical expenses and professional services	26.9%	11.8%	19.8%




# Economics—Question #2: 401(k) loans and wealth formation

- Repayment crowd-out (-)
  - 401(k) loan repayment may crowd-out existing savings (flows)
  - Preliminary Hewitt data--suggestive evidence of some crowd-out, but effect not large
    - 6 plans
    - Data on contribution rates over 5-7 year time period
    - Look at contributions of individual who take out a loan before and after they obtain the loan
- Calibration Assumptions: 100% and 25%

## 401(k) Contribution Rates Before and After Loan Origination: Hewitt Data






## Economics—Question #2: 401(k) loans and wealth formation

- Default effect (+/-)
  - Job separation → required loan repayment → potential for default
  - Impact of separation-generated default likely small
    - Default rate at separation ~ 25% for those with loans
    - BUT, separation rates are low (e.g. 20%)
    - Loan utilization rates are low (e.g. 20%)
  - Pre-separation, default rates likely low because loans repayed through payroll deduction
  - Loan default not reported to credit agencies → lower future borrowing costs (borrowing cost effect)

## Savings Impact of 401(k) Loans


<b>Assumptions</b>	<b>Scenario 1</b>	<b>Scenario 2</b>
Enrollment effect	+0%	+6%
Contribution effect	+0.6%	+1%
Initial participation	60%	70%
Initial contribution rate	6%	6%
Savings crowd-out	50%	25%
Repayment crowd-out	100%	25%
Credit availability effect	50%	10%



# Economics—Question #2: 401(k) loans and wealth formation

## ■ Savings increase


- Increased participation rate
  - 0 or 6 percentage points
- Increased contribution rate for existing participants and induced participants
  - 0.6% of pay or 1.0% of pay
- Increase in savings within the plan
  - Pessimistic:  $0.6\% \times 60\% = 0.36\%$
  - Optimistic:  $(6\% \times 6\%) + (1\% \times 76\%) = 1.2\%$
- Crowd-out: 50% or 25%
  - Pessimistic:  $0.36\% \times 50\% = 0.18\%$  increase in saving
  - Optimistic:  $1.2\% \times 75\% = 0.84\%$  increase in saving



# Economics—Question #2: 401(k) loans and wealth formation

## ■ Loan leakage

- Loan repayment ~ 5.2% of pay for those with loans
  - Median monthly repayment ~\$125 (Hewitt data)
  - Average number of outstanding loans (1.4)
  - Assume average annual pay of \$40K
  - $\rightarrow (\$125 * 1.4) / \$40K = 5.2\%$  of pay
- 20% of participants have loan  $\rightarrow$  repayments ~ 1.05% of pay for all participants

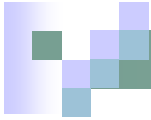


# Economics—Question #2: 401(k) loans and wealth formation

## ■ Loan leakage


- Repayment crowd-out of existing contributions
  - Pessimistic: 100% crowd-out → 1.05% decrease in saving
  - Optimistic: 25% crowd out → 0.26% decrease in saving
- Credit availability effect—new consumption vs. more efficient financing
- Leakage
  - Pessimistic:  $1.05\% \times 50\% = 0.53\%$  decrease in saving
  - Optimistic:  $0.26\% \times 10\% = 0.03\%$  decrease in saving





## Savings Impact of 401(k) Loans

Assumptions	Scenario 1	Scenario 2
Enrollment effect	+0%	+6%
Contribution effect	+0.6%	+1%
Initial participation	60%	70%
Initial contribution rate	6%	6%
Savings crowd-out	50%	25%
Repayment crowd-out	100%	25%
Credit availability effect	50%	10%
<b>Savings Increase</b>	<b>+0.18%</b>	<b>+0.84%</b>
<b>Consumption leakage</b>	<b>-0.53%</b>	<b>-0.03%</b>
<b>NET IMPACT ON SAVINGS RATE</b>	<b>-0.35%</b>	<b>+0.81%</b>

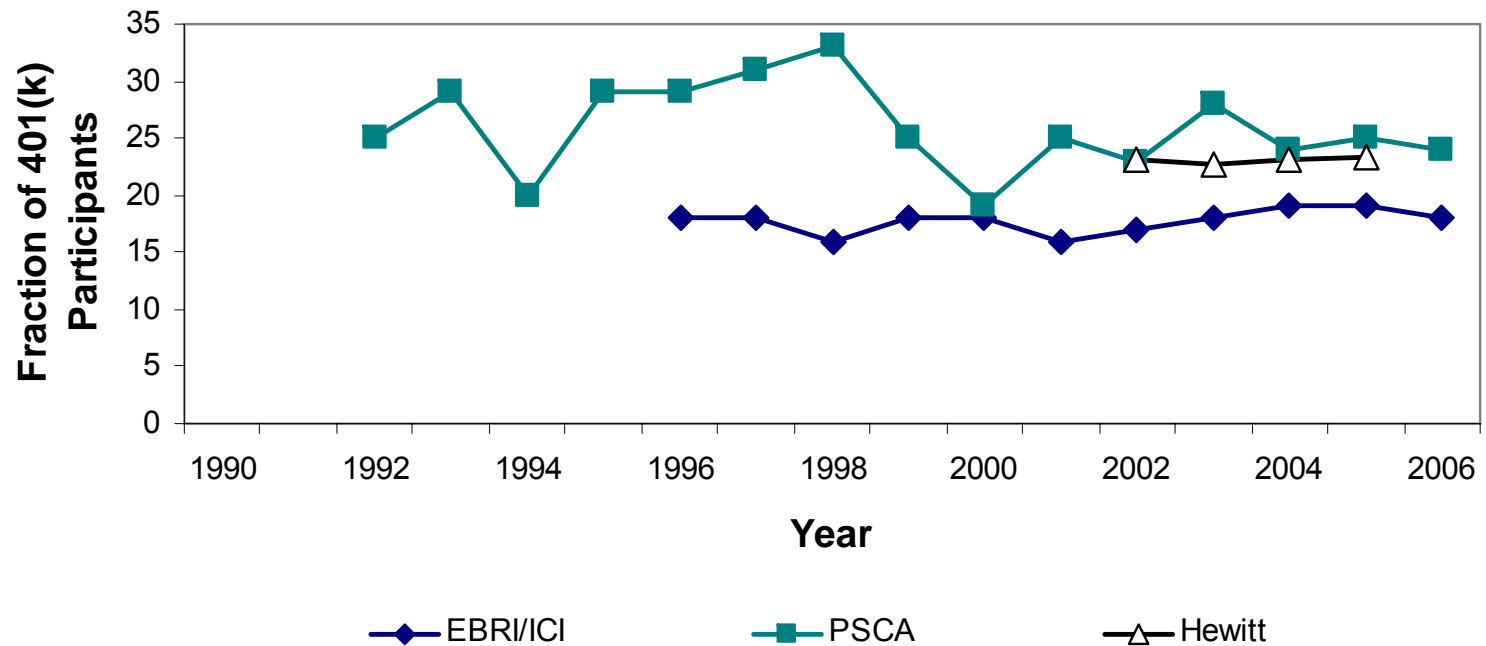


# Economics—Question #2: 401(k) loans and wealth formation

- Net impact savings rate likely to be small:
  - Extreme lower bound: -0.35%
  - Extreme upper bound: +0.84%
  - Truth...somewhere in the middle?
  
- Li and Smith (2008) corroboration (SCF data)
  - 401(k) contribution rates are similar for those with and without loans
  - Household with 401(k) loans have a higher share of financial assets in the 401(k)
  - No difference in the rate of growth of household wealth between 1992 and 2004 for household with and without access to 401(k) loans

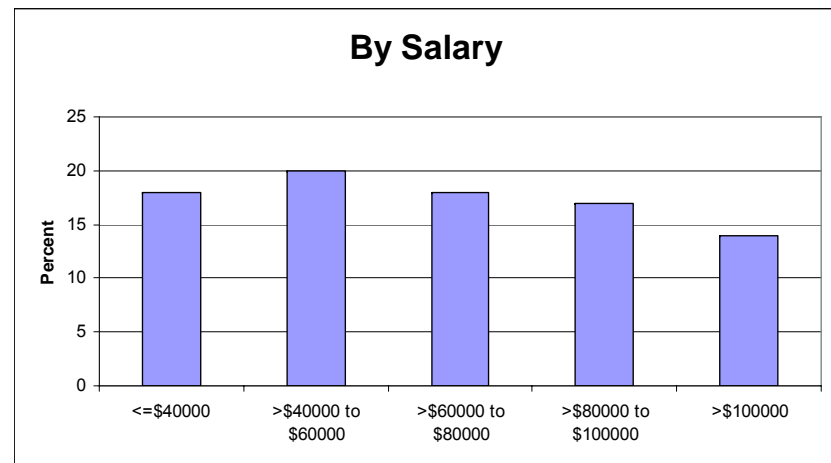
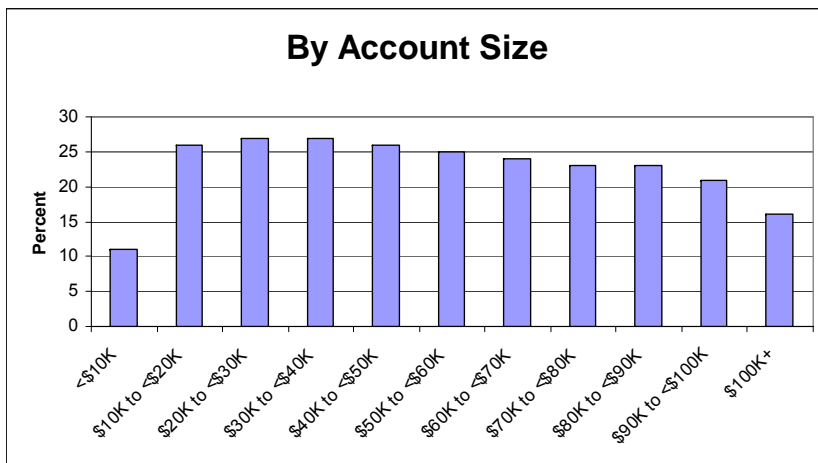
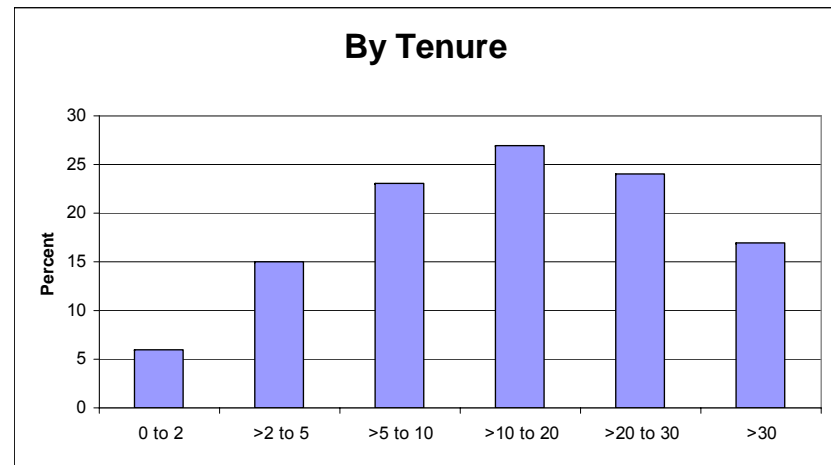
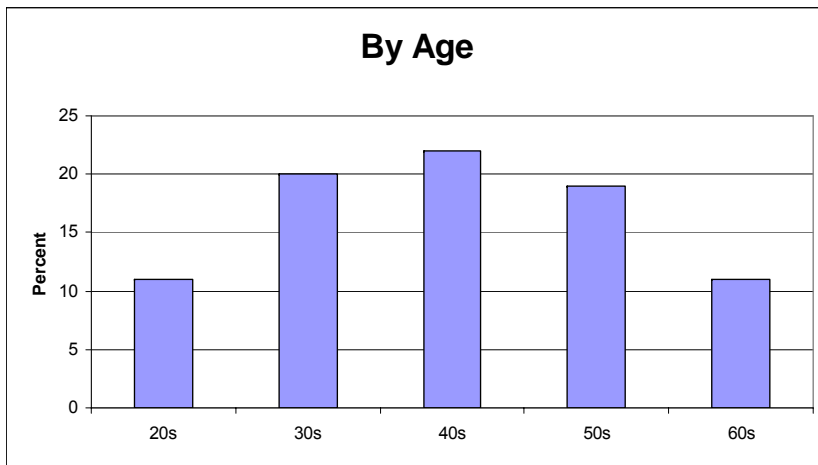


**FIGURE 7. Fraction of 401(k) Participants in Plans with Loan Provisions Who Have an Outstanding Plan Loan (1990-2006)**



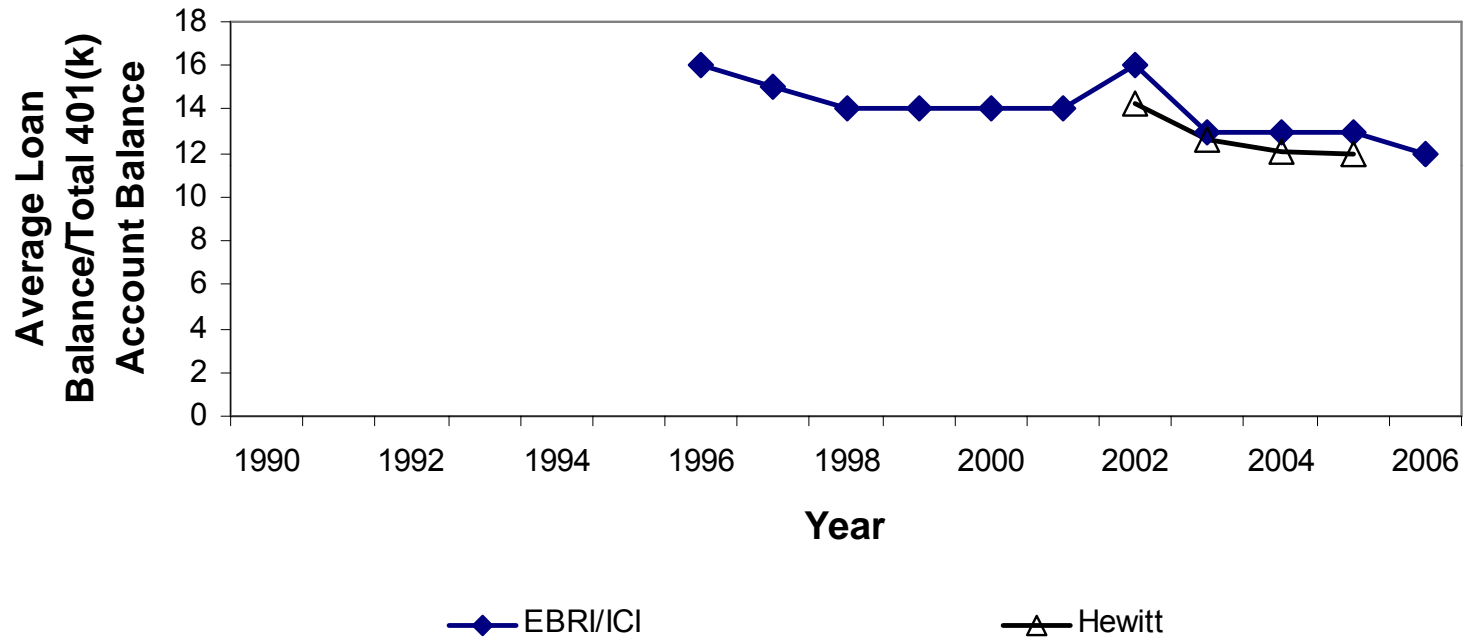


# Loan Utilization Rates (EBRI/ICI, 2006)



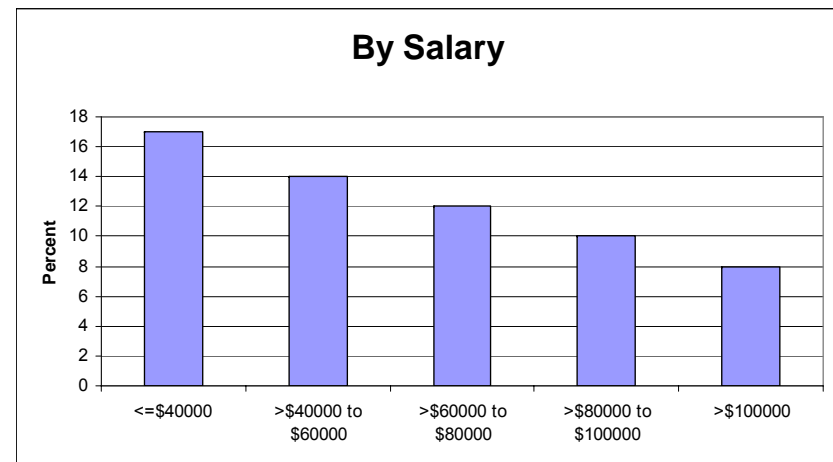
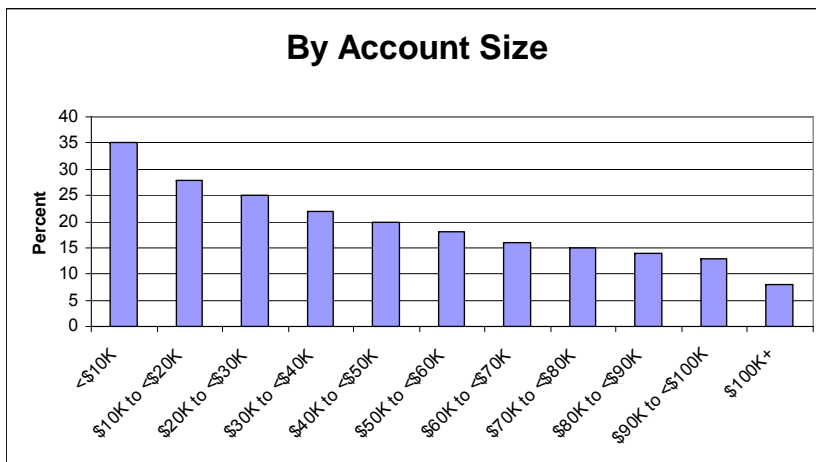
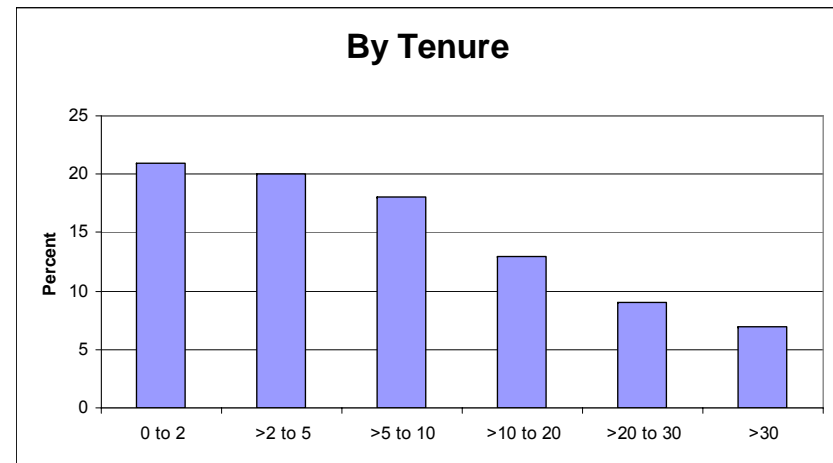
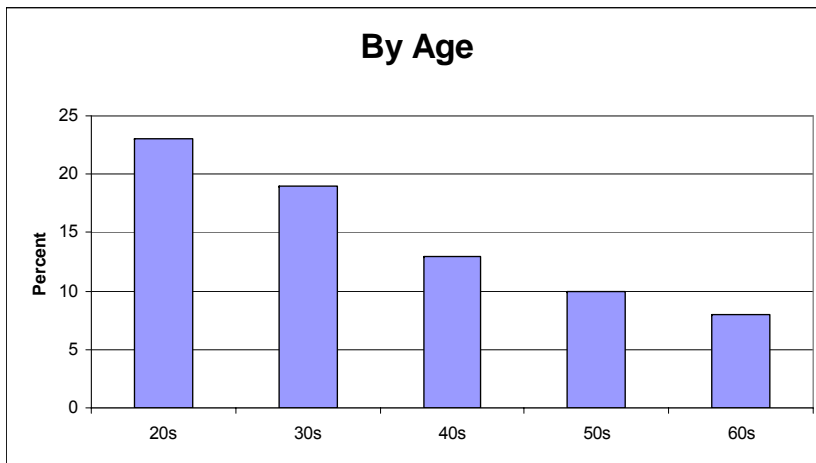


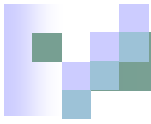
**FIGURE 8. Outstanding Loan Balances as a Fraction of Total 401(k) Balances (1990-2006)**



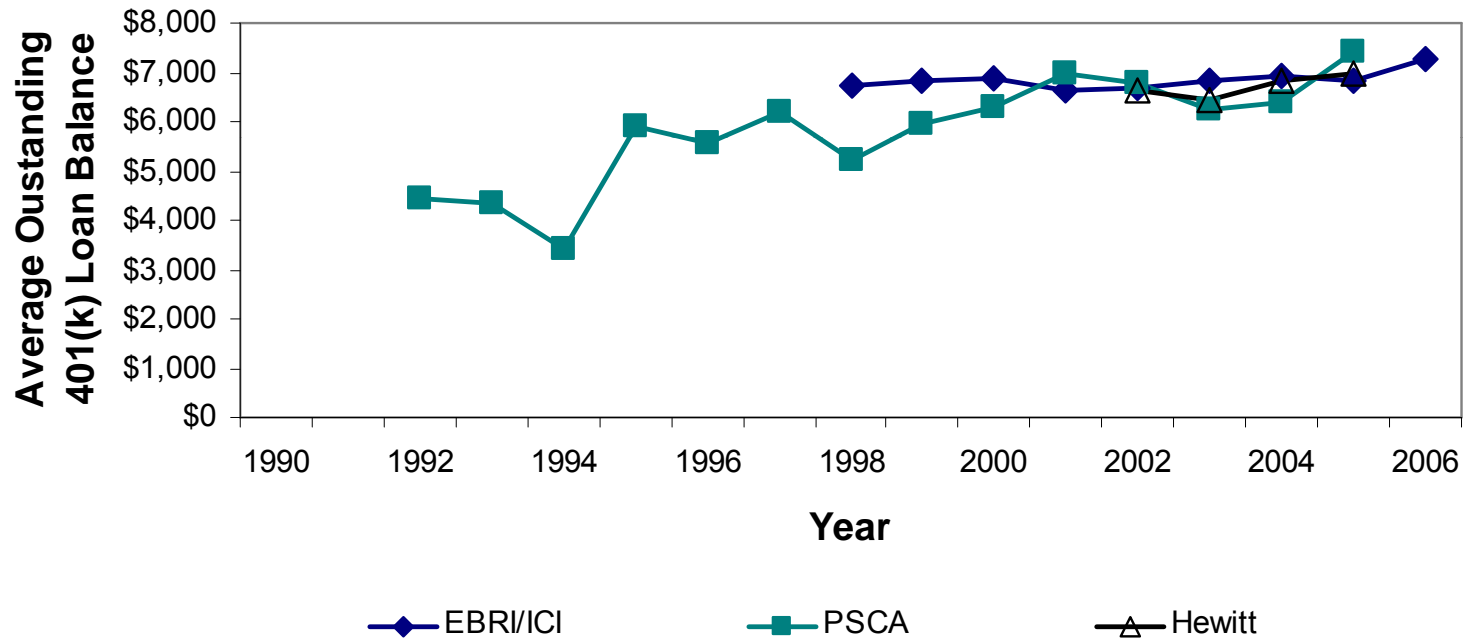


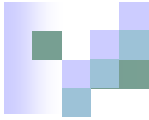
# Loan-to-Balance Ratios





**FIGURE 9. Average Outstanding 401(k) Loan Balances (1990-2006)**





## Participants with Multiple Loans

<b>Number of outstanding loans</b>	<b>Fraction of participants</b>	<b>Average total loan/balance ratio</b>	<b>Average total outstanding loan balance</b>
0 loans	76.3%	0.0%	0
1 loans	16.6%	9.7%	\$5,720
2 loans	6.5%	16.6%	\$8,878
3+ loans	0.7%	21.9%	\$11,757





## Characteristics of Newly Originated Loans (2005)

	<b>Loan amount</b>	<b>Payment amount (monthly equivalent)</b>
5 <sup>th</sup> percentile	\$730	\$28
25 <sup>th</sup> percentile	\$1,575	\$69
Median	\$3,850	\$125
75 <sup>th</sup> percentile	\$8,910	\$238
95 <sup>th</sup> percentile	\$24,680	\$566



# Demographics and loan utilization

- Table 6 (see also Table 4)
- Hewitt participant-level data (47 plans)
- Regression of loan utilization on demographic and plan characteristics
  - Age: peaks in the 30s-40s
  - Tenure: peaks with 10-30 years tenure
  - Balance size: peaks at \$10K-\$20K
  - Salary: peaks at <\$40K



# Plan characteristics and loan utilization

- Number of loans permitted (relative to 1 loan)
  - 2 loans: +12%
  - 3+ loans: +7%
  
- Interest rate (relative to prime)
  - >Prime to prime+1 -1%
  - >Prime+1 to prime+2 -9%
  
- Minimum loan amount (relative to \$500 or less)
  - >\$500 -7%

	Has a 401(k) Loan Outstanding			
	Demographics only		+Plan Loan Features	
	Coefficients	SEs	Coefficients	SEs
Age (20s omitted)				
30s	0.039	(0.011)	0.034	(0.007)
40s	0.023	(0.014)	0.023	(0.009)
50s	-0.012	(0.016)	-0.009	(0.011)
60s	-0.111	(0.018)	-0.093	(0.014)
Tenure (years, 0 to 2 omitted)				
2 to 5	0.090	(0.015)	0.104	(0.020)
5 to 10	0.188	(0.022)	0.205	(0.030)
10 to 20	0.258	(0.029)	0.274	(0.035)
20 to 30	0.269	(0.033)	0.287	(0.039)
> 30	0.145	(0.070)	0.193	(0.051)
Account Size (<\$10K omitted)				
\$10,001 to \$20,000	0.121	(0.012)	0.096	(0.009)
\$20,001 to \$30,000	0.114	(0.014)	0.087	(0.013)
\$30,001 to \$40,000	0.102	(0.019)	0.074	(0.018)
\$40,001 to \$50,000	0.100	(0.021)	0.072	(0.020)
\$50,001 to \$60,000	0.086	(0.024)	0.056	(0.024)
\$60,001 to \$70,000	0.085	(0.026)	0.056	(0.025)
\$70,001 to \$80,000	0.080	(0.029)	0.048	(0.028)
\$80,001 to \$90,000	0.085	(0.034)	0.051	(0.032)
\$90,001 to \$100,000	0.075	(0.030)	0.044	(0.029)
> \$100000	0.043	(0.039)	-0.001	(0.038)

Salary Range (<\$40K omitted)				
\$40,001 to \$60,000	-0.002	(0.017)	-0.011	(0.010)
\$60,001 to \$80,000	-0.024	(0.015)	-0.033	(0.015)
\$80,001 to \$100,000	-0.048	(0.020)	-0.062	(0.020)
> \$100000	-0.112	(0.022)	-0.120	(0.018)
Primary residence loans			0.003	(0.025)
Maximum number of loans (1 omitted)				
2			0.121	(0.040)
≥ 3			0.072	(0.040)
Interest rate (prime omitted)				
>Prime to prime+1			-0.013	(0.043)
>Prime+1 to prime+2			-0.085	(0.034)
Other			-0.045	(0.052)
Application fee (binary variable)			-0.027	(0.027)
Minimum loan amount (≤ \$500 (omitted))				
> \$500			-0.074	(0.031)
Minimum loan duration (≤ 1 month (omitted))				
2 to 6 months			0.066	(0.077)
7 to 12 months			0.104	(0.043)
Maximum loan duration				
< 5 years (binary variable)			-0.021	(0.040)
<b>Sample Size</b>		578,749		497,169
<b>R<sup>2</sup></b>		0.079		0.092



# Future Research

- How does having a 401(k) loan option impact savings plan participation—other companies?
- How does having a 401(k) loan option impact contribution rates
  - Initially
  - After a loan is taken
- What is the net effect on asset accumulation?
- How important is 401(k) loan default?



# Policy Implications

- Should 401(k) loans be allowed?
- If so, should they be further regulated?
  - 401(k) debit card
  - Maximum number of loans outstanding
  - Minimum loan amount
  - Restrictions on purposes for which loans can be used



# Sources of Data/Information

- EBRI/ICI: administrative data from providers
  - 1996
    - 28,000 plans (9% of all plans)
    - 6.5 million participants (17% of all participants)
    - 31% of all assets
  - 2006
    - 54,000 plans (12% of all plans)
    - 20 million participants (40% of all participants)
    - 46% of all assets
- EBRI/ICI tabulations available (data not available)
- Representativeness?
- Sample changes over time





# Sources of Data/Information

- Profit Sharing/401(k) Council of America
  - Annual survey of employers
  - Long historical perspective
  - Extensive information on loan provisions
  - PSCA tabulations of survey responses available (data not available)
  - Representativeness?
  - Sample changes over time



# Sources of Data

- BLS Employee Benefits Surveys
  - 1993, 1995, 1997 surveys collected limited information on loans
  - Representativeness
    - Random, stratified sampling with weights
    - Sampling frame
      - Medium and large firms
      - Restricted set of occupations/industries
        - 1995: sampling frame covers 33 million FT workers
    - Non-response
      - 60% overall survey response rate
      - 30% item non-response for retirement plan questions



# Sources of Data

## ■ Hewitt

- Plan descriptions for 81 firms
  - Detail on loan provisions
- Participant-level data for 47 firms
  - Year-end 2002-2005 in paper, 2006-2007 pending
  - All outstanding loans at year-end
    - Outstanding balance
    - Loan interest rate
    - Remaining payments
    - Payment amount



# Sources of Data

- Survey of Consumer Finances
  - 1998, 2001, 2004 cross-sectional surveys
  - Nationally representative with weights
  - Limited information on loans
  - Wealth of information on assets, income, debt