

GAO

Report to the Chairman, Special
Committee on Aging, and the Honorable
Judd Gregg, U.S. Senate

October 1997

401(k) PENSION PLANS

Loan Provisions Enhance Participation But May Affect Income Security for Some



**Health, Education, and
Human Services Division**

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The Honorable Charles E. Grassley
Chairman
Special Committee on Aging
United States Senate

The Honorable Judd Gregg
United States Senate

Since they were established in 1978, 401(k) pension plans have grown rapidly and now account for about one quarter of all pension plans and pension assets.¹ Through 401(k) plans, workers can affect their retirement savings, depending on the contribution level they choose and the investment decisions they make. Most 401(k) pension plans also allow participants to borrow against their pension accounts at relatively low interest rates. Pension-plan borrowing is not limited to 401(k) plans. For example, to encourage saving in individual retirement accounts (IRA), recent legislation allows early withdrawal from these accounts for certain purposes, such as for a first-time home purchase.

Proponents of pension-plan borrowing argue that allowing such access to retirement savings before retirement increases participation in pension plans where participation is voluntary. They also argue that pension-plan borrowing increases contributions to plans where participants determine their contribution levels. However, critics argue that pension-plan borrowing often results in lower pension income at retirement. In addition, opponents to the creation of individual Social Security accounts fear that if borrowing from such accounts were allowed, Social Security income could be jeopardized.

Given the importance of pension-plan borrowing and possible implications for Social Security reform and individual retirement accounts (IRA), you asked us to (1) determine the effects of pension-plan borrowing on participation in and contributions to 401(k) pension plans, (2) describe the demographic and economic characteristics of workers who borrow from their pension accounts, and (3) identify the potential consequences for participants who borrow from their pension accounts.

¹There are two basic types of pension plans: defined benefit and defined contribution. Pension benefits in defined-benefit plans are generally calculated with a formula based on years with the firm, age at retirement, and salary averaged over some number of years. In defined-contribution plans, employers generally promise to make guaranteed periodic contributions to workers' accounts, but retirement benefits are not specified. Many employers also match workers' contributions to these accounts. A 401(k) plan is a defined-contribution plan.

To conduct our work, we analyzed two databases. The first is a nationally representative sample containing detailed demographic and employment information about American workers in 1992; the second contains pension plan information for plans with 100 or more participants in 1992. These data were the most recent available at the start of our study, and we have no reason to believe that worker characteristics have significantly changed. We also reviewed the economic and pension literature and solicited comments from outside pension analysts. We did our work between October 1996 and August 1997 in accordance with generally accepted government auditing standards. (For further details on our scope and methodology, see app. I.)

Results in Brief

Plans that allow borrowing have a somewhat higher proportion of employees participating than other plans, all other factors being equal. In addition to employer matching, allowing borrowing increases participation among eligible employees, especially lower-income employees. Allowing pension-plan borrowing also significantly affects how much employees contribute. Participants in plans that allow borrowing contribute, on average, 35 percent more to their pension accounts than participants in plans that do not allow borrowing.

Based on individual financial data we examined, relatively few plan participants—less than 8 percent—have one or more loans from their pension accounts. This, of course, is true at a point in time and would not include those who had repaid a past loan or who might borrow in the future. Blacks and Hispanics, lower-income individuals, participants who have recently been turned down for a loan, and workers who also are covered by other pension plans are more likely to borrow from their pension account than other participants. Plan borrowers, on average, have fewer assets than nonborrowers and have more nonhousing debt relative to income than nonborrowers.

While borrowing provisions may reduce retirement income, they also can encourage workers to save for their retirement. Loan provisions of many pension plans provide for repaying the loan at favorable interest rates, which may be lower than the investment yield that could have been earned had the money been left in the pension account. Consequently, the borrower will have a smaller pension balance at retirement, since the interest paid to the account is less than what the account balance could have earned from investing in equities. However, other potential effects of borrowing could outweigh these disadvantages. For example, borrowing

for purposes such as education or training could increase lifetime family income and, hence, retirement income. In addition, if loan provisions influenced the employee's decision to participate in the pension plan, the employee's retirement income would likely have been even less had there not been such provisions.

Allowing participants to borrow from their defined-contribution pension plan, therefore, may be a double-edged sword. Our results also suggest that there are both advantages and disadvantages to borrowing from other voluntary retirement savings accounts, such as IRAs. However, few of the positive effects of pension-plan borrowing would be realized in mandatory retirement programs like Social Security.

Background

The number of defined-contribution pension plans, especially 401(k)s, has been growing, and by 1993, they accounted for 88 percent of all pension plans and 61 percent of all active pension-plan participants. Many participants' defined-contribution plans supplement another pension plan.

A 401(k) pension, or salary-reduction, plan is a defined-contribution plan that allows participants to contribute, before taxes, a portion of their salary to a qualified retirement account. Investment income earned on 401(k) account balances accumulates tax-free until the individual withdraws the funds at retirement. However, participation in 401(k) is voluntary, and contribution levels are determined by the individual but can be no larger than \$9,500 per year.

About 85 percent of 401(k) pension plans are the only pension plan sponsored by the employer, although the majority of 401(k) plan participants are covered by another pension plan. A recent study of selected 401(k) plans shows that worker participation rates for these plans varies from about 50 percent to over 90 percent.² Participant contributions to 401(k) accounts, on average, are about 7 percent of earnings. To encourage participation in and contributions to these pension plans, plan sponsors may wholly or partially match employee contributions and provide education on the importance of retirement saving. In addition, over half of all 401(k) pension plans allow participants to borrow from their pension accounts.

²Robert L. Clark and Sylvester J. Schieber, Factors Affecting Participation Rates and Contribution Levels in 401(k) Plans (Washington, D.C.: Watson Wyatt Worldwide, May 1996).

Borrowing from 401(k) pension plans is legally permissible and allows plan participants to borrow the lesser of \$50,000 or one half of their vested account balance. The term of the loan cannot exceed 5 years, unless the loan is used to purchase a primary home. Furthermore, the loans are generally offered at very favorable interest rates. A recent survey of 401(k) plans found that about 70 percent of the plans that allow borrowing charge an interest rate equal to or less than the prime rate plus one percentage point, while less than 10 percent charge an interest rate equal to the local bank's lending rate.³ The repayment of loan principal and, unless the primary residence is used to secure the loan, interest payments are not tax-deductible. Failure to repay the loan results in the outstanding loan balance being considered a taxable pension distribution. The borrower is then responsible for paying all taxes on the distribution plus a 10-percent early withdrawal penalty if the borrower is under 59-1/2 years old.

Overall, about half of all firms with 100 or more employees that offer savings and thrift plans permit participant loans.⁴ Previously, GAO reported that 57 percent of the firms with 100 to 499 employees that offer a 401(k) plan permit participant loans.⁵ Similarly, 80 percent of firms with 500 to 4,999 employees and 46 percent of firms with 5,000 or more employees permit loans against 401(k) accounts. In addition, over 95 percent of 401(k) plans that offer loans have at least one plan participant with an outstanding loan.

Pension-plan loan provisions, however, are controversial. Advocates argue that loan provisions are an incentive to lower-income workers to participate in pension plans where participation is voluntary. Furthermore, many 401(k) plan administrators think loan provisions also have a somewhat positive impact on participants' contribution rates to pension accounts. A survey conducted by the Employee Benefit Research Institute (EBRI) suggests that most workers think that participants should be able to withdraw retirement funds to pay for financial emergencies, to buy a house, or to pay for a child's education.⁶ Workers may be more willing to save for retirement if they can have access to their savings for emergencies before retirement.

³Buck Consultants, *401(k) Plans: Employer Practices and Policies* (New York: Buck Consultants, Sept. 1996). The report does not indicate the bank lending rate used.

⁴Department of Labor, Bureau of Labor Statistics, *Employee Benefits in Medium and Large Private Establishments, 1993*, Bulletin No. 2456 (Nov. 1994).

⁵*401(k) Plans: Incidence, Provisions, and Benefits* (GAO/PEMD-88-15BR, Mar. 29, 1988).

⁶EBRI, *Public Attitudes on Investment Preferences*, EBRI Report No. G-44 (Washington, D.C.: EBRI, May 1993).

Opponents of loan provisions argue that permitting participants to borrow from their retirement accounts works against the policy objective of enhancing retirement income. Almost half of the companies that do not permit 401(k) loans surveyed by William M. Mercer say that loan programs are contrary to plan philosophy.⁷ Almost 60 percent of employed respondents to a recent EBRI survey think about using their own retirement funds only at the time of retirement.⁸

Loan Provisions, Among Other Factors, Encourage Participation in and Larger Contributions to 401(k) Plans

Our analysis of the two databases on worker characteristics and pension-account activity shows that pension-plan borrowing increases participation in 401(k) plans (see app. II). However, a number of other factors, such as employer matching and size of firm, also influence participation and contribution amounts.

Participation rates in plans with loan provisions are about 6 percentage points higher than plans with no loan provisions (see fig. 1). Employer matching also increases participation rates by about 20 percentage points depending on the match rate. These findings are consistent with the results of other research.⁹ Under the typical situation—where the employer contributes about half of what participants contribute—borrowing provisions plus employer matching increases participation by about 28 percentage points—from 55 percent to 83 percent.¹⁰

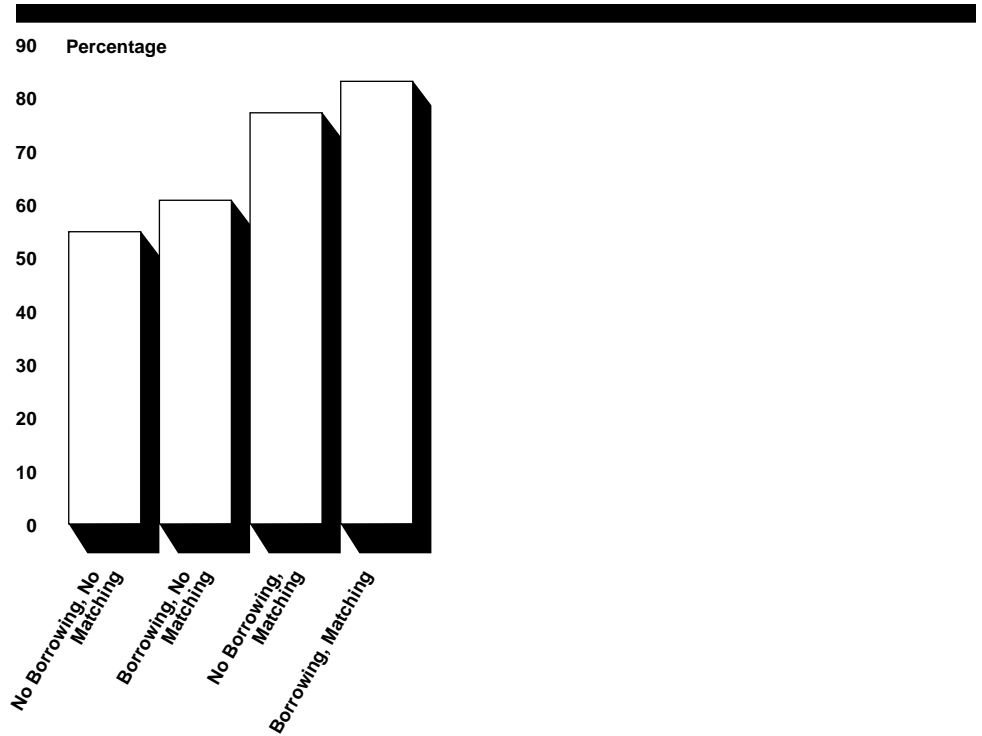
⁷William M. Mercer, Inc., Fax Facts Survey Results: Savings Plan Loans (New York: William M. Mercer, Inc., Aug. 9, 1995).

⁸EBRI, Public Attitudes on Investment Preferences, EBRI Report No. G-61 (Washington, D.C.: EBRI, Nov. 1994).

⁹Clark and Schieber, Factors Affecting Participation Rates and Contribution Levels in 401(k) Plans, and William E. Even and David A. Macpherson, Factors Influencing Employee Participation in 401(k) Plans (Oxford, OH: Miami University, Dec. 1996).

¹⁰Some research suggests that employer matching does not play a critical role in increasing participation in 401(k) plans. It may be that the match-rate variable in our analysis is reflecting plan characteristics that are not reported in the database. See Leslie E. Papke, "Participation in and Contributions to 401(k) Pension Plans," Journal of Human Resources, Vol. 30, No. 2 (1995), pp. 311-325, and Andrea L. Kusko, James M. Poterba, and David W. Wilcox, Employee Decisions with Respect to 401(k) Plans: Evidence From Individual-Level Data, Working Paper No. 4635 (Cambridge, MA: National Bureau of Economic Research, Feb. 1994).

Figure 1: Predicted Participation Rates in a Firm With a 401(k) Plan



Note: Participation rates are for a firm offering no other pension plan.

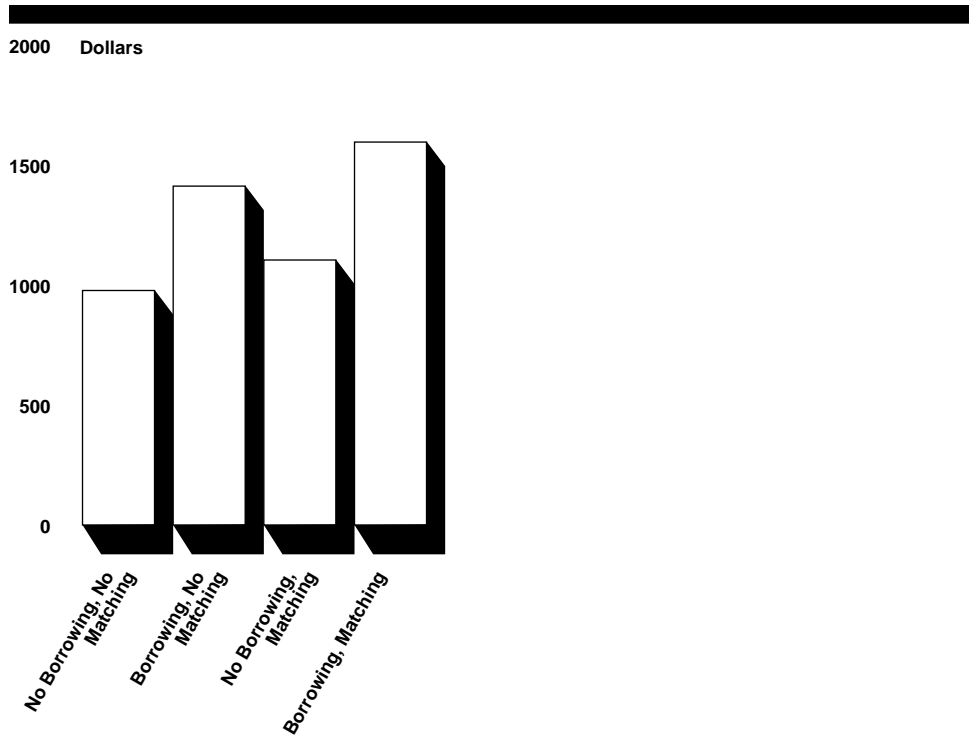
Our analysis also indicates that smaller firms tend to have slightly higher participation rates than larger firms. This may be due to smaller firms more effectively targeting benefits to employee needs. In addition, a recent study found that the type and quality of information provided to employees on 401(k) plans may also be an important factor in encouraging employee participation in 401(k) pension plans.¹¹ The impact of providing high-quality information appears to be greatest on workers with lower earnings.

In our analysis of 401(k) plans, we also found that average annual employee contribution amounts are 35 percent higher in 401(k) plans with loan provisions than in 401(k) plans with no loan provisions. Employer matching also increases average contribution amounts in 401(k) plans but not to the same extent as loan provisions. Depending on the employer

¹¹Clark and Schieber, *Factors Affecting Participation Rates and Contribution Levels in 401(k) Plans*.

match rate, we estimate that average annual employee contribution amounts are typically 10- to 24-percent higher than with no employer matching. The effect of both loan provisions and employer matching can be dramatic—an increase in average contribution amounts of over \$600 per year (see fig. 2). Furthermore, one study suggests that providing high-quality pension-plan information to plan participants may also increase contribution levels to 401(k) plans.¹²

Figure 2: Predicted Average Employee Contribution Amounts to a 401(k) Plan



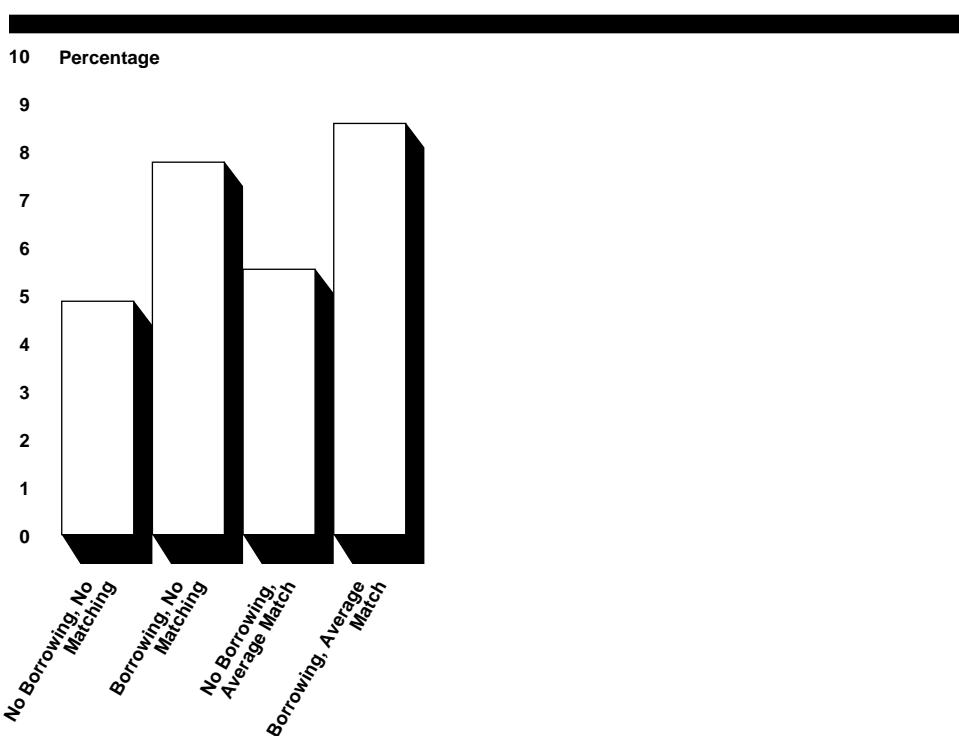
Note: Average contribution amounts are for a firm offering no other pension plan.

These results are further corroborated when we examined individual participant contributions to 401(k) pension accounts. We estimate that a

¹²Clark and Schieber, *Factors Affecting Participation Rates and Contribution Levels in 401(k) Plans*. However, it may also be true that workers who are more likely to contribute to a 401(k) plan are more likely to attend pension-plan training sessions.

typical 401(k) participant¹³ covered by a pension with loan provisions and receiving an average employer match rate will contribute a higher proportion of earnings to his or her 401(k) account than an identical participant covered by a plan with no loan provision or employer matching—8.6 percent versus 4.9 percent (see fig. 3).

Figure 3: Predicted Contribution Rates to a 401(k) Plan



Borrowers May Be Less Economically Secure Than Nonborrowers

Plan participants with no outstanding plan loans are in a better financial position than borrowers. Plan borrowers, on average, have less family income, lower net worth, and more nonhousing debt than nonborrowers. Total family income of borrowers is 83 percent of that of nonborrowers (see table 1). The total net worth and nonhousing net worth of borrowers is also considerably lower than that of nonborrowers. In addition, retirement-account borrowers have about \$1,500 more in nonhousing debt and have much higher nonhousing-debt-to-income ratios than nonborrowers.

¹³The typical 401(k) participant is married, college educated, white, 45 years old, and male; has an annual family income of \$61,469 and a net worth of \$146,182; and has participated in the pension plan for 4 years. The relative impacts of pension-plan borrowing and employer matching, however, do not depend on the demographic characteristics of the participant.

Table 1: Average Assets, Debts, and Income of Defined-Contribution Plan Participants Who Can Borrow From Retirement Accounts, 1992

	No pension-plan loan	Outstanding pension-plan loan ^a
Loan balance from defined-contribution account	0	\$2,963
Nonhousing debt	\$16,911	\$18,509
Nonhousing net worth	\$113,021	\$77,672
Net worth	\$161,827	\$119,304
Total family income	\$62,139	\$51,422
Ratio of nonhousing debt to total family income	25.2 percent	42.5 percent

^aSignificantly different from the no-loan group at the 1-percent level.

Source: GAO analysis of the 1992 Survey of Consumer Finances database.

Nevertheless, our analysis indicates that 401(k) plan participants who also are covered by another pension plan are 50-percent more likely to have an outstanding loan than other participants (see app. II). Those with only a 401(k) pension plan—and, thus, with the most to lose by borrowing from their pension accounts—are less likely to do so. But participants who have recently been turned down for a loan from another source are almost 40-percent more likely to borrow against their pension account than other plan participants, holding all else equal.

Black and Hispanic pension-plan participants are almost twice as likely as white participants to borrow against their pension account (see app. II), after controlling for income and assets. Minorities may have more difficulties obtaining commercial loans, including mortgages.¹⁴ Our results also indicate that other characteristics of an individual, such as age, gender, and marital status, do not significantly affect pension-plan borrowing.

Pension-plan borrowers may use their pension-plan loan for living expenses, an automobile purchase, or housing (rather than borrowing from a commercial source to finance a home purchase), all of which could be considered necessities.¹⁵ A smaller proportion of pension-plan borrowers report having housing debt than nonborrowers, but a larger proportion report having education loans (see table 2).

¹⁴Alicia H. Munnell, Geoffrey M. B. Tootell, Lynn E. Browne, and James McEneaney, "Mortgage Lending in Boston: Interpreting HMDA Data," *American Economic Review*, Vol. 86, No. 1 (1996), pp. 25-53, and Geoffrey M. B. Tootell, "Redlining in Boston: Do Mortgage Lenders Discriminate Against Neighborhoods?" *Quarterly Journal of Economics*, Vol. 111, No. 4 (1996), pp. 1049-79.

¹⁵The Survey of Consumer Finances does not ask how pension-plan loans are used.

Table 2: Proportion With Specific Types of Loans and Attitudes Toward Borrowing for Specific Reasons

	No pension-plan loan	Outstanding pension-plan loan ^a
Outstanding housing debt	70.0%	64.7%
Outstanding education loans	13.2%	19.7%
All right to borrow for		
education expenses	91.2%	89.4%
automobile	86.7%	95.8%
living expenses	35.3%	49.2%
vacation	13.8%	8.4%
luxury goods	9.0%	7.6%

^aIn all cases, the difference in proportions between the no-loan and the loan groups is statistically significant at the 1-percent level.

Source: GAO analysis of the 1992 Survey of Consumer Finances database.

Attitudes toward borrowing money also differ between plan borrowers and nonborrowers.¹⁶ A larger proportion of plan borrowers think it is all right to borrow to finance an automobile, but a slightly smaller proportion think it is all right to borrow to finance education expenses. Almost half of the plan borrowers say it is all right to borrow money to cover living expenses compared to about a third of nonborrowers. Less than 10 percent of each group think it is all right to borrow to finance luxury goods, such as jewelry, and less than 10 percent of plan borrowers think it is all right to borrow to cover the expenses of a vacation. This suggests that relatively few participants—whether borrowers or nonborrowers—would elect to borrow against their pension accounts to finance the purchase of nonnecessities.

Borrowing From Pension Account May Reduce Retirement Income

Pension-plan participants who borrow from their pension accounts risk having substantially lower pension balances at retirement. Under reasonable assumptions about pension-plan savings and borrowing behavior, a borrower could have 2- to 28-percent less pension income at retirement (see app. II). Many 401(k) participants have a substantial amount of their pension balances invested in the stock market and earn a relatively high rate of return. Pension-plan loans, however, generally have a favorable interest rate, which may be much lower than the return on the pension-account investments. Consequently, a borrower may earn less on

¹⁶The question on the Survey of Consumer Finances that is asked by interviewers reads, “People have many different reasons for borrowing money which they pay back over a period of time. For each of the reasons I read, please tell me whether you feel it is all right for someone like yourself to borrow money...”

the loan balance because he or she is making interest payments to the account at the relatively low interest rate rather than earning higher returns from investments, such as equities.

How much pension income is lost depends on the size of the loan, the interest rate of the loan, the rate of return of pension account investments, and whether or not the borrower continues to make pension contributions while repaying the loan. For example, if a borrower decides to forgo making pension-plan contributions during loan repayment, he or she could have over 20-percent less retirement income. Continuing pension-plan contributions while repaying the loan, on the other hand, could lead to a relatively small retirement income loss of less than 7 percent.

Observations

People save for many reasons, including retirement, emergencies, home purchase, and a college education. Saving for retirement receives favorable tax treatment, but in the past, it was at the cost of being virtually inaccessible until late in life. Since retirement savings could not be used for other purposes, people were reluctant to save in retirement accounts. Allowing participants to borrow against their 401(k) pension accounts for reasons unrelated to retirement can increase both participation in these plans and participant contributions. However, pension-plan borrowing is a two-edged sword: Individuals who were prompted to participate because of the borrowing provision increase their retirement savings, but individuals who opt to borrow lose some of the tax advantages to retirement savings and risk having less income at retirement.

Our findings have implications for other sources of retirement income. Since participation in IRAs is voluntary,¹⁷ our results suggest that early access to IRA funds may increase both participation in and contributions to these accounts but at the risk of lower retirement income. On the other hand, individual Social Security accounts—if created—would require participation, and contribution levels would be set by law. Consequently, individual Social Security accounts would not benefit from the positive aspects of borrowing provisions, but the borrowing provisions would increase the risk of reduced retirement income.

¹⁷While participation in IRAs and 401(k) plans is voluntary, different rules apply to these two retirement savings accounts. Maximum contribution limits for IRAs are much lower than for 401(k) plans, spouses are allowed to make contributions to IRAs but not to 401(k) plans, and IRA contributions for some people are made with before-tax dollars.

Comments

We asked pension plan experts to comment on a draft of this report. They generally agreed with the study approach and results. They made a few technical suggestions, which we incorporated where appropriate.

We are sending copies of this report to the Secretary of Labor, relevant congressional committees, and other interested parties. We will make copies available to others on request.

This report was prepared under my direction. Please contact Francis P. Mulvey, Assistant Director, at (202) 512-3592 or Thomas L. Hungerford, Senior Economist, at (202) 512-7028 if you or your staff have any questions concerning this report.



Jane L. Ross
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Contents

Abbreviations

IRA	individual retirement account
IRS	Internal Revenue Service
EBRI	Employee Benefit Research Institute

Scope and Methodology

To determine how pension-plan borrowing affects workers' participation in and contributions to a pension plan and retirement income, we addressed the following questions:

- Does the ability to borrow from defined contribution pension accounts increase participation in and contributions to 401(k) pension plans?
- What are the demographic and economic characteristics of workers who borrow from their pension accounts?
- What are the potential consequences for participants who borrow from their retirement accounts?

To conduct our work, we analyzed two data sources. The first, the 1992 Survey of Consumer Finances prepared by the Federal Reserve, provided a nationally representative individual-level sample. The second, the 1992 research database of Internal Revenue Service (IRS) Form 5500 reports, which are maintained by the Pension and Welfare Benefits Administration of the Department of Labor, provided a nationally representative plan-level sample. We also reviewed the relevant technical literature and talked to pension experts.

Survey of Consumer Finances, 1992

The Survey of Consumer Finances randomly sampled 3,906 households regarding current and past employment by family members, assets and debts, and demographic information. Included in the current employment portion of the survey were detailed questions about pension participation. From the survey, we created a database containing information on respondents and their spouses who were working and between the ages of 18 and 64 at the time of the survey. We did not independently verify the accuracy of the Survey of Consumer Finances database because it is commonly used by researchers. We used the Survey of Consumer Finances to determine the effects of pension-plan borrowing on participation in and contributions to 401(k) pension plans and to describe the demographic and economic characteristics of workers who borrow from their pension accounts.

For the analysis of the impact of borrowing on contributions to pension accounts, the subsample of the survey contained information on 477 workers who participate in a 401(k) pension plan. Since the dependent variable is a continuous variable, which can be no less than zero, the multivariate regression estimation technique used is a tobit model. A tobit model takes into account the fact that the participation rate can be no less than 0 percent, and the results from this model will not predict a

participation rate of less than 0 percent.¹⁸ Let C^* be an individual's desired contribution rate, which is affected by the individual's characteristics. If the desired contribution rate is greater than zero, then the individual contributes to his or her pension account. If it is less than or equal to zero, then the individual does not contribute to his or her account. Formally, the model is written as

$$C^* = \beta'X + \epsilon,$$

where the X vector contains the variables, the β vector contains the parameters to be estimated, and the last term is the random error that captures the unobserved factors affecting the desired contribution rate. The dependent variable—that is, the observed contribution rate—is

$$C = C^* \text{ if } C^* > 0$$
$$C = 0 \text{ if } C^* \leq 0.$$

To describe the demographic and economic characteristics of workers who borrow from their pension accounts, the subsample we used for our analysis contained information on 769 workers with defined-contribution pension plans that allowing borrowing. We were interested in determining how participant characteristics affect the likelihood or probability that an individual has an outstanding loan against his or her pension account. The dependent variable for this analysis is a variable that is equal to one if the individual has an outstanding pension-account loan and equal to zero if he or she does not have an outstanding loan. The multivariate estimation technique used for the analysis is a logit model, which will prevent predictions from being outside the probability range of 0 to 1. In the logit model, the probability that an individual will have an outstanding pension plan loan is a function of the individual's characteristics:

$$P = f(\beta'X),$$

where P is the probability, the X vector contains the variables or characteristics used in the estimation, the β vector contains the parameters to be estimated, and f is the cumulative logistic probability

¹⁸William H. Greene, *Econometric Analysis*, 3rd ed. (Upper Saddle River, NJ: Prentice Hall, 1997), ch. 20.

function. The parameter vector is estimated using maximum likelihood techniques.¹⁹

Construction of Variables

The primary variables of interest are whether or not a worker can withdraw funds from his or her pension account, the proportion of salary contributed to the defined-contribution pension plan account, and whether or not the worker has an outstanding pension-plan loan. The Survey of Consumer Finances asks respondents who have defined-contribution pension plans,²⁰ “Can you borrow against that account?” and “If you needed money in an emergency, could you withdraw some of the funds in that account?” If the answer to either of these questions was “yes,” we considered that plan as allowing participants to withdraw funds from their account before retirement. Respondents to the survey also were asked how much they contribute to their pension account. The contribution rate is the ratio of the respondent’s contribution to his or her salary. Other variables used in the analysis include sex, race, income, net worth, education, recent loan experiences, and whether or not the individual is covered by another pension plan (see table I.1).

¹⁹The logit model can be stated in more formal terms. Let L^* be an individual’s unobserved propensity to borrow from his or her pension plan. An individual will borrow if L^* is greater than zero and will not borrow if L^* is less than or equal to zero. The model can be written as

$$L^* = \beta'X + \epsilon$$

where the X vector contains the variables used in the estimation, the β vector contains the parameters to be estimated, and the last term is the random error that captures unobserved factors influencing the borrowing propensity. The dependent variable is defined by

$$L = 1 \text{ if } L^* > 0 \\ L = 0 \text{ if } L^* \leq 0.$$

See Greene, *Econometric Analysis*, ch. 19, for the derivation of the likelihood function.

²⁰About 60 percent of the respondents who can borrow from their pension plans participate in a 401(k) pension plan, and another 30 percent participate in either a thrift savings plan or a profit-sharing plan.

Appendix I
Scope and Methodology

Table I.1: Variables Used in the Multivariate Regression Analysis of the 1992 Survey of Consumer Finances Sample

Variable	Definition
Female	Indicates whether or not the worker is a female
Age 35 to 44 years	Indicates whether or not the worker is between the ages of 35 and 44 years
Age 45 to 54 years	Indicates whether or not the worker is between the ages of 45 and 54 years
Age 55 to 64 years	Indicates whether or not the worker is between the ages of 55 and 64 years
Married	Indicates whether or not the worker is married
Dropped out of school before the 12th grade	Indicates whether or not the worker has less than a high-school education
1 to 4 years of college; no degree	Indicates whether or not the worker has some college education
4 or more years of college; college degree	Indicates whether or not the worker is a college graduate
Black	Indicates whether or not the worker is black
Hispanic	Indicates whether or not the worker is Hispanic
Covered by another pension plan	Indicates whether or not the worker is covered by another pension plan
Natural logarithm of employer match rate	The natural logarithm of one plus the ratio of the employer contribution to the worker's pension account to the worker's salary
Can withdraw funds from pension account	Indicates whether or not the worker is able to borrow against his or her pension account or withdraw funds in an emergency
Family income \$25,000 to \$34,999 per year	Indicates whether or not the worker's family income is between \$25,000 and \$34,999 per year
Family income \$35,000 to \$44,999 per year	Indicates whether or not the worker's family income is between \$35,000 and \$44,999 per year
Family income \$45,000 to \$59,999 per year	Indicates whether or not the worker's family income is between \$45,000 and \$59,999 per year
Family income \$60,000 to \$74,999 per year	Indicates whether or not the worker's family income is between \$60,000 and \$74,999 per year
Family income \$75,000 or more per year	Indicates whether or not the worker's family is \$75,000 or more per year
Natural logarithm of number of years covered by this defined-contribution plan	The natural logarithm of the number of years the worker has been covered by his or her pension plan

(continued)

Variable	Definition
Family net worth \$50,001 to \$100,000	Indicates whether or not the worker's family net worth is between \$50,001 and \$100,000
Family net worth \$100,001 to \$250,000	Indicates whether or not the worker's family net worth is between \$100,001 and \$250,000
Family net worth \$250,001 to \$1,000,000	Indicates whether or not the worker's family net worth is between \$250,001 and \$1,000,000
Family net worth over \$1,000,000	Indicates whether or not the worker's family net worth is over \$1,000,000
Outstanding loan	Indicates whether or not the worker has an outstanding loan against his or her pension account
Contribution rate	The ratio of the worker's contribution to his or her pension account to the worker's salary

IRS Form 5500 Research Database, 1992

We used IRS' Form 5500 research database for 1992 to determine the effects of pension-plan borrowing on participation in and contributions to 401(k) pension plans. Under the Employee Retirement Income Security Act of 1974, private employers must annually file a separate Form 5500 with the IRS for each employee's pension plan. Each report contains financial, participant, and actuarial information. We did not independently verify the accuracy of the Form 5500 research database because this database is commonly used by researchers. The 1992 Form 5500 research database was obtained from the Pension and Welfare Benefits Administration of the Department of Labor.

The plans selected for analysis are plans that had 100 or more participants and offered defined-contribution plans with 401(k) features as the primary plan. All plans that were terminated during the year or where there was a resolution to terminate the plan are not included in the sample. Furthermore, we selected only plans that had one or more active participants, that is, those with pension accounts.²¹ The final sample used in the analysis contains 7,245 plans with an average of 337 active participants. The analysis consists of estimating two multivariate statistical models.

²¹Participants of a pension plan include all current employees who are covered by the plan (active participants plus those eligible to participate but do not) plus retired and former employees who are covered by the plan.

The first model estimated examined the impacts of firm and plan characteristics on participation in the plan. The dependent variable is the percent of employees eligible to participate who participate in the plan.²² The second model examines average employee contributions to the plan. Ordinary least squares regression techniques were used to estimate both models. Formally, the models can be expressed as

$$Y = \beta'X + \epsilon,$$

where Y is the dependent variable, which is either the participation rate or the natural logarithm of average contribution amounts; the X vector contains the independent variables; the β vector contains the parameters to be estimated; and the last term is the random error that captures the unobserved factors influencing the dependent variable.

Construction of Variables

The first dependent variable is the ratio of active participants to the number of all employees eligible to participate in the plan.²³ The second dependent variable is the natural logarithm of the average contribution rate. The average employee contribution variable is the ratio of total contributions to the plan to the number of active participants. The independent variables used in the analysis are variables used by other researchers,²⁴ such as employer matching and firm size, plus a variable denoting if the plan participants had any outstanding loans (see table I.2).

²²Some pension plans mistakenly reported active participants on line 7a(4) of Form 5500, which should contain the total number of workers eligible to participate in the plan. Consequently, we could not determine which plans had 100-percent participation and which had made mistakes filling in the Form 5500. Therefore, all plans with a participation rate calculated to be 100 percent were deleted from the sample for the regression analysis of the participation rate (about 45 percent of the sample). We did, however, estimate the participation rate model with the full sample, and the results were quantitatively and qualitatively the same.

²³The Pension and Welfare Benefits Administration adds a variable to the Form 5500 research database that indicates the number of current employees participating in the plan and calls this variable "active participants."

²⁴See, for example, Leslie E. Papke, "Participation in and Contributions to 401(k) Pension Plans," *Journal of Human Resources*, Vol. 30, No. 2 (1995), pp. 311-25.

Table I.2: Variables Used in the Multivariate Regression Analysis of the 1992 IRS Form 5500 Research Database

Variable	Definition
Participation rate	Ratio of active participants in the pension plan to all employees eligible to participate in the plan
Natural logarithm of average employee contributions	Natural logarithm of the ratio of contributions to active participants
Firm size	Number of employees of the firm divided by 1,000
Firm size squared	Firm size squared
Match rate ^a 1	Indicates whether or not the employer match rate is greater than zero and less than or equal to 0.1
Match rate 2	Indicates whether or not the employer match rate is greater than 0.1 and less than or equal to 0.2
Match rate 3	Indicates whether or not the employer match rate is greater than 0.2 and less than or equal to 0.3
Match rate 4	Indicates whether or not the employer match rate is greater than 0.3 and less than or equal to 0.4
Match rate 5	Indicates whether or not the employer match rate is greater than 0.4 and less than or equal to 0.5
Match rate 6	Indicates whether or not the employer match rate is greater than 0.5 and less than or equal to 0.6
Match rate 7	Indicates whether or not the employer match rate is greater than 0.6 and less than or equal to 0.7
Match rate 8	Indicates whether or not the employer match rate is greater than 0.7 and less than or equal to 0.8
Match rate 9	Indicates whether or not the employer match rate is greater than 0.8 and less than or equal to 0.9
Match rate 10	Indicates whether or not the employer match rate is greater than 0.9 and less than or equal to 1.0
Match rate 11	Indicates whether or not the employer match rate is greater than 1.0 and less than or equal to 1.5
Match rate 12	Indicates whether or not the employer match rate is greater than 1.5
Can borrow	Indicates whether or not there are outstanding loans from the plan
Sole pension plan	Indicates whether or not employer has other qualified pension plans

^aThe match rate is the ratio of employer contributions to participant contributions.

Simulation Model

To determine the potential consequences of borrowing from a 401(k) account, we prepared a simulation model. We created a 35-year annual earnings series with a starting salary of \$25,000. Annual earnings were

allowed to grow with age²⁵ and with inflation (assumed to be 3 percent). The contributions to the 401(k) account are 6.8 percent of annual earnings.²⁶ We assumed that the 401(k) account balance earns an annual rate of return of 11 percent. The simulation involves a \$40,000 loan against the pension account made in the 15th year and paid back over a 10-year period in equal installments. Pension account balances were determined for several different loan interest rates. We created simulations under two extreme scenarios: (1) the borrower continues to make contributions to the 401(k) account while repaying the loan and (2) the borrower suspends making contributions to the 401(k) account while repaying the loan.

²⁵Thomas Hungerford and Gary Solon, "Sheepskin Effects in the Return to Education," Review of Economics and Statistics, Vol. 69, No. 1 (1987), pp. 175-77.

²⁶This is the average contribution rate for 401(k) participants reported in 401(k) Pension Plans: Many Take Advantage of Opportunity to Ensure Adequate Retirement Income (GAO/HEHS-96-176, Aug. 2, 1996).

Supplementary Analysis

This appendix contains supplementary tables of multivariate statistical results from the two databases that we used to conduct our work.

Participation Rates in 401(k) Plans

The coefficient estimates from the regression model of the participation rate are shown in table II.1. The coefficient estimates indicate the effect of a change in an independent variable on a plan's participation rate holding the values of all other independent variables constant. For example, the coefficient estimate of 0.0591 for the borrowing variable indicates that plans that allow participant borrowing have participation rates that are about 6 percentage points higher than plans that do not allow borrowing.

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Table II.1: Regression Results for Participation Rates (Dependent Variable: Participation Rate)

Variable	Coefficient estimate (standard error)
Constant	0.5716
Firm size	-0.0020 ^a (0.0006)
Firm size squared (x1000)	0.0050 ^a (0.0015)
Can borrow	0.0591 ^a (0.0063)
Sole pension plan	-0.0206 ^b (0.0090)
Match rate 1	0.1035 ^a (0.0141)
Match rate 2	0.1410 ^a (0.0101)
Match rate 3	0.1759 ^a (0.0108)
Match rate 4	0.1975 ^a (0.0112)
Match rate 5	0.2226 ^a (0.0124)
Match rate 6	0.2612 ^a (0.0164)
Match rate 7	0.2600 ^a (0.0194)
Match rate 8	0.2818 ^a (0.0206)
Match rate 9	0.2943 ^a (0.0252)
Match rate 10	0.3183 ^a (0.0256)
Match rate 11	0.3341 ^a (0.0177)
Match rate 12	0.3210 ^a (0.0256)
Adjusted R ²	0.2102
Number of observations	4,006

^aSignificant at the 1-percent level.

^bSignificant at the 5-percent level.

Source: GAO analysis of IRS 1992 Form 5500 research database.

Contributions to 401(k) Plans

The regression results of the effects of pension-plan characteristics on average employee contribution levels are reported in table II.2. The coefficient estimates indicate the effect of a change in an independent variable on average contribution levels holding the values of all other independent variables constant. For example, the coefficient estimate of 0.3682 for the borrowing variable indicates that borrowing provisions increase average employee contribution levels by 36.8 percent.

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Table II.2: Regression Results for Average Employee Contribution Levels (Dependent Variable: Natural Logarithm of Average Employee Contribution)

Variable	Coefficient estimate (standard error)
Constant	7.0208
Firm size	-0.0043 ^a (0.0015)
Firm size squared (x1000)	0.0119 ^a (0.0044)
Can borrow	0.3682 ^a (0.0167)
Sole pension plan	-0.1300 ^a (0.0231)
Match rate 1	0.1608 ^a (0.0410)
Match rate 2	0.1042 ^a (0.0302)
Match rate 3	0.1205 ^a (0.0313)
Match rate 4	0.2427 ^a (0.0317)
Match rate 5	0.1222 ^a (0.0343)
Match rate 6	0.1779 ^a (0.0412)
Match rate 7	0.1460 ^a (0.0446)
Match rate 8	0.1838 ^a (0.0464)
Match rate 9	0.1615 ^a (0.0529)
Match rate 10	0.1211 ^b (0.0569)
Match rate 11	0.0991 ^a (0.0374)
Match rate 12	0.0551 (0.0493)
Adjusted R ²	0.0745
Number of observations	7,245

^aSignificant at the 1-percent level.

^bSignificant at the 5-percent level.

Source: GAO analysis of IRS 1992 Form 5500 research database.

The tobit-model results of individual pension-plan participants reported in table II.3 examine the influence of participant characteristics on contribution rates holding all other characteristics constant. When a variable changes, it will have two effects on the overall contribution rate. First, for individuals already making a contribution, an increase in a variable with a positive coefficient estimate will directly increase the contribution rate. Second, for individuals who are not making contributions to their 401(k) accounts, an increase in this variable will increase the likelihood that they contribute to their plan account. The marginal impacts of a variable change reported in table II.3 include both these impacts on the expected value of the contribution rate. For example, the marginal impact of 3.0247 for the borrowing variable indicates that, on average, contribution rates of participants in plans with borrowing provisions are about 3 percentage points higher than for participants in other plans.²⁷

Table II.3: Tobit-Model Results for the Contribution Rate (Dependent Variable: Contribution Rate)

Variable	Coefficient estimate (standard error)	Marginal impact
Constant	-1.1724	
Female	0.2887 (0.3244)	0.2327
Age 35 to 44 years	-0.8662 ^b (0.4105)	-0.6981
Age 45 to 54 years	1.4346 ^a (0.4576)	1.1562
Age 55 to 64 years	0.4641 (0.5946)	0.3741
Married	-1.7866 ^a (0.4298)	-1.4399
Dropped out of school before the 12th grade	0.8815 (1.1460)	0.7105
1 to 4 years of college; no degree	-0.6867 (0.4776)	-0.5534
4 or more years of college; college degree	-1.5289 ^a (0.4462)	-1.2322
Black	-0.5284 (0.7617)	-0.4258

(continued)

²⁷Several specifications were tried that deleted the income variables and the wealth variables. The parameter estimates of the variables of interest were quantitatively the same in each case. In addition, the match rate was entered as a quadratic in one specification with very little change in the coefficient estimates of the other variables. Furthermore, the overall impact of matching is the same in both specifications.

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Variable	Coefficient estimate (standard error)	Marginal impact
Hispanic	1.7746 (1.0690)	1.4302
Covered by another pension plan	1.3272 ^a (0.3223)	1.0697
Natural logarithm of employer match rate	0.7589 ^a (0.1620)	0.6116
Can withdraw funds from pension account	3.7530 ^a (0.4430)	3.0247
Family income \$25,000 to \$34,999 per year	1.3454 (0.7846)	1.0843
Family income \$35,000 to \$44,999 per year	4.8156 ^a (0.8101)	3.8811
Family income \$45,000 to \$59,999 per year	2.9547 ^a (0.7905)	2.3813
Family income \$60,000 to \$74,999 per year	4.1386 ^a (0.8635)	3.3355
Family income \$75,000 or more per year	4.5341 ^a (0.8446)	3.6542
Natural logarithm of number of years covered by this defined-contribution plan	-0.3309 (0.1900)	-0.2667
Family net worth \$50,001 to \$100,000	1.6156 ^a (0.4819)	1.3021
Family net worth \$100,001 to \$250,000	2.2099 ^a (0.5198)	1.7811
Family net worth \$250,001 to \$1,000,000	3.6329 ^a (0.6248)	2.9279
Family net worth over \$1,000,000	1.1595 (0.6746)	0.9345
σ	7.0546 ^a (0.1142)	
Logarithm of likelihood function	-7016.1	

^aSignificant at the 1-percent level.

^bSignificant at the 5-percent level.

Source: GAO analysis of the 1992 Survey of Consumer Finances database.

Characteristics of Pension-Plan Borrowers

A logit model was estimated to determine the magnitude of the effects of participant characteristics on the likelihood of having an outstanding pension-plan loan (see table II.4). The coefficient estimates do not indicate the magnitude of the impacts on the likelihood of having an outstanding

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loan due to changes in the variables. Consequently, the marginal impacts of changes in the variables on the likelihood were calculated and are reported in the third column of table II.4. For example, the marginal impact of 0.0578 for black participants indicates that the likelihood of blacks having an outstanding loan is 5.8 percentage points higher than for whites. Given that about 7.6 percent of plan participants have outstanding loans, then blacks are about 5.8/7.6 times 100—or 76 percent—more likely to have an outstanding pension-plan loan than whites.

Table II.4: Logit-Model Results for Whether or Not Participants Have Outstanding Loans From Their Pension Account

Variable	Parameter estimate (standard error)	Marginal impact
Constant	-3.7994	
Female	-0.2854 (0.1550)	-0.0145
Age 35 to 44 years	0.3341 (0.1920)	0.0170
Age 45 to 54 years	0.2815 (0.2184)	0.0143
Age 55 to 64 years	-0.1426 (0.3006)	-0.0073
Married	0.3298 (0.1976)	0.0168
Dropped out of school before the 12th grade	0.0874 (0.3921)	0.0045
1 to 4 years of college; no degree	0.1365 (0.2291)	0.0070
4 or more years of college; college degree	0.7249 ^a (0.2127)	0.0369
Black	1.1337 ^a (0.2068)	0.0578
Hispanic	1.7382 ^a (0.2934)	0.0886
Covered by another pension plan	0.7651 ^a (0.1515)	0.0390
Recently turned down for loan	0.5829 ^a (0.1855)	0.0297
Family income \$25,000 to \$34,999 per year	0.0192 (0.2937)	0.0010
Family income \$35,000 to \$44,999 per year	0.0094 (0.2975)	0.0005
Family income \$45,000 to \$59,999 per year	-0.3429 (0.3128)	-0.0175

(continued)

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Variable	Parameter estimate (standard error)	Marginal impact
Family income \$60,000 to \$74,999 per year	-0.4968 (0.3411)	-0.0253
Family income \$75,000 or more per year	-1.0754 ^a (0.3522)	-0.0548
Natural logarithm of number of years covered by this defined-contribution plan	0.2608 ^a (0.0900)	0.0133
Family net worth \$50,001 to \$100,000	-0.9459 ^a (0.2722)	-0.0482
Family net worth \$100,001 to \$250,000	-0.0553 (0.2251)	-0.0028
Family net worth \$250,001 to \$1,000,000	-0.3286 (0.2913)	-0.0167
Family net worth over \$1,000,000	-0.1263 (0.3226)	-0.0064
Logarithm of likelihood function	-776.81	

^aSignificant at the 1-percent level.

Source: GAO analysis of the 1992 Survey of Consumer Finances database.

Consequences of Borrowing From Retirement Accounts

Our simulation results are presented in table II.5 and show the pension account balance after 35 years for each scenario. The results show that as long as the interest rate of the loan is less than the rate of return of the pension account balance (assumed to be 11 percent), borrowers will have a lower account balance at retirement. The actual reduction depends on the gap between the account rate of return and the loan interest rate, and whether or not pension contributions continue during the loan repayment period. Furthermore, these results hold only if the loan is repaid.

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Table II.5: Simulation Results

	Account balance in year 35	Percent of no-loan balance
No loan	\$952,977	
Maintain contributions to pension account during loan repayment		
6.3 percent loan	\$892,209	93.6 percent
7.0 percent loan	\$900,892	94.5 percent
8.0 percent loan	\$913,526	95.9 percent
9.5 percent loan	\$932,968	97.9 percent
Suspend contributions to pension account during loan repayment		
6.3 percent loan	\$687,863	72.2 percent
7.0 percent loan	\$696,546	73.1 percent
8.0 percent loan	\$709,180	74.4 percent
9.5 percent loan	\$728,622	76.5 percent

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