

How Financial Factors Outside of a 401(k) Plan Can Impact Retirement Readiness

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Introduction

Workers' finances can face many challenges over their careers including irregular expenses, which are sometimes quite large. How workers deal with covering these expenses and how they affect other aspects of their financial goals are ripe areas of analysis, particularly with respect to retirement preparations. In many cases, workers' only source of significant savings is an employment-based retirement savings plan, typically a 401(k) plan. Thus, some 401(k) participants could take a loan from the plan or adjust their contributions to these plans, while others could access credit outside of a plan or use some combination of all three to cover unusually high expenses. Balancing these decisions is a key component of participants' financial wellbeing.

This study aims to provide a unique analysis of 401(k) plan participants' finances by linking 401(k) plan data with consumer banking data to better understand how 401(k) participants behave when faced with irregular expenses. In particular, changes in credit card utilization, 401(k) plan contributions, and/or 401(k) plan loan use are examined after these participants experience a significant spending "spike."

Although 401(k) plan loans are a source of leakage from retirement savings if they are not paid back in full when a participant leaves their employer, they do provide flexibility that can lead to higher participation and contributions.¹ As a result, plan loans are a common option for 401(k) plans. Results from the EBRI/ICI 401(k) Plan Database show the incidence of loans and the loan amounts across specific participant demographic factors but not in regard to the participants' overall finances or potential reasons for taking the loans.²

The analysis presented here, which links 401(k)-plan data and banking data, builds on those results to evaluate the impact of financial factors outside of the plan, such as overall spending levels and debt accumulation, on behavior inside the plan.

This study is part of a joint effort between the Employee Benefit Research Institute (EBRI) and J.P. Morgan Asset Management to deliver data-driven research to better understand how the financial factors faced by 401(k) plan participants outside of their 401(k) plan impact their retirement preparations. Thus, the aim is to provide unique fact-based insights to help build a stronger retirement system by policymakers, plan sponsors, and plan providers.

Specifically, 401(k) plan participants who experience spending spikes are compared with those who do not experience them on their credit card utilization, 401(k) plan contributions, and 401(k) plan loan use. First, the households with participants who have a spending spike are identified. Once identified, the impact of the spending spikes on credit card debt, 401(k) plan loan usage, and 401(k) plan contribution levels are then assessed.

Data Sources

EBRI/ICI 401(k) Plan Database — This is a participant-level database constructed from the administrative records of 401(k) plans at the end of each year, representing a large cross section of 401(k) plans. The database represents a broad range of participants — including those who are young, old, new to their jobs, or have been with their current employers for many years.³

Chase Data — JPMorgan Chase Bank, N.A. (Chase) serves nearly half of America’s households with a broad range of financial services including checking, savings, investments, credit cards, and loans. Chase’s scale and wide reach allows for a comprehensive view of household finances. In this analysis, the Chase data sample is restricted to the households in 2016–2020 who use Chase as their primary banking institution, and their total household spending through all payment mechanisms (selected credit and debit card transactions, electronic payment transactions, check and cash payments) and sources of income including wage income, Social Security, annuity, pensions, etc. can be linked to the EBRI/ICI Database. For more information about Chase, visit the following website:

<https://www.chase.com/digital/resources/about-chase>.

Data privacy is fully protected. No personally identifiable information is contained within the data and all spending and saving attributes analyzed in this research are kept completely anonymous.⁴

Longitudinal Sample Construction

In this study, spending and 401(k) plan data from 2016–2020 at the household level are examined. In order to create this household view, the following steps were taken to merge the spending data from Chase and 401(k) plan data from EBRI/ICI 401(k) Plan Database to create the full data sample:

1) Using the unique participant/customer identifier (not personally identifiable information) in each dataset, the individuals in both sets of data are established. These individuals with both the spending and the saving data are then grouped into households using Chase’s method for determining members of a household.⁵ The unit of observation in this study is the household. The number of people in these households may not truly reflect the exact household size, as the household size can only be approximated based on the number of unique individuals who have Chase accounts. As an example, if only one spouse has a Chase account, this will be considered a one-person household. This household unit observation necessitates the defining of specific data variables.

2) In order to ensure that the data sample only includes households where the Chase data has all or the majority of their spending, filters are applied to the households to meet the full (majority) spending criteria. These filters include but are not limited to: all 12 months of spending data, households with spending more than 50 percent of their estimated gross income, and households with credit card spending outside of Chase of less than 30 percent of their overall spending.⁶

3) Once these households are identified, the sample is restricted to single-customer households — a household that only has one person attached to the bank account(s). This person would also be a 401(k) participant where a loan is available in their plan and are aged 65 or younger. The demographic and financial characteristics of this person are those used in the analysis. The single-customer household ensures that the demographic factors from the banking data match the 401(k) participant. In contrast, a multi-customer household might include additional 401(k) assets that are not captured within this dataset.

4) Since the status of many of the variables must be known before and after the study year (year two), these households must have three contiguous years in the sample to be included. Thus, each instance of a household having three contiguous years of complete data during 2016–2020 is an observation for this analysis. This results in 58,915 observations from 35,184 unique households.

Data Definitions

Spending — Total spending is the annual sum of the monthly spending captured through credit and debit cards, electronic payment transactions, Chase checks, and cash across 10 specific spending categories: apparel & services, education, entertainment, food & beverage, health care, housing, transportation, travel, charitable contributions, and other.

Income — Since all the spending data are at the household level, the income used in this study is also at the household level, but the use of single-customer households matches the income to the 401(k) participant.

Net Income — This is the observed deposited amount from the Chase data for salaries and wages that is net of any taxes and deductions taken out before the paycheck is deposited.

Gross Income — This is an estimate based on net income with the addition of estimated federal income and Federal Insurance Contributions Act (FICA) taxes for the household, plus any 401(k) plan contributions for the year.

Unfunded Spending Spike — An unfunded spending spike is determined to occur when a household's monthly spending is at least 25 percent or more than the previous 12 months' median monthly spending, and this spending cannot be covered by the household's income and cash reserves (checking and savings accounts), i.e., it is not funded by immediate liquid assets. Year two is the test year of whether a spending spike occurs.

Credit Card Utilization — This is measured by the ratio of the revolving credit card balances in the last month of the year to the credit limit on those cards. A ratio of 0 percent means that the household has no revolving credit card debt, while 100 percent means that the household has used the full allowable credit on their credit card(s).

New Plan Loan — Plan loan data are only available at year end, so any participant who has no outstanding loan balance at the end of year one but has a balance at the end of year two is considered to have a new loan in year two. In addition, any participant who has a higher outstanding loan balance at the end of year two than they had at the end of year one is also considered to have taken a new loan in year two.

Spending Ratio — This is the ratio of total annual spending to annual net income.

Tenure — This is the number of years that the 401(k) plan participant of the household has been with their current employer.

Household Demographics

As shown in Figure 1, the single-customer household participants are widely distributed across ages, incomes, and tenures with their current employer. For example, 11.1 percent are less than age 30, 26.6 percent are ages 40–49, and 8.3 percent are ages 60–65. For incomes, 6.1 percent have incomes of \$20,000–\$29,999 and 19.2 percent have incomes of \$100,000 or more. Approximately one-third of the participants have tenure of less than two years and 10.5 percent have 20 or more years.

As far as financial factors, 4.8 percent of the participant households have 401(k) account balances of less than \$2,000 and 7.5 percent have balances of \$2,000–\$4,999, while 22.7 percent have balances of \$100,000 or more (Figure 2). Over one-third (35.7 percent) of these households have no revolving credit card debt in year one, while 22.5 percent are using 80–100 percent of their credit card limit. Just over half (52.4 percent) of the households have spending ratios of 1.05 or more, while one-third have ratios of 0.95 or less.

**Figure 1
Demographic Characteristics of the Sample**

Age	
Less than 30	11.1%
30–39	29.8%
40–49	26.6%
50–59	24.2%
60–65	8.3%
Gross Income	
\$20,000–\$29,999	6.1%
\$30,000–\$49,999	28.2%
\$50,000–\$74,999	30.5%
\$75,000–\$99,999	16.0%
\$100,000 or more	19.2%
Tenure With Employer	
Less than 2 years	30.6%
2–4 years	20.4%
5–9 years	17.5%
10–19 years	20.9%
20 or more years	10.5%

Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

**Figure 2
Financial Characteristics of the Sample**

401(k) Account Balance	
Less than \$2,000	4.8%
\$2,000–\$4,999	7.5%
\$5,000–\$9,999	11.2%
\$10,000–\$14,999	8.7%
\$15,000–\$19,999	6.9%
\$20,000–\$49,999	23.0%
\$50,000–\$99,999	15.3%
\$100,000 or more	22.7%
Credit Card/Limit Ratio — Year One	
0%	35.7%
>0%–19%	13.8%
20%–39%	10.5%
40%–59%	9.1%
60%–79%	8.4%
80%–100%	22.5%
Spending-to-Income Ratio	
Less than 0.80	13.3%
0.80–0.94	19.6%
0.95–1.04	14.8%
1.05–1.49	35.4%
1.50–1.99	10.2%
2.00 or more	6.8%

Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Spending Spikes

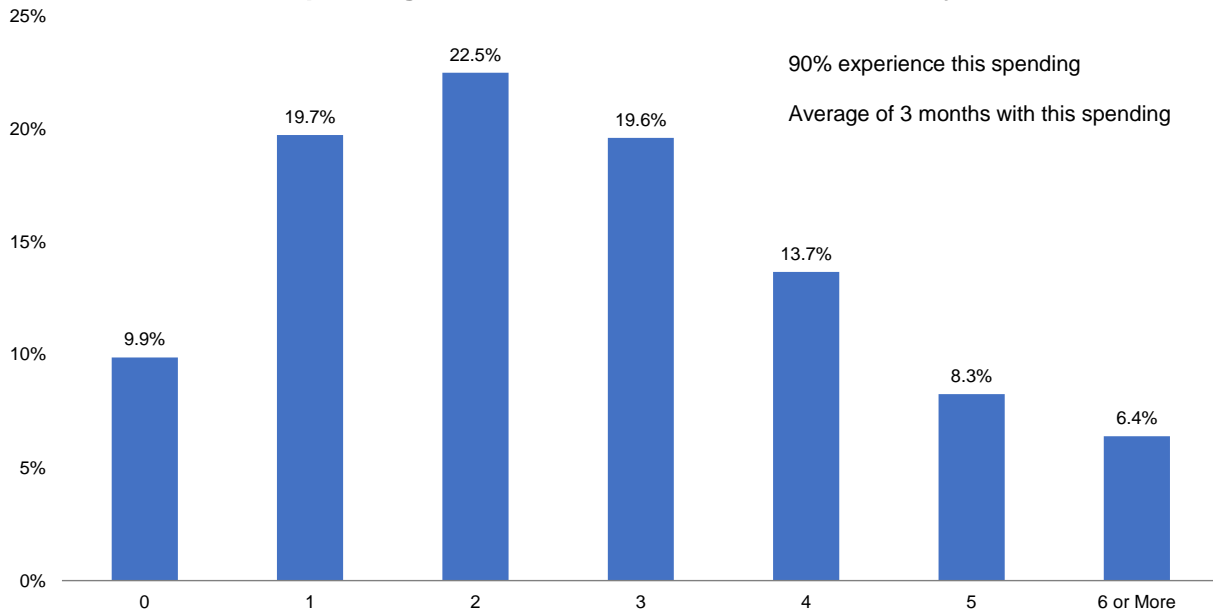
Spending surges can play havoc on a household’s finances and possibly lead to the need to access more funds. Thus, a study of irregular spending spikes can provide insight into 401(k) plan participants’ financial decisions, including taking a plan loan and/or increasing credit card debt. A spending spike could be a result of an unexpected expense, e.g., a car repair, or an expected expense such as a vacation.⁷

As noted, a monthly unfunded spending spike is defined as a spike at least 25 percent above the previous 12 months’ median spending that cannot be funded by the household’s income and available cash reserves in that month. Separately, spending that cannot be funded by the household’s income alone is discussed.

By any measure, household monthly spending is generally highly variable. In fact, 90 percent of the household observations were found to have had at least one month where their spending was 25 percent or larger than their median spending in the prior 12 months and was not covered by that month’s income (Figure 3). Twenty-eight percent of the households had four or more months where their spending was 25 percent or larger than the median spending of the prior 12 months, with an average of three months. Given that nearly all of the observations had this irregularly high spending, significant differences in participant behaviors based on this spending not covered by income alone were not found. However, this definition is an important measure to consider for policymakers and plan sponsors as they grapple with the appropriate size of emergency reserves for the working population, because what is held outside of the 401(k) plan is not known by plan sponsors.

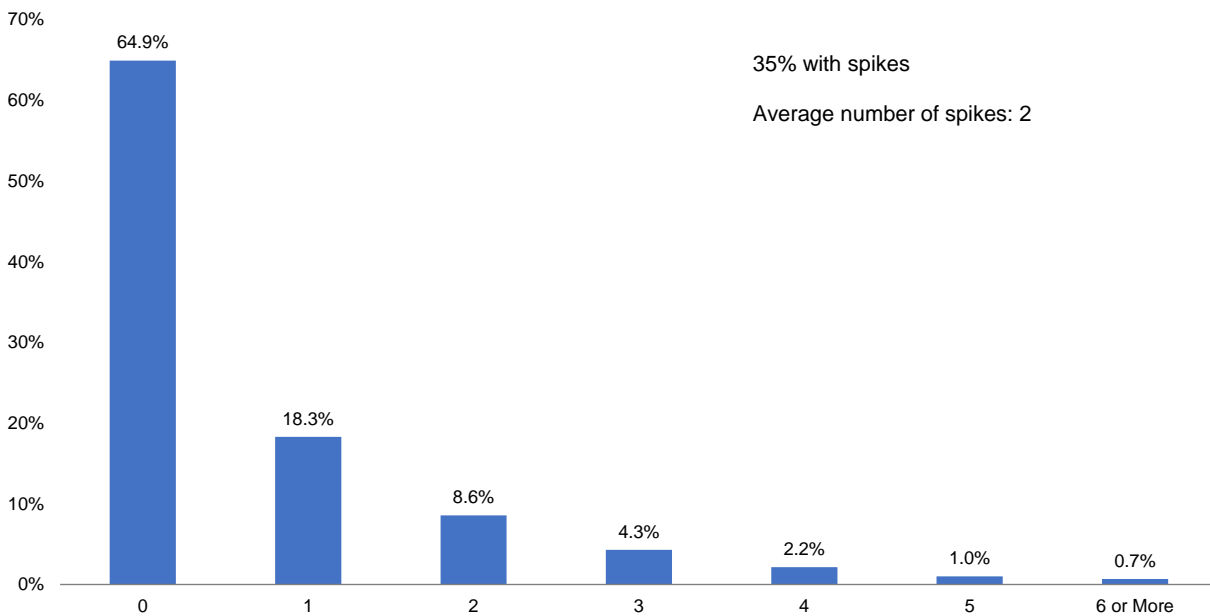
Turning to unfunded spending spikes (spending surges not covered by income and cash reserves), 35 percent of household observations were found to have had at least one month where an unfunded spending spike occurred. In addition, 8.2 percent of household observations had three or more months of these spikes (Figure 4). Overall, the average number of these spikes was two.

Figure 3
Percentage of Households With Monthly Spending 25 Percent or More Than the Median Spending of the Prior 12 Months Not Covered by Income



Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

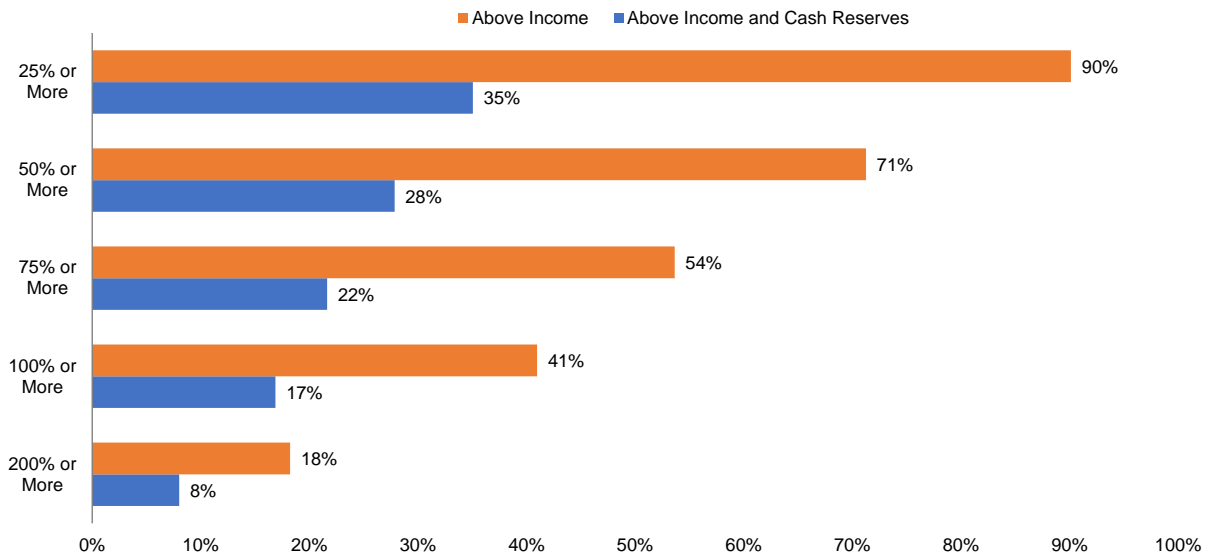
Figure 4
Percentage of Households With Spending Spikes of 25 Percent or More Than the Median Spending of the Prior 12 Months Not Covered by Income and Cash Reserves



Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

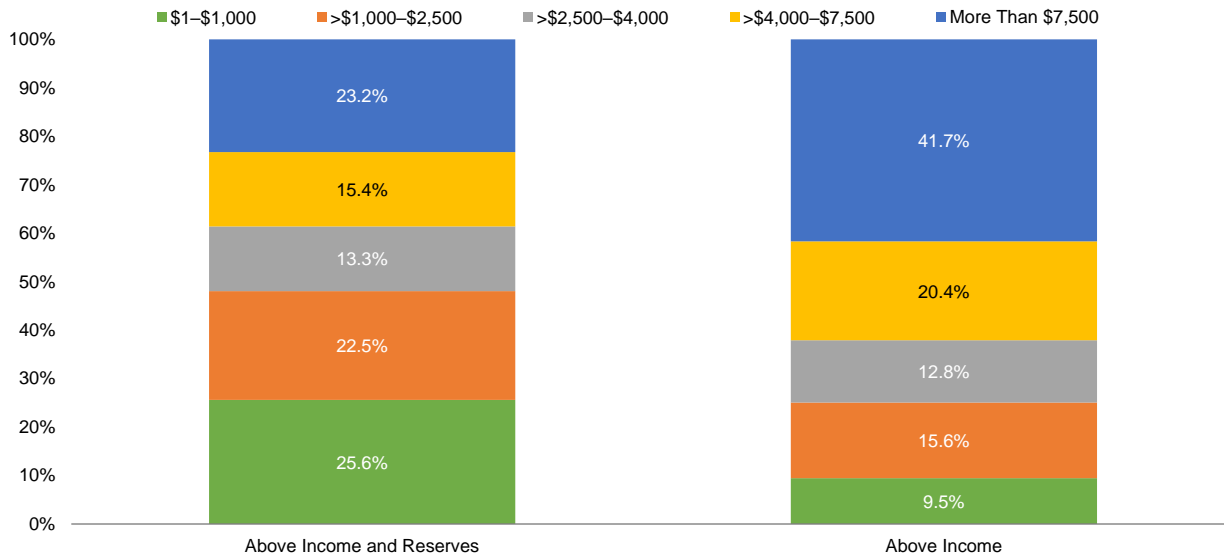
Spikes can be quite large relative to income. While 35 percent of the household observations had spikes of 25 percent or larger, 28 percent had spikes of 50 percent or larger and 22 percent had spikes of 75 percent or larger (Figure 5). On a dollar basis, which is how the maximum allowable amount for an in-plan emergency savings account in SECURE 2.0 is set, 52 percent of the household observations had spikes not covered by income and cash reserves larger than \$2,500 aggregated over the year and 75 percent had spending not covered by income alone above this threshold among those with incomes of less than \$150,000 (Figure 6).⁸ Forty-one percent of those with spending not covered by income alone had totals larger than \$7,500. For households with incomes of more than \$150,000, 81 percent could not fund spending spikes over \$2,500 with their income and cash reserves, and 94 percent could not do so with their income alone (Figure 7).⁹

Figure 5
Spending Relative to the Median of the Prior 12 Months of Spending —
Percentage Above Specific Thresholds of Median Monthly Spending



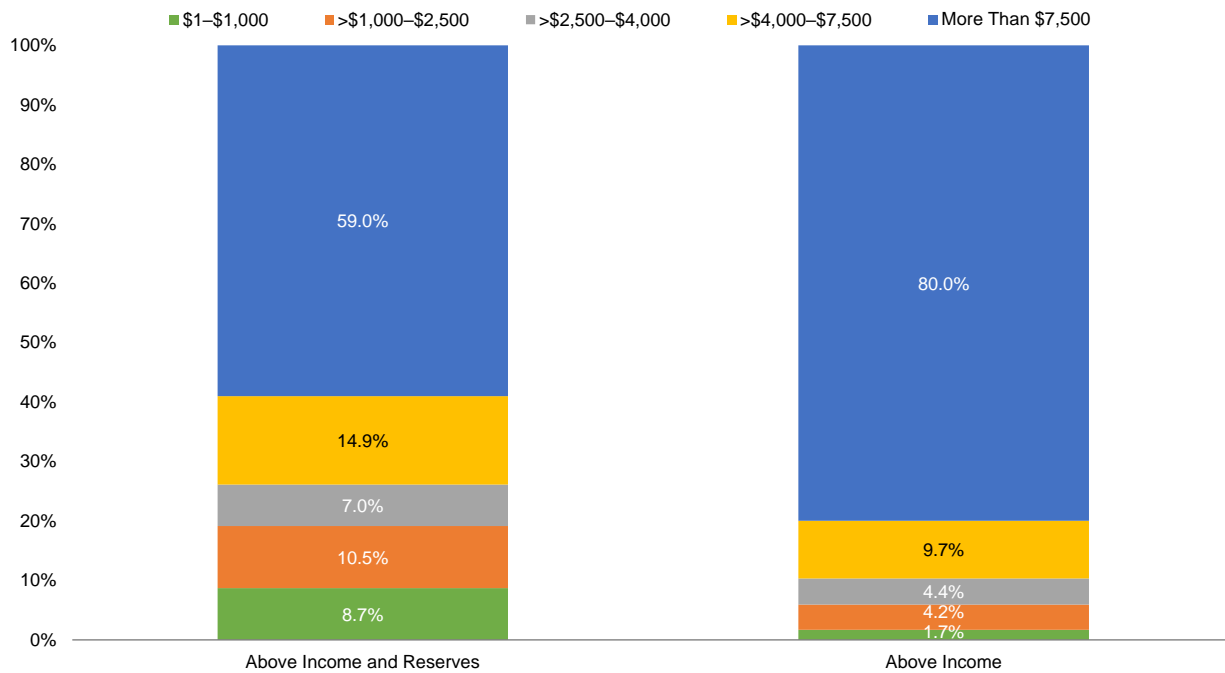
Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Figure 6
Distribution of Annual Spending Amounts Above
Income and Cash Reserves and Above Income Alone
(Households With Incomes Less Than \$150,000)



Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Figure 7
**Distribution of Annual Spending Amounts Above Income and
 Cash Reserves and Above Income Alone**
 (Households With Incomes of \$150,000 or More)



Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Unfunded Spending Spikes' Impact on Financial Behavior

The households with spikes had lower incomes and higher spending ratios, credit card utilization, and revolving credit card balances in both years one and two than households without spikes, but age was not significantly different (Figure 8). Specifically, the median gross income of those with a spike was \$55,305 vs. \$64,822 for those without a spike. The median spending ratios in years one and two were near 1.0 for those without a spike, compared with roughly 1.2 for those with a spike. The median credit card utilizations were particularly higher among those with a spike at over 40 percent vs. 10 percent or less. Similarly, the likelihood of experiencing a spike increased with the spending ratio and credit card utilization (Figures 9 and 10), while the likelihood decreased as gross income increased (Figure 11).

These spending spikes have a clear impact on the likelihood of 401(k) plan participants taking a plan loan and increasing their credit card debt in the year of the spike, but the spikes do not have a clear impact on the likelihood of decreasing 401(k) contributions. Of those with a spending spike in the analysis year (year two), 17.2 percent took a new plan loan and 47.5 percent increased their credit card debt, compared with 6.5 percent and 34.1, respectively, of those without a spending spike in that same year (Figure 12).¹⁰ However, there was no significant difference in the share who decreased contributions in the analysis year.¹¹ (For a complete breakdown of the sample data related to connections between having a spending spike and taking action to fund the spike, see Appendix Figure 1.) Furthermore, there were no significant changes in loan use and credit card debt in the year after the spike occurred, as the participants appeared to need money immediately to cover the spikes in spending.

Those with a spending spike not only had a greater likelihood of taking a new plan loan and increasing credit card debt, but the median amount of the loan and the median increase in credit card debt were also larger than they were for those without a spending spike. Those with spikes had a median outstanding new balance, or additional balance for those having a loan increase from the prior year, of \$3,508 vs. \$2,804 for those without a spike (Figure 13). The median increase in credit card debt for those with a spike was \$1,507 compared with \$1,172 for those without a spike.

Figure 8
Median Demographic and Financial Factors, by Unfunded Spending Spike Occurrence

Age	42	43
Gross Wage Income	\$55,305	\$64,822
Spending Ratio Year One	1.18	1.03
Spending Ratio Year Two	1.26	0.99
Credit Card Utilization Year One	44.60%	10.60%
Credit Card Utilization Year Two	42.10%	5.90%
Credit Card Revolving Balance Year One	\$1,689	\$599
Credit Card Revolving Balance Year Two	\$1,952	\$457

Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Figure 9
Incidence of an Unfunded Spending Spike, by Spending Ratio

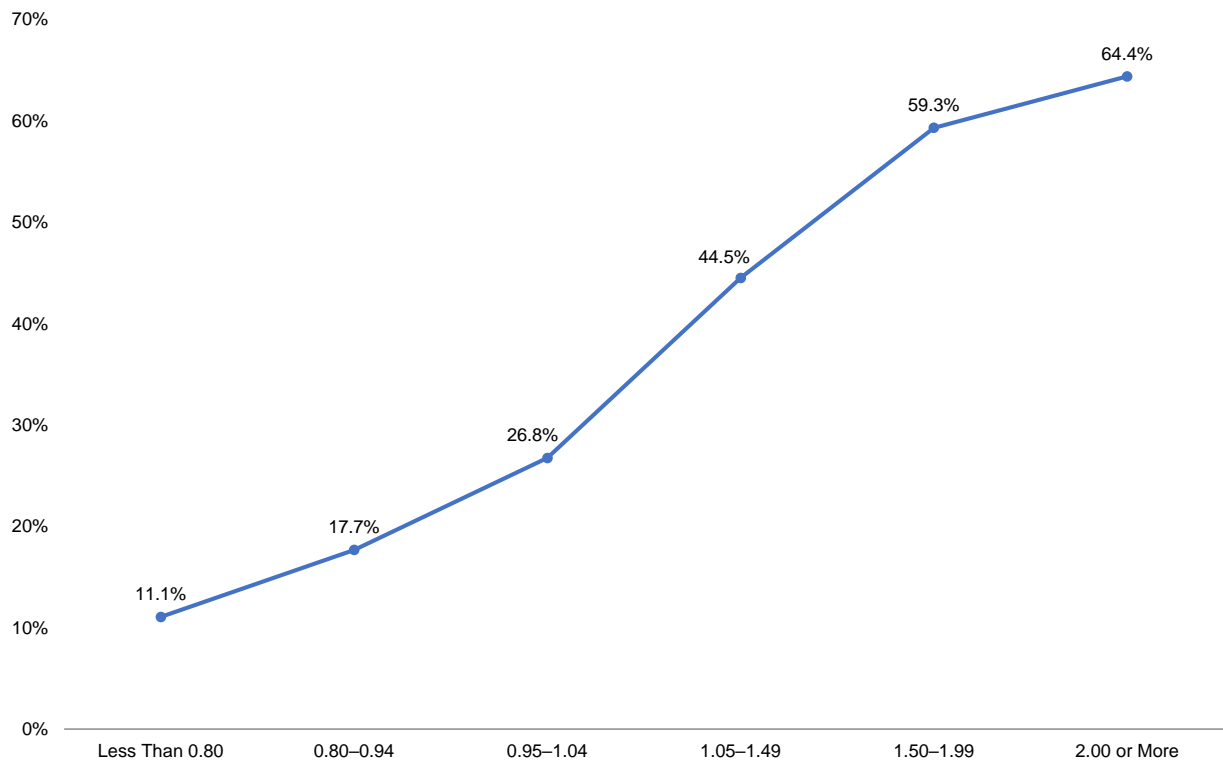
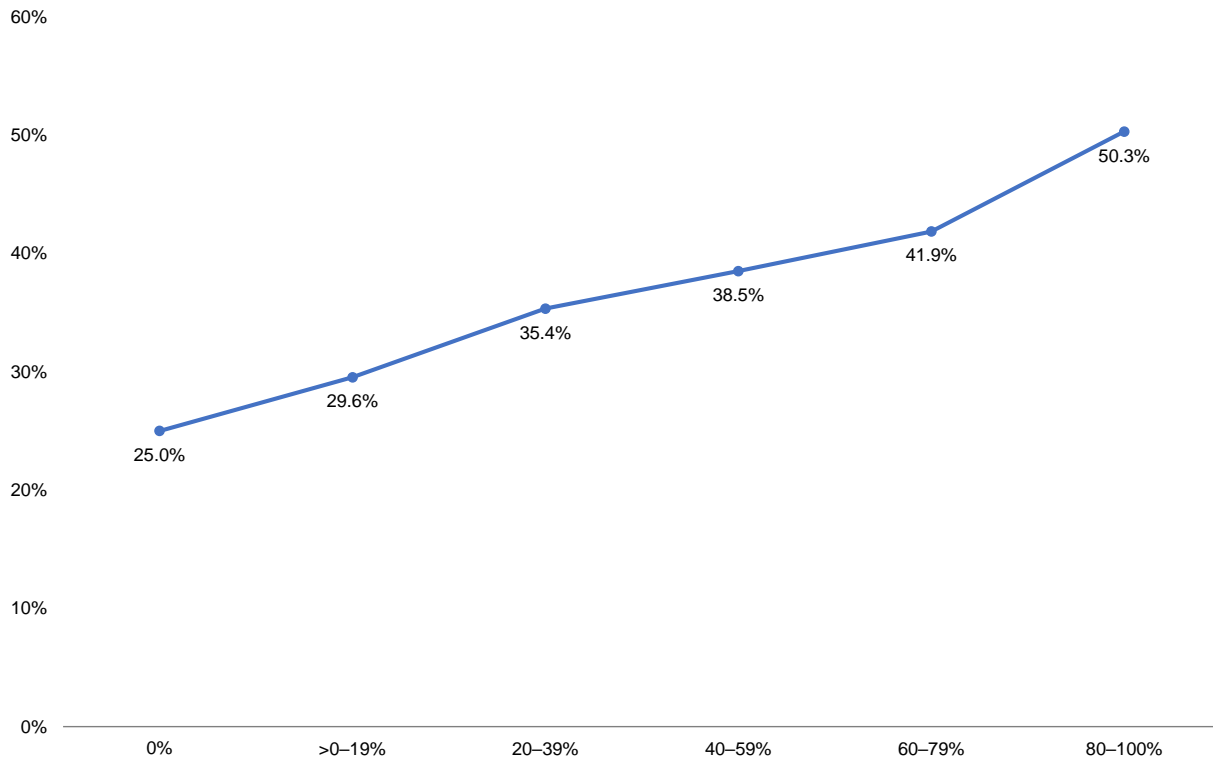
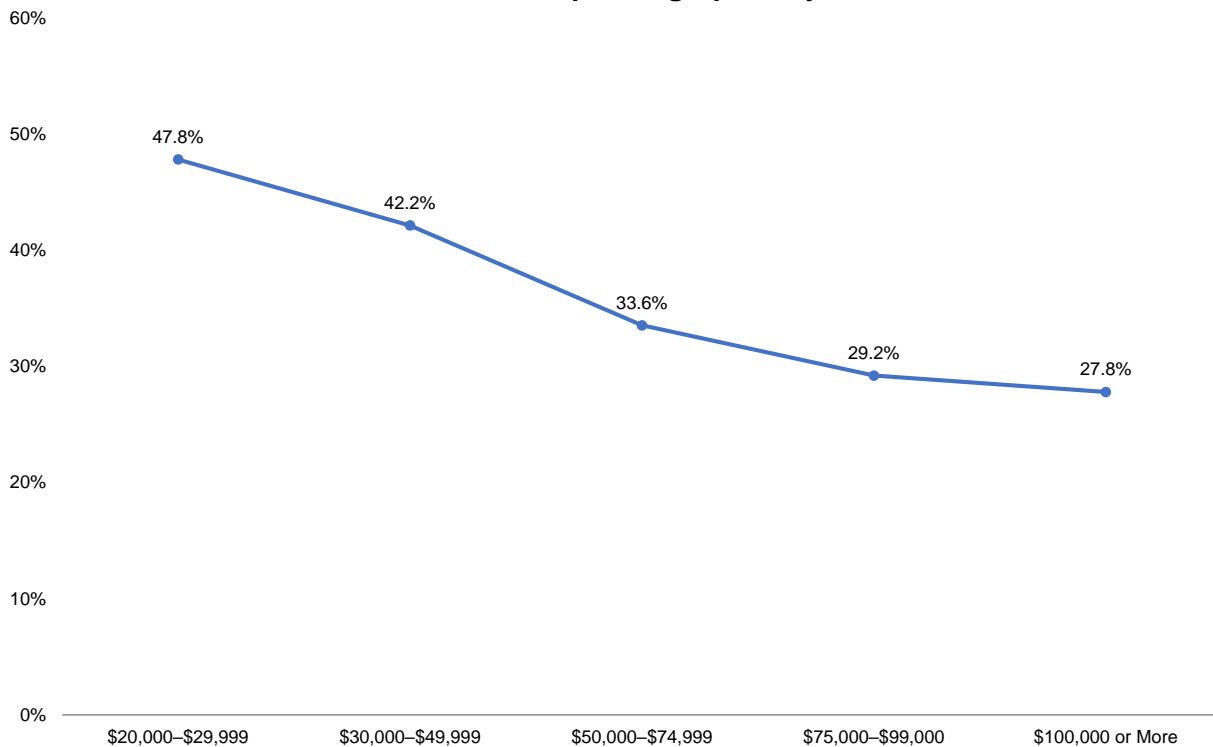


Figure 10
Incidence of an Unfunded Spending Spike, by Credit Card Utilization in Year One



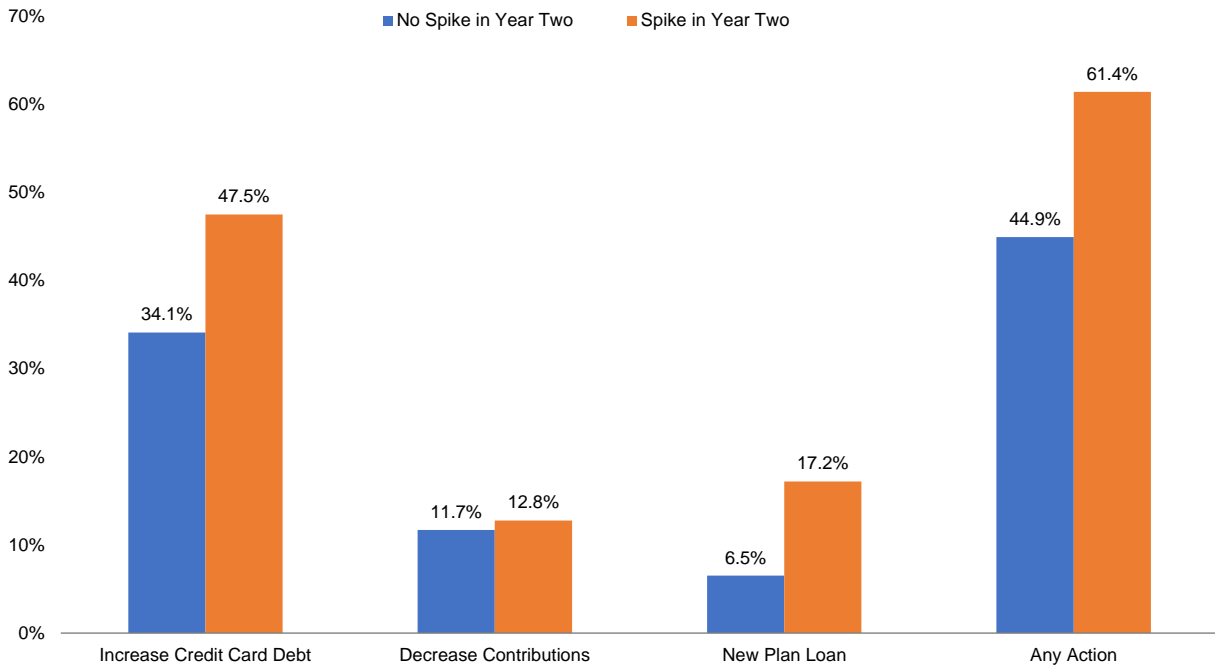
Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Figure 11
Incidence of an Unfunded Spending Spike, by Gross Income



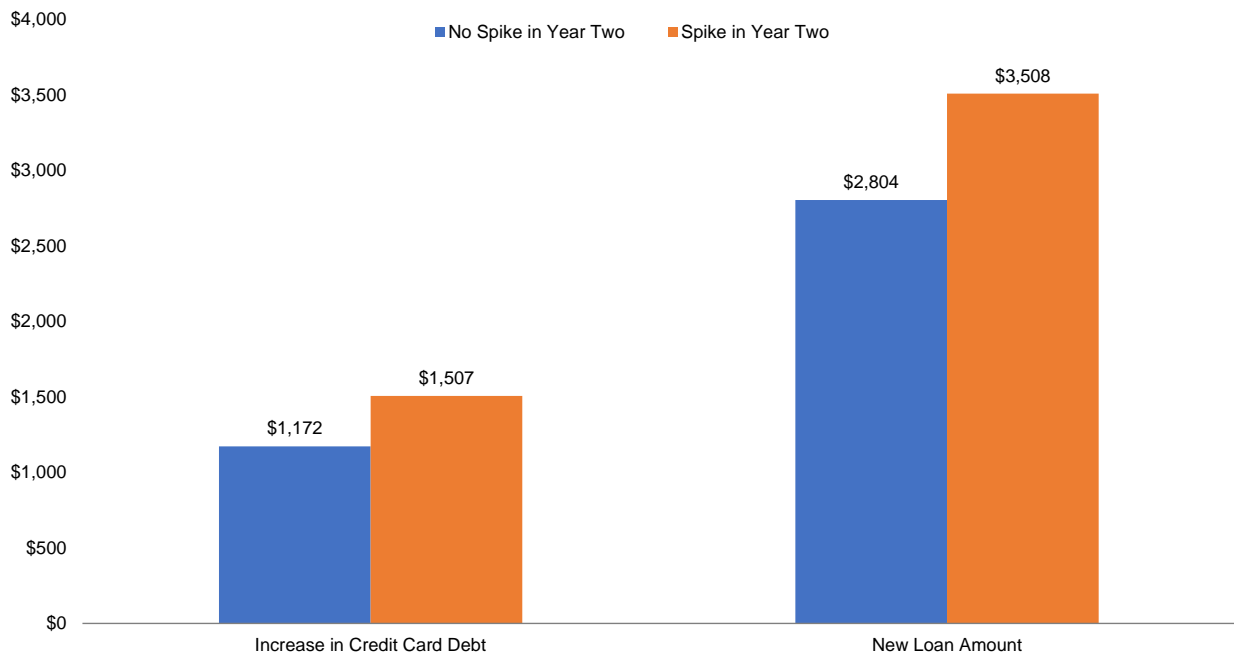
Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Figure 12
Likelihood of Increasing Credit Card Debt, Decreasing 401(k) Contributions, and Taking a New 401(k) Plan Loan in Year Two, by Unfunded Spending Spike Occurrence



Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Figure 13
Median Amount of New 401(k) Plan Loans and Increases in Credit Card Debt, by Unfunded Spending Spike Occurrence



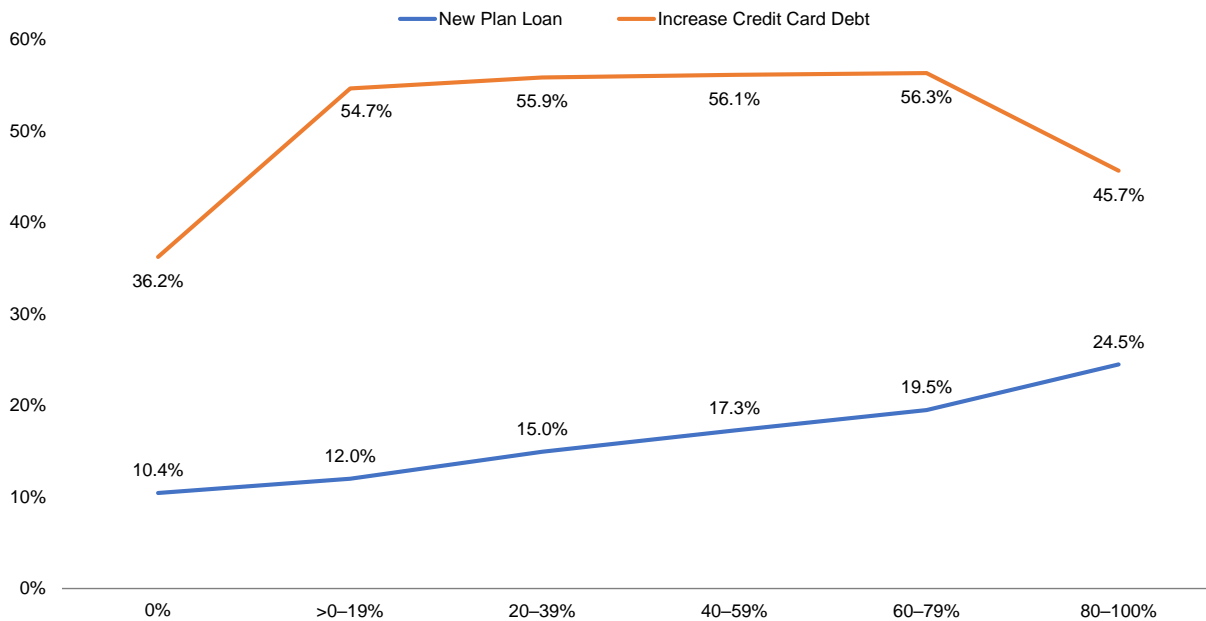
Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Credit Card Utilization and 401(k) Plan Loans

Credit card utilization is another important factor in determining whether a 401(k) plan participant takes a plan loan. As shown in Figure 2, 35.7 percent of the households had no revolving credit card balances at the end of year one, while 22.5 percent had credit card utilization of 80–100 percent. This credit card utilization plays an important role in the participant taking a plan loan, as less availability of credit card borrowing could force the participants to take a plan loan to pay expenses not covered by income or cash reserves. In fact, the median credit card ratio of those taking a plan loan was 63.5 percent compared with 16.7 percent for those who did not take a plan loan.

Even among the households with a spending spike, higher credit card utilization was correlated with a higher likelihood of taking a plan loan. Of the households with a spike having no revolving credit card debt in year one, 10.4 percent took a plan loan in year two compared with 24.5 percent of those having a spike with credit card utilization of 80–100 percent (Figure 14). Interestingly, it appears that the households are likely to take on additional credit card debt before taking the plan loan, as approximately 55–56 percent of those with credit card utilization of >0–79 percent increased their credit card debt, while only a small increasing percentage took a new plan loan with that level credit card utilization.

Figure 14
Percentage of Those With Unfunded Spending Spikes Who Took a New 401(k) Plan Loan or Increased Credit Card Debt in Year Two, by Credit Card Utilization in Year One



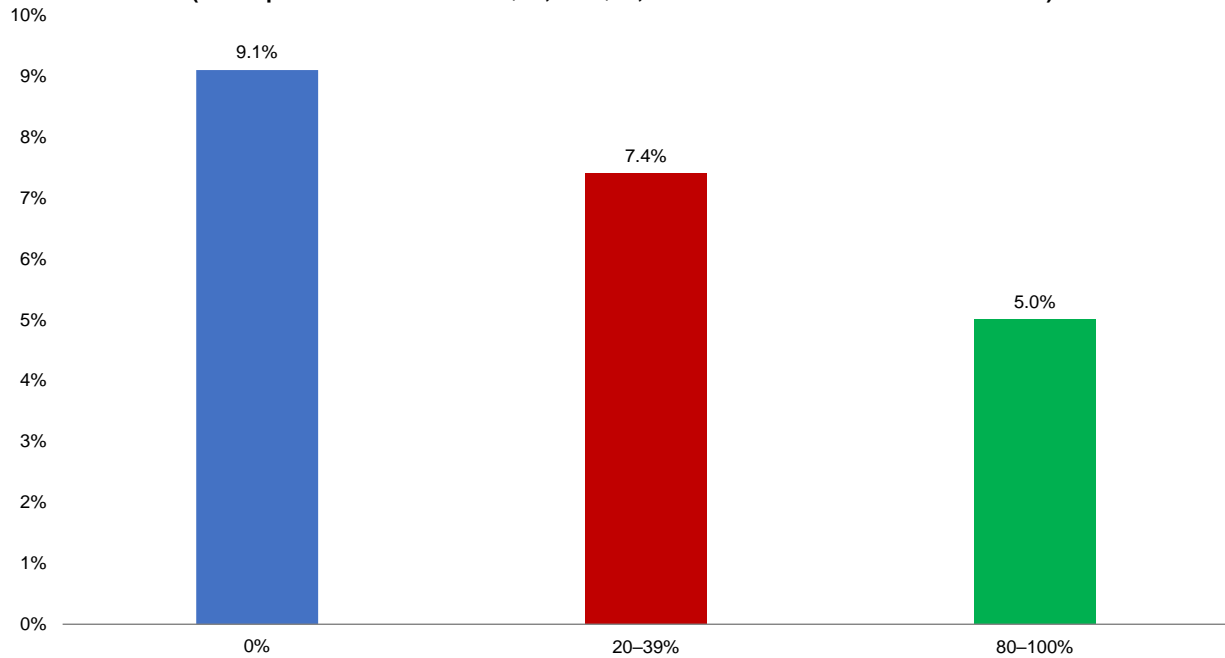
Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

However, when credit card utilization reaches 80 percent, the likelihood of increasing credit card debt decreases to 46 percent, while the increasing trend of taking a new plan loan goes up by 5 percentage points (19.5 percent to 24.5 percent) from credit card utilization of 60–79 percent to credit card utilization of 80–100 percent. No other increases in the likelihood of taking a new plan loan when credit card utilization increased went up by more than 3 percentage points.

In looking at the potentially long-lasting impact of credit card debt, higher credit card utilization is associated with lower contribution rates, even when controlling for tenure and income. For example, for participants with tenures of more than 15 years and incomes of \$75,000–\$99,999, the median employee contribution rate was 9.1 percent for those with credit card utilization of 0 percent, which decreases to 5.0 percent for those with credit card utilization of 80–100 percent (Figure 15). Correspondingly, the median account balance decreases from \$184,357 for those with credit card utilization of 0 percent to \$79,803 for those with credit card utilization of 80–100 percent for those with the same

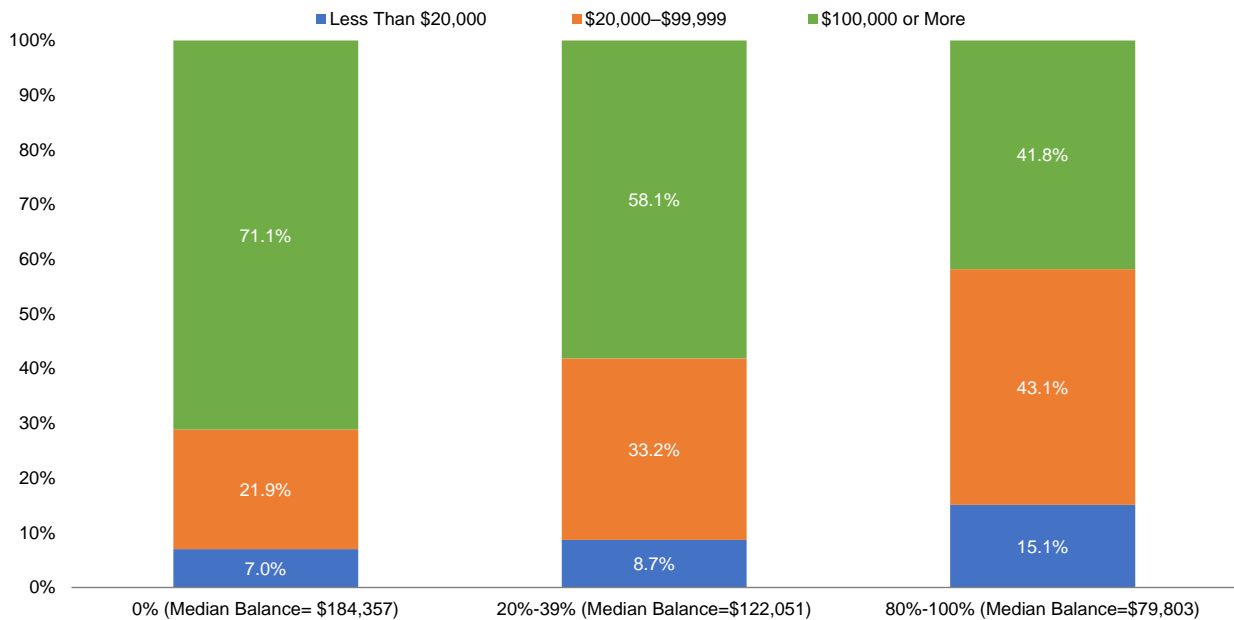
incomes and tenures (Figure 16). Furthermore, 71.1 percent of these participants with no revolving credit card debt had a balance of \$100,000 or more, compared with only 41.8 percent of those with credit card utilization of 80–100 percent.

Figure 15
Median Contribution Rates, by Credit Card Utilization in Year One
 (Participants With Incomes of \$75,000–\$99,999 and Tenure of More Than 15 Years)



Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Figure 16
Distribution of Account Balances, by Credit Card Utilization in Year One
 (Participants With Incomes of \$75,000–\$99,999 and Tenure of More Than 15 Years)



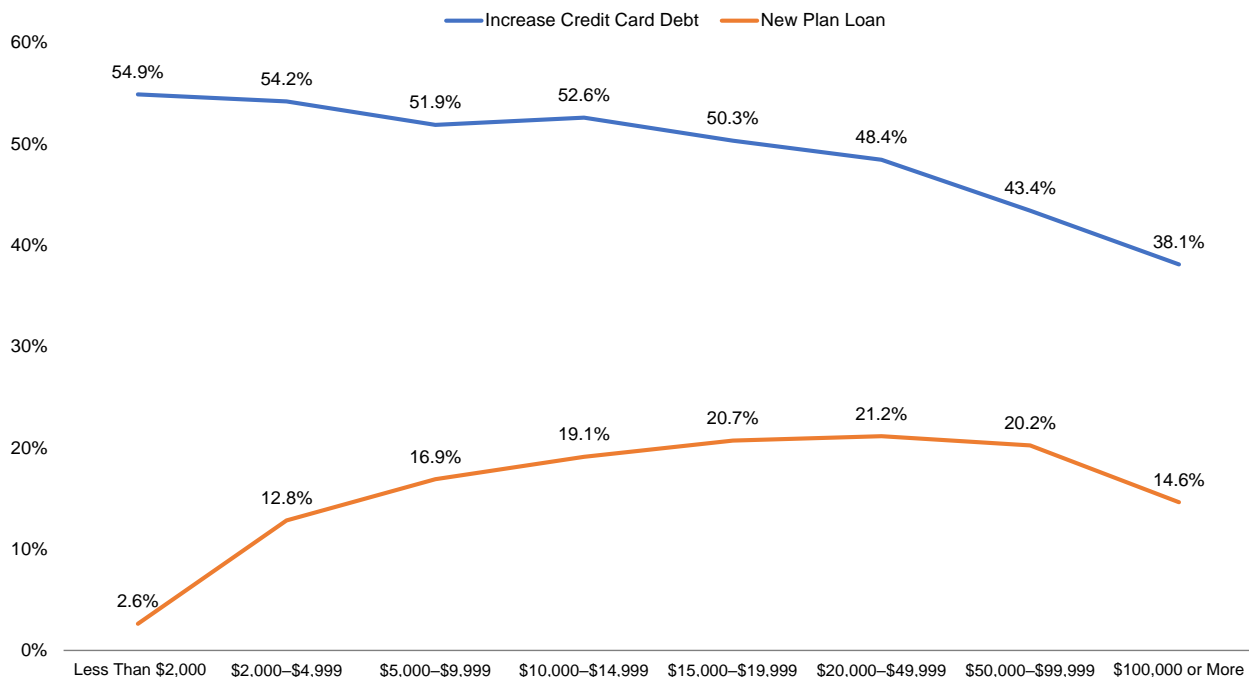
Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Account Balances and Plan Loans

The level of the account balance is also correlated with loan incidence and increases in credit card balances. As the account balance increases, the likelihood of increasing credit card debt decreases (Figure 17). Specifically, of those with 401(k) account balances of less than \$2,000, 54.9 percent increased their credit debt when a spike occurred. This declined to 48.4 percent for those with balances of \$20,000–\$49,999 and to 38.1 percent for those with balances of \$100,000 or more.

The probability of taking a plan loan increased sharply to 12.8 percent for participants with 401(k) account balances of \$2,000–\$4,999 from 2.6 percent for those with balances of less than \$2,000. The percentage taking loans increased to 21.2 percent for those with balances of \$20,000–\$49,999, before tapering off for account balances above that amount.

Figure 17
Percentage Who Increased Credit Card Debt or Took a New 401(k) Plan Loan
When a Spending Spike Occurred, by Account Balance



Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Probit Results on Factors Affecting the Probability of Taking a Plan Loan

In addition to a cross-sectional analysis, a probit regression can be used to see the impact of various factors on the probability of a participant taking a plan loan. This allows for all of the factors examined to be controlled for to see which ones have a statistically significant impact. Probit only allows for two options for the dependent variable, in this case taking a loan or not taking a loan. The probability of taking a new plan loan in year two is assumed to be a function of specific parameters within the 401(k) plan such as the account balance (a series of dummy variables for various balance thresholds), the age of the participant (a series of dummy variables for various age thresholds), gross income, the tenure of the participant with their current employer (a series of dummy variables for various tenure thresholds), and employee and employer contributions. Also, this analysis allows for the unique variables outside of the 401(k) plan to be tested as well, including the credit card utilization at the end of year one, the change in the revolving credit card balance from end of year one to end of year two, mortgage payments started in year two (=1 if a new

mortgage), the spending ratio in year two, and spike occurrence (=1 if the a spike occurred in year 2 (see Appendix Figures 2 and 3 for summary statistics, complete variable definitions, and probit results).

For the unique addition of the financial factors outside of the plan, the higher the credit card utilization, the more likely a new plan loan is taken as well as the higher the change in revolving credit card debt held from year one to year two.¹² Starting mortgage payments in year two is also positively associated with an increased likelihood of taking a plan loan. Furthermore, the occurrence of a spending spike in year two is positively associated with an increased likelihood of taking a plan loan. The spending ratio is positively associated with taking a loan but statistically insignificant. Consequently, the financial factors outside of what is known within the plan are important considerations in 401(k) plan participant decisions to take a plan loan.

Even with the additional factors, the variables within the plan generally follow the results from EBRI/ICI 401(k) plan cross-sectional studies.¹³ For account balance, the omitted category is \$5,000–\$9,999, so those with balances less than \$5,000 are less likely (negative coefficient) to take a loan than those with balances of \$5,000–\$9,999, while those with higher balances than that are more likely (positive coefficient) to take a loan. However, for balances of \$100,000 or more, the likelihood of taking a loan is not different (insignificant coefficient) from those with balances of \$5,000–\$9,999. Thus, a hump-shaped line would result based on the probability of taking a loan as the account balance increases.

A similar hump shape results for age, as those in their 20s are less likely to take a loan than those in their 30s, while those in their 40s and 50s are more likely to take a loan before falling back to the same level as those in their 30s for those in their 60s. For tenure, the likelihood increases with tenure through 10–19 years and then levels off for those with 20 or more years of tenure. As income increases, the likelihood of taking a loan decreases. Contributions are not significant at the 99 percent level.

Conclusion

Revolving consumer credit has grown at 9 percent per year during the study period from 2016–2020.¹⁴ In the 2023 Retirement Confidence Survey (RCS), almost two-thirds of workers said their debt is a problem and half of workers said debt is negatively impacting their ability to save for retirement.¹⁵ This study further validates this sentiment by looking at the relationship between spending spikes, credit card utilization, and 401(k) loan usage. The tight link between these variables suggests that retirement planning is part of a holistic financial planning journey. In fact, participating in a budget webinar is associated with higher 401(k) plan contributions.¹⁶ Programs to help with workers' overall finances — for example, financial wellbeing benefits — could be indispensable. The decision to take a plan loan is not just dependent on what happens in the plan but on the total financial profile of the participant.

Given the impact of participants' overall finances on the need for a plan loan, it appears clear that prohibiting plan loans would not necessarily improve participants' retirement security. Without the option of taking a plan loan, participants would seek loans outside the plan to fill spending gaps, and those loans may have terms more expensive than those of a plan loan.

This research found that the lack of income and cash reserves to support spending spikes is likely to result in higher credit card debt. This higher debt can have a long-lasting impact on retirement security, since higher credit card utilization is correlated with lower 401(k) plan contributions and account balances, even when controlling for tenure and income. Thus, the availability of emergency savings to cover spending spikes is a critical factor in preventing or stalling a cycle of increasing debt that can significantly impact retirement readiness.

DATA PRIVACY: JPMorgan Chase has a number of security protocols in place which are designed to ensure all customer data is kept confidential and secure. Reasonable physical, electronic and procedural safeguards are used that are designed to comply with federal standards to protect and limit access to personal information. There are several key controls and policies in place which are designed to ensure customer data is safe, secure, and anonymous: (1) Before J.P. Morgan Asset Management (JPMAM) receives the data, all selected data is highly aggregated and all unique identifiable information, including names, account numbers, addresses, dates of birth and Social Security numbers, is removed. (2) JPMAM has put privacy protocols in place for its researchers. Researchers are obligated to use the data solely for approved research and are obligated not to re-identify any individual represented in the data. (3) JPMAM does not allow the publication of any information about an individual or entity. Any data point included in any publication based on customer data may only reflect aggregate information. (4) The data is stored on a secure server and can be accessed only under strict security procedures. Researchers are not permitted to export the data outside of J.P. Morgan Chase’s (JPMC) systems. The system complies with all JPMC Information Technology Risk Management requirements for the monitoring and security of data. (5) JPMAM provides valuable insights to policymakers, businesses, and financial professionals, but these insights cannot come at the expense of consumer privacy. We take every precaution to ensure the confidence and security of our account holders’ private information.

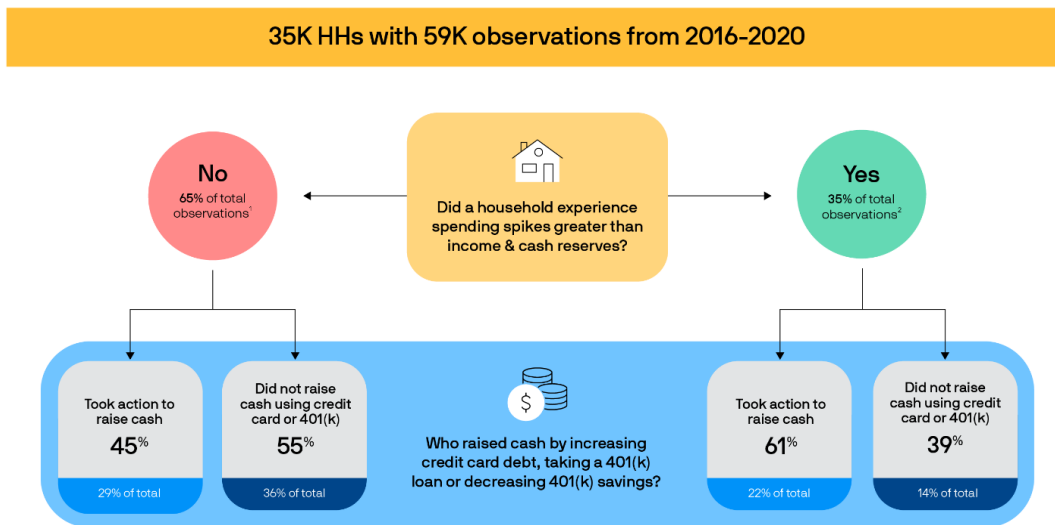
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Appendix

Appendix Figure 1
Longitudinal Data Sample and Segmentation

1 in 3 experienced at least one spending shock and most of them took action to raise cash



Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

¹Likely households include those who spend less than their income; spend consistently more than their income; experience <25% of the last 12 months' median.

²Likely households include those who increase spending by at least 25% at least one month in any given year.

Appendix Figure 2
SAS Output for Probit on Taking a New Plan Loan

Dependent Variable: New Plan Loan in Year Two

Number of Observations Used 58,659

Name of Distribution Normal

Log Likelihood -17487.85327

Analysis of Maximum Likelihood Parameter Estimates

Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-1.7622	0.0359	-1.8326	-1.6918	2407.93	<.0001
tbal20	1	-0.9559	0.0653	-1.0840	-0.8279	214.14	<.0001
tbal50	1	-0.2072	0.0369	-0.2795	-0.1349	31.56	<.0001
tbal200	1	0.1166	0.0285	0.0607	0.1724	16.71	<.0001
tbal500	1	0.1574	0.0273	0.1040	0.2108	33.34	<.0001
tbal1000	1	0.1533	0.0305	0.0936	0.2130	25.30	<.0001
tbal5000	1	0.0275	0.0327	-0.0366	0.0916	0.71	0.4001
agrsinc2	1	-0.0138	0.0019	-0.0175	-0.0101	53.36	<.0001
age20	1	-0.1168	0.0292	-0.1741	-0.0595	15.97	<.0001
age40	1	0.1000	0.0199	0.0610	0.1391	25.18	<.0001
age50	1	0.0997	0.0213	0.0579	0.1415	21.90	<.0001
age60	1	-0.0742	0.0318	-0.1365	-0.0118	5.43	0.0197
ten2	1	-0.1041	0.0227	-0.1485	-0.0597	21.10	<.0001
ten5	1	-0.1502	0.0251	-0.1995	-0.1010	35.78	<.0001
ten10	1	0.0715	0.0235	0.0255	0.1175	9.27	0.0023
ten20	1	0.0742	0.0300	0.0154	0.1330	6.11	0.0134
AECT1	1	0.0015	0.0007	0.0002	0.0029	4.88	0.0272
AERCT1	1	-0.0058	0.0022	-0.0101	-0.0014	6.60	0.0102
ccrat1	1	0.6943	0.0201	0.6549	0.7338	1189.68	<.0001
accdelta2	1	0.0109	0.0019	0.0072	0.0145	33.21	<.0001
NMRTG2	1	0.1688	0.0332	0.1037	0.2339	25.83	<.0001
spndrat2	1	0.0220	0.0090	0.0044	0.0396	6.02	0.0142
shck2	1	0.4640	0.0156	0.4335	0.4945	888.75	<.0001

There are three groups of dummy variables to account for the impact of the nonlinear correlation between them and taking a new plan loan: account balance, age, and tenure.

Account Balance: tbal20 — less than \$2,000, tbal50 — \$2,000–\$4,999, tbal200 — \$10,000–\$19,999, tbal500 — \$20,000–\$49,999, tbal1000 — \$50,000–\$99,999, and tbal5000 — \$100,000 or more (omitted category — \$5,000–\$9,999).

Age: age20 — ages less than 30, age40 — 40–49, age50 — 50–59, and age60 — 60 or older (omitted category — ages 30–39).

Tenure: ten2 — less than 2 years, ten5 — 2 to less than 5 years, ten10 — 10 to less than 20 years, ten20 — 20 or more years (omitted category — 5 to less than 10 years).

agrinc2: gross income in year two in \$10,000s.

AECT1: employee contributions in year one in \$1,000s.

AERCT1: employer contributions in year one in \$1,000s.

ccrat1: revolving credit card debt to card credit limit ratio in year one.

accdelta: change in revolving credit card debt from end of year one to end of year two in \$1,000s (positive value is an increase in outstanding debt).

NMRTG2: dummy variable =1 if mortgage payments first occurred in year two (no mortgage payments in year one).

spndrat2: total spending to total net income ratio in year two.

shck2: dummy variable =1 if a spending spike occurred during year two.

A variable with a Pr > t of greater than 0.0100 is not considered to have a significant effect at the 99% level.

**Appendix Figure 3
Summary Statistics**

Variable	Median	Mean
Age2	43.0	43.4
Tenv2	4.4	7.7
agsinc2	\$5.722	\$7.123
tbal2	\$30,663	\$84,407
AEECT1	\$2.838	\$5.392
AERCT1	\$1.075	\$2.186
ccrat1	20.7%	35.9%
accdelta2	\$0.000	\$0.242
NMRTG2		4.6%
spndrat2	1.07	1.23
shck2		35.1%

Source: Estimates from the EBRI/ICI 401(k) Plan Database and select Chase data. For more information, see the Data Sources box in the text.

Endnotes

¹ For example, see Holden, Sarah, and Jack VanDerhei, "Contribution Behavior of 401(k) Plan Participants." *EBRI Issue Brief no. 238* (October 2001). Available at [https://www.ebri.org/publications/research-publications/issue-briefs/content/full/contribution-behavior-of-401\(k\)-plan-participants-154](https://www.ebri.org/publications/research-publications/issue-briefs/content/full/contribution-behavior-of-401(k)-plan-participants-154); Munnell, Alicia H., Annika Sundén, and Catherine Taylor, "What Determines 401(k) Participation and Contributions?" CRR Working Paper, no. 2000-12. Chestnut Hill, MA: Center for Retirement Research at Boston College, December 2000. Available at https://crr.bc.edu/wp-content/uploads/2000/12/wp_2000-12.pdf; and US General Accounting Office, "401(k) Pension Plans: Loan Provisions Enhance Participation but May Affect Income Security for Some." *Letter Report*, GAO/HEHS-98-5 (October 1997). Washington, DC: US General Accounting Office. Available at www.gao.gov/assets/hehs-98-5.pdf.

² For the most recent results, see Holden, Sarah, Steven Bass, and Craig Copeland, "401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2020," *EBRI Issue Brief*, no. 576, and *ICI Research Perspective*, vol. 28, no. 11 (November 2022).

³ For more information on the EBRI/ICI 401(k) Plan Database and the findings from the database see Holden, Sarah, Steven Bass, and Craig Copeland, "401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2020," *EBRI Issue Brief* no. 576, and *ICI Research Perspective*, vol. 28, no. 11 (November 2022).

⁴ See Lucas, Lori, Jack VanDerhei, Kelly Hahn, Je Oh, and Livia Salonen, "The 3% Difference: What Leads to Higher Retirement Spending?" Employee Benefit Research Institute & J.P. Morgan Asset Management Research Collaboration available at <https://am.jpmorgan.com/us/en/asset-management/adv/insights/retirement-insights/the-3-difference-what-leads-to-higher-retirement-savings-rates/> and VanDerhei, Jack, and Kelly Hahn, "In Data There Is Truth: Understanding How Households Actually Support Spending in Retirement," *EBRI Issue Brief*, no. 531 (Employee Benefit Research Institute, June 24, 2021) for more information about the EBRI/JPMorgan Asset Management research collaboration.

⁵ Data privacy of customers and contractual relationships with recordkeepers have been carefully protected, and no data was transferred to JPMorgan Asset Management. EBRI has no access to personally identifiable information.

⁶ See the Appendix in VanDerhei, Jack, and Kelly Hahn, "In Data There Is Truth: Understanding How Households Actually Support Spending in Retirement," *EBRI Issue Brief*, no. 531 (Employee Benefit Research Institute, June 24, 2021) for an example schematic of how the overlap of the Chase data with data from an EBRI database is determined.

⁷ In future research, the cause of the spike will be examined to see if the effects are different depending on the cause of the spike.

⁸ The \$150,000 income threshold is the limit set for participants to partake in the tax-preferred, in-plan emergency savings vehicle under SECURE 2.0, and \$2,500 is the maximum they can have saved in the account.

⁹ This would be expected since the threshold for the spikes was 25 percent, so meeting that requirement for higher-income households would result in much higher spike amounts than for those with lower incomes.

¹⁰ These participants were not likely to both increase credit card debt and take a new plan loan in the analysis year, as only 7.9 percent of those with spikes and 2.7 percent of those without spikes did both.

¹¹ The contribution data in the 401(k) plan database is in dollar amounts, not the percentage of income, and income is not available for most of the 401(k) participants. Thus, any participants who had unstable incomes, such as from reduced overtime or smaller bonuses if those were part of covered compensation, would have had a decrease in the dollar amount of contributions but would not necessarily have had a decrease in the percentage of income contributed. The dollar amounts are also net of any recharacterizations from the prior year due to discrimination testing. As a result, the decreases in contributions are not all the result of an action by the participant.

¹² In a different specification using a simple ordinary least squares (OLS) regression of the same variables, a spike occurrence and an increase in outstanding credit card debt are also strongly associated with increases in the likelihood of taking a loan.

¹³ For example, see Holden, Sarah, Steven Bass, and Craig Copeland, "401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2020," *EBRI Issue Brief*, no. 576, and *ICI Research Perspective*, vol. 28, no. 11 (November 2022).

¹⁴ Board of Governors of the Federal Reserve System, *Consumer Credit G.19*, <https://www.federalreserve.gov/releases/g19/current/default.htm>.

¹⁵ Employee Benefit Research Institute and Greenwald Research, 2023 Retirement Confidence Survey, EBRI Chartbook (Employee Benefit Research Institute, April 27, 2023).

¹⁶ "Field of Dreams? Measuring the Impact of Financial Wellbeing Initiatives on 401(k) Plan Utilization," *EBRI Issue Brief*, no. 554 (Employee Benefit Research Institute, March 10, 2022).