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In case of emergency, break glass: Managing household liquidity

Saving for an emergency helps support financial wellness and can be just as important as investing for long-term goals. A common rule of thumb suggests that households should have three to six months' worth of expenses set aside for a rainy day. In this paper, we'll explore a more nuanced view of emergency savings and household liquidity. By understanding what we're saving for when we talk about emergencies, we can determine what level of savings is appropriate and how maintaining adequate cash and liquidity reserves fits into a broader financial plan to save for long-term goals. For the purposes of this paper, we define liquidity as the ability to convert an investment into cash quickly and cheaply, and we define emergency savings as a combination of cash and liquidity. Three key points to consider when saving for emergencies:

Understand the types of financial shocks

Not all emergencies are alike. Spending shocks can include unexpected health care costs, home repairs, or other unwelcome expenses. Income shocks, on the other hand, involve the unexpected loss or reduction of employment income. Planning for both types of shocks is important and requires different strategies.

Assess your risks and define your savings targets

While all shocks are unpredictable, spending shocks are more likely to occur as a matter of course while income shocks are generally expected to be less frequent. Evaluating your risks and setting aside an appropriate amount of savings in readily accessible accounts can help mitigate the potential harm of unanticipated expenses and help you avoid expensive emergency financing while offering peace of mind.

Balance emergency savings with your other goals

Holding too much in cash can be a drag on a portfolio's ability to meet long-term financial goals. Choosing whether to save for retirement or build up a contingency fund can be challenging. Strategic planning and creative use of flexible account types can help investors maximize investment opportunities while maintaining a prudent level of liquidity.

Understand the types of financial shocks

Building and maintaining appropriate reserves of cash and liquidity is an exercise in self-insurance. As with any form of insurance, it's important to understand what you're protecting against and why. While the specifics will be different for each person or household, we can broadly place financial shocks into two categories: spending shocks and income shocks. For more information on how emergency savings fit into a holistic financial picture, see *Vanguard's Guide to Financial Wellness* (Costa and Felton, 2022).

Spending shocks

Spending shocks encompass a wide range of expenses that share two defining characteristics: They are unplanned, and they are unwanted. A spending shock could be anything from a broken air conditioner to a chipped windshield to a toothache that requires a root canal.

Survey data give us some insight into spending shocks. A Pew Charitable Trusts study (2015) showed that households across the income spectrum are susceptible to spending shocks, with households reporting a 60% likelihood of experiencing such a shock over any 12-month period. The typical shock represented around half a month's worth of household expenses across income groups, and the median expense for a shock for those surveyed was about $2,000.

Perhaps not coincidentally, one commonly cited measure of financial fragility is whether a household could come up with an additional $2,000 in a month if necessary. The National Financial Capability Survey found that in 2021, 57% of working-age American respondents were other than certain that they could meet such a challenge (Lin et al., 2022).

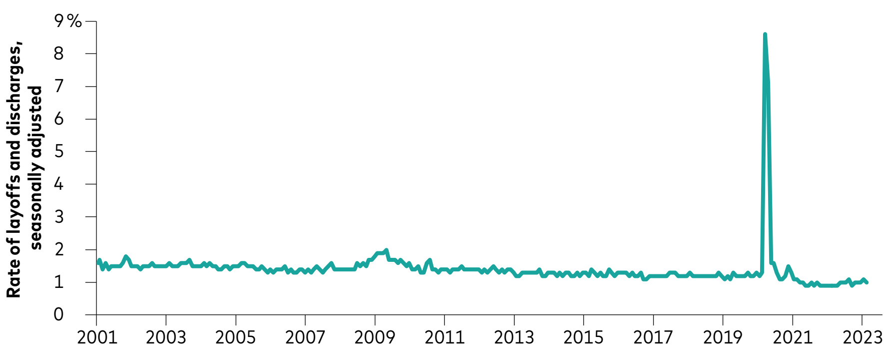
The aftereffects of these shocks can be significant: Pew also found that households that experienced such a shock typically reported liquid savings of almost $4,000 less than respondents who had not experienced a shock in the past year. That decrease in wealth was almost twice the expense of the median shock ($2,000) and suggests that the costs of emergency financing (such as having to rely on credit cards) may add to the challenge of recovery, emphasizing the importance of having savings in place.

Income shocks

An income shock, such as an unexpected job loss or other reduction in income, is less likely to occur than a spending shock for most households but can have more severe financial consequences. Data from the Bureau of Labor Statistics show that the rate of layoffs and discharges is typically influenced by the broader economic environment and generally fluctuates between 1% and 2% per month, as shown in **Figure 1**. COVID-19 brought about a brief but significant spike in layoffs and discharges in 2020.

FIGURE 1

Rate of layoffs and discharges



Source: U.S. Bureau of Labor Statistics, Layoffs and Discharges: Total Nonfarm, retrieved from FRED, Federal Reserve Bank of St. Louis; available at https://fred.stlouisfed.org/series/JTSLDR; data are as of April 4, 2023.

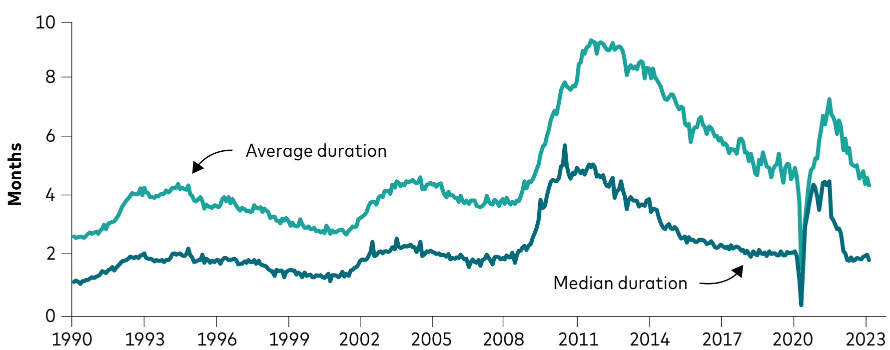
Duration of unemployment is also sensitive to macroeconomic factors. Over the last 30 years, the median unemployment duration has dipped to as low as one month and spiked to as long as six months, as in the aftermath of the 2008 global financial crisis (**Figure 2**). The goal of a well-planned emergency fund is to turn potential crises into manageable setbacks. Workers who were laid off or furloughed during the pandemic reported increased difficulty in covering expenses and bills, resulting in higher rates of hardship withdrawals from retirement accounts, late mortgage payments, and overdrawn checking accounts (Lin et al., 2022). Each of these things can negatively impact the ability to achieve near-team and long-term investment success.

The goal of a well-planned emergency fund is to turn potential crises into manageable setbacks.

Building a financial cushion and having a plan to deal with unfortunate events can bring a sense of calm in a fraught situation and allow those affected to chart a way forward. To that end, those who have emergency savings tend to report having higher financial well-being, or feelings regarding their financial standing, compared with those who do not. Meanwhile, those with no emergency savings tend to more likely to report that finances control their life (Ratcliffe et al., 2022). Appropriately managing the risks of unforeseen circumstances can provide the freedom to invest with a higher risk-return trade-off to build wealth for longer-term goals.

FIGURE 2

Duration of unemployment



Source: U.S. Bureau of Labor Statistics, Median Duration of Unemployment and Average (Mean) Duration of Unemployment, retrieved from FRED, Federal Reserve Bank of St. Louis; available at https://fred.stlouisfed.org/series/UEMPMED and https://fred.stlouisfed.org/series/UEMPMEAN; data are as of April 4, 2023.

Safety versus liquidity

While spending shocks are a semifrequent, inevitable fact of life, income shocks are generally rarer and, for some, may never occur at all. Each individual's approach to managing these risks should account for these differences. The risk of a spending shock should be managed by maintaining a surplus balance of cash or safe, liquid cash equivalents. This may be done through a savings or checking account, a money market mutual fund in a brokerage account, or a combination of sources.

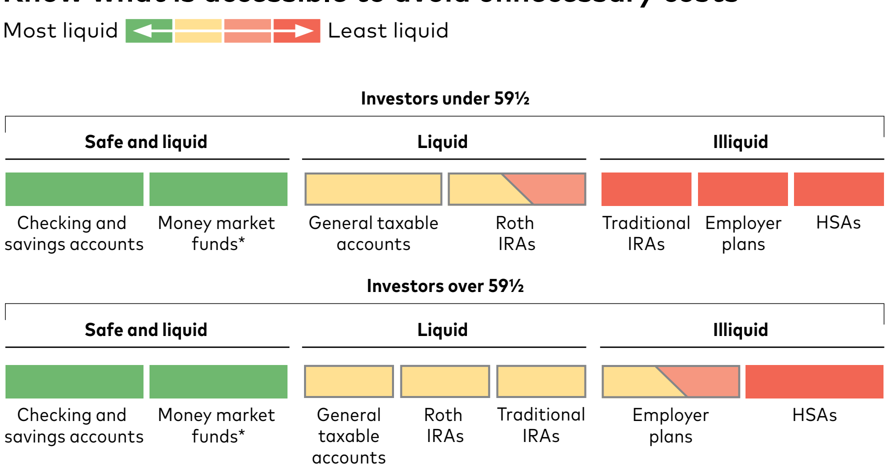
While spending shocks are a semifrequent, inevitable fact of life, income shocks are generally rarer.

In case of income shocks, assets need to be liquid, or accessible at a minimal cost, but not necessarily free from market risks. While some investors who are uniquely exposed to income shocks may choose to have cash set aside, for most investors it is useful to rely on accessible assets invested as appropriate for other long-term financial goals. The accessibility of these assets will vary based on account type and investor demographics, notably age. If tapping distributions from certain accounts for an emergency would trigger high opportunity costs in the form of taxes and penalties that otherwise wouldn't apply, those accounts should not be considered liquid for emergency savings purposes.

Figure 3 shows how this distinction would look across common account types for investors on either side of 59½ years old—the age when qualified distributions are generally allowed for many retirement-focused account types.[1]

FIGURE 3

Know what is accessible to avoid unnecessary costs



***** When held in an accessible account type.

Notes: SECURE 2.0 Act of 2022 provisions may allow for nonpenalized withdrawals from IRAs or certain employer plans for emergency purposes, subject to certain limits, beginning in 2024. Investors under 59½ can access their Roth IRA contributions free of taxes and penalties, but any conversions or earnings may be subject to taxes and penalties. For investors over 59½, employer plan rules dictate one's ability to access funds.

Source: Vanguard.

1 Certain withdrawal exemptions may exist to avoid penalties prior to age 59½. See IRS Publications 590 and 969 as well as your employer plan rules for additional information.

Assess your risks and define your savings targets

Individual factors and consumption choices can also affect one's susceptibility to these events and the potential costs. When it comes to potential spending shocks, for example, the $2,000, or half a month of household expenses, derived from the Pew survey is a good starting point.

Practical savings applications
Many of those who do not have emergency savings acknowledge that they are not aware of how to begin saving (Ratcliffe et al., 2022). Automatically setting aside funds on a regular basis can be an effective way to start building and maintaining savings. Whether it be through direct deposits or automatic transfers, incremental progress can be made and a cushion can be established.

For example, say your target is $2,000 and you are starting from no savings. Putting away about $6 a day, or $42 a week, would have you meeting this target in about a year. Double the savings to $12 a day, or $84 a week, and you would be there in less than six months—or instead, halve the amount to $3 a day, or $21 a week, to hit the target in a little less than two years.

While achieving your target sooner is better, the best strategy is one that works for your budget and that you can stick to. Building momentum is important. Using windfalls, such as tax refunds, can also be an effective way to replenish savings. Be careful on relying too heavily on windfalls, however, as their potential frequency and magnitude may be uncertain.

Think about what spending shocks you may be prone to and understand how much cash you should set aside for potential emergencies.

Individual circumstances make a difference. Someone without health insurance could have substantially higher costs in a medical emergency than someone with robust health insurance coverage. An older, out-of-warranty car is more likely to need an expensive repair than a new lease still under warranty. Renting an apartment will typically come with fewer expensive surprises than owning a home, but the potential for rent to increase could affect one's savings target. Think about what spending shocks you may be prone to and understand how much cash you should set aside for potential emergencies.

Similarly, the risk, duration, and severity of the consequences of an unexpected job loss can vary by individual, as illustrated in **Figure 4**. While the rule of thumb—holding three to six months' worth of expenses—can be a reasonable starting point, it's useful to consider the following factors and how they might apply to your situation.

FIGURE 4

Many factors can affect liquidity needs

Factor	More liquidity needed	Less liquidity needed
Income	Single	Dual
Dependents	Yes	No
Income variability	More	Less
Spending flexibility	Low	High
Job security	Less	More
Job skills	Highly specialized	Generalized
Insurance	Less	More
Alternative financing	Low borrowing ability	Alternatives available
Portfolio composition	Exposed to market risks	Cash

Source: Vanguard.

Job security, skill transferability, and income variability

Some industries and positions are more prone to turnover than others; a tenured university professor is less likely to experience an unexpected loss of income than someone working in the service industry. Likewise, income can be less predictable for some professions. Bonuses, contract work, and sales commissions can fluctuate significantly from one period to the next.

Understanding the drivers of your income can also help determine your liquidity needs. Businesses driven by discretionary consumer spending are more prone to falter in a recession than those driven by other revenue sources. The risks here are not always obvious, however. Federal employment or contract jobs funded through federal grants might seem to be stable, but a 35-day partial government shutdown from December 2018 to January 2019 disrupted the income of hundreds of thousands of federal employees and contractors (Congressional Budget Office, 2019). Consider not only the potential for job loss, but also any underemployment periods or work slowdowns that may occur.

Skill transferability is another consideration. A line cook laid off from one restaurant may be able to find another job down the street. Some skills, however, are more specific to a particular industry, employer, or locale. Generally speaking, employees who are longer tenured and higher paid will take longer to find an equivalent position with a new employer.

The top factor influencing the length of unemployment may, unfortunately, be out of an employee's control. An analysis by FiveThirtyEight of data from the Current Population Survey demonstrated that the timing of losing a job amid poor economic circumstances dwarfed all other factors, such as level of education, industry, and demographic profile (Casselman, 2014). The unpredictable nature of this risk highlights the need to monitor your financial plan for adequate liquidity. Take control of what you can and have a plan in place.

Potential safety nets beyond your own savings should also be considered but done carefully. Some employers routinely offer severance pay in the event of a layoff. Unemployment compensation may be available for some workers as well. States administer unemployment-compensation programs, so it can help to understand how your state calculates benefits and eligibility rules, how long benefits could last, what waiting periods may apply, and any expected processing delays. For example, post-COVID data show that many states' processing and payment timeliness have not entirely returned to prepandemic speeds, which may warrant a higher savings target as individuals should expect to wait for applications to be approved and payments to be made.[2]

2 Based on data from the Department of Labor Employment and Training Administration through December 31, 2022.

Income and dependents

Single-earner households will generally require more liquidity than dual-earner households. The extent to which household income depends on a single source also should influence how much liquidity is needed, as should the number of dependents relying on the income source.

Spending flexibility

The mix of discretionary versus nondiscretionary expenses in your budget can be important in understanding emergency savings needs. Your willingness and ability to cut back on discretionary spending when an emergency arises should also be considered. If you want to maintain a desired level of consumption regardless of how much income is coming in, you will require a larger liquidity reserve.

Alternative financing

The availability of affordable financing can also affect your emergency savings plan, but it's important to be mindful of the risks that come with accessing credit in a crisis. Lines of credit may be lowered, withdrawn, or available only at less favorable interest rates. A 401(k) loan, for instance, will generally no longer be available in the event of a job loss, and any 401(k) loan outstanding at the time of a job loss will typically have to be repaid upon termination or separation to avoid taxes and penalties, which could potentially compound an already unfortunate situation.[3]

Portfolio composition

The likelihood of a job loss, the potential duration of unemployment, and falling portfolio values are all, unfortunately, positively correlated. So, if you rely on assets that are otherwise invested for long-term goals to become available in an emergency, you may find the value of those assets has declined when you need them. Therefore, your target for liquid, accessible assets should be higher compared with someone who is setting aside low-risk assets explicitly for insurance against this risk. For example, for a globally diversified portfolio of 60% stocks and 40% bonds, the worst 12-month decline during the global financial crisis was about –32%.[4] To compensate for a potential drawdown of this magnitude, someone with a savings target of $10,000 would need a total of $14,706 ($10,000 ÷ [1 – 0.32]) in accessible funds.

3 See plan documents for more information.

4 Based on Vanguard calculations, using total return data from the Bloomberg Barclays Global Aggregate Bond Index and the MSCI All World Index USD.

Past performance is not a guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

Balance emergency savings with your other goals

The first step in assessing emergency spending needs is understanding what you already have. Your first source for emergency savings will be anything held in cash accounts beyond your month-to-month cash-flow needs. Assess what you have, then look at your other accounts to understand what is accessible and what is not. This will depend somewhat on individual circumstances. Investors who are over age 59½, for example, will have penalty-free access to most of their retirement accounts, while younger investors could face penalties or other roadblocks.[5] For each account and asset, it can be useful to think through what the costs and consequences will be if assets have to be sold in an emergency. Costs could include taxes, penalties, and transaction fees, as well as the opportunity cost of spending from accounts that are supporting future financial goals.

Some accounts may be more flexible than they first appear. A Roth IRA, for example, while traditionally used for retirement, can also be an option for emergency savings. Contributions to a Roth IRA can be withdrawn without tax or penalty and, if the emergency you're saving for never arises, you'll enjoy tax-free growth and progress toward your long-term retirement goals. A Roth conversion strategy may be beneficial under certain circumstances, and converted assets are available without penalty once the five-year holding period has been satisfied (Wong and Dickson, 2022).[6]

Health savings accounts, or HSAs, are another account type to consider. The tax benefits of contributing to HSAs are significant, and withdrawals can be made tax-free to cover unforeseen medical expenses (Kahler, Clarke, and Bruno, 2020).[7] Moreover, medical expenses that occur once an HSA has been opened can be reimbursed at any point in the future, even decades down the road. By paying your qualified medical expenses out of pocket and saving your receipts, you can build a store of value that is available to you at any point in the future, free of taxes and penalties.

Other account types are less flexible for emergencies. Employer-sponsored plans, such as 401(k) plans, may allow for loans but are only accessible for active participants. Withdrawals from these accounts may also be possible in the event of a hardship, but taxes and penalties will generally still apply. **Figure 5**, on page 12, provides an overview of various account types and their relative suitability for emergency savings purposes.

5 Exceptions may allow for withdrawals that avoid taxes or penalties prior to age 59½. See IRS Publication 590 and plan rules for additional information.

6 A separate five-year rule applies for each year a conversion is made. See IRS Publication 590 for additional information.

7 For individuals under age 65, nonqualified HSA distributions are subject to income taxes and a 20% penalty.

SECURE 2.0's emergency savings provisions

Beginning in 2024, two new provisions in the SECURE 2.0 Act of 2022 related to emergency savings could help mitigate taxes and penalties due for an untimely distribution.

First, up to $1,000 may be distributed from an IRA or employer plan such as a 401(k), 403(b), or 457(b) for an emergency expense. This amount can only be taken once every three calendar years unless fully repaid (or less if not entirely repaid). It is likely still a better option for individuals to first access cash in accessible accounts, if available, as any retirement distributions will no longer be invested and will miss out on time in the market, especially if they are never repaid.

Second, an employer plan may offer or even auto-enroll participants in Roth deferrals up to $2,500 (or a lesser amount specified by the plan) to be invested in a cash or cash-like product for emergency purposes. Often, these deferrals are also eligible for employer matching. The deferrals then can be accessed at least once per month to be used on potential emergency spending needs, or more frequently if plan rules allow.[8]

Distributions under either option would be exempt from penalties. Income taxes may still be due from deductible distributions or Roth earnings, depending on the specific situation.

Be sure to consider your emergency savings in the context of a broader financial plan.

Be sure to consider your emergency savings in the context of a broader financial plan. For those struggling with credit card or other high-interest debt, it's essential to get this under control first—remember, the primary benefit of having an emergency reserve is to avoid expensive financing in the first place. Building up a cash reserve while credit card debt compounds is counterproductive. Focus on eliminating high-cost debt before building an emergency fund.

Once cash has been set aside to safeguard against the risk of a spending shock, your focus can turn to building liquidity to protect against an income shock. For most investors, the risk of an unexpected job loss is minimal and saving for this can be balanced against other financial priorities. If an employer matches 401(k) contributions, employees should prioritize contributing enough to get the full match whenever possible. Once you're contributing enough to get the full match, consider a Roth IRA, if you're eligible, for additional savings.[9] This will allow you to continue to save for retirement while also building a flexible reserve of liquid savings.

8 Highly compensated employees are ineligible. Consult your plan sponsor for additional information.

9 For 2023, the eligibility to contribute to a Roth IRA begins to phase out at a modified adjusted gross income of $138,000 for single filers and $218,000 for spouses filing jointly, and ends at $153,000 and $228,000, respectively.

FIGURE 5

Use account types flexibly to meet emergency savings needs

Account type	Spending shocks	Income shocks	Considerations	
			Pros	**Cons**
Checking and savings accounts	Best	Caution	• Quick access when needed • No market risk	• Cash drag if savings are for a low-probability event
Taxable brokerage account	Good	Best	• Flexible investment options • Generally, can access funds quickly	• Income and dividends are taxed each year and capital gains taxes may be due when positions are sold
Roth IRA	Caution	Good	• Flexible investment options • Contributions can be withdrawn free of taxes and penalties*	• Earnings withdrawn prior to age 59½ are generally subject to taxes and penalties** • Assets withdrawn for an emergency cannot be placed back into the account***
Traditional IRA	Caution	Caution	• Flexible investment options • Potential for tax deductions subject to income limitations	• Distributions always subject to taxes • Penalties generally on distributions prior to age 59½ • Assets withdrawn for an emergency cannot be placed back into the account***
Employer plan	Caution	Poor	• Loans and hardship withdrawals may be available, subject to plan rules	• Nonqualified withdrawals subject to taxes and penalties • Outstanding loan amounts may become due upon separation from service; otherwise, taxes and penalties apply • Distributions subject to plan rules and may not be allowed while in service
HSA	Caution	Poor	• Tax-free withdrawals for qualified medical expenses • Ability to reimburse qualified expenses later	• Nonqualified withdrawals subject to income taxes and 20% penalty prior to age 65; see IRS Publication 969 for additional information

* Roth conversions are subject to a holding period of five calendar years to avoid potential taxes and penalties. See IRS Publication 590 for additional information.

** Exceptions may apply. See IRS Publication 590 for additional information.

*** An exception applies for indirect rollovers performed within 60 days, allowed once per rolling 365-day period. Beginning in 2024, SECURE 2.0 Act of 2022 provisions may also allow for up to $1,000 to be replaced if used for an emergency need. See IRS Publication 590 for additional information.

Some accounts may be more flexible than they first appear.

Case study

Riley is 22, just got a job, and wants to start building her emergency savings. Riley expects to make $60,000 a year and to spend $42,000 on expenses. She has some federal student loans, but the interest rates are favorable and do not warrant prioritization. After considering her risks, she decides that her total liquidity target should be $14,000, equal to four months of expenses, with $2,000, or just over half a month's expenses, safely in cash for spending shocks. She also wants to start saving for retirement. Her employer offers a 401(k) plan and will match 100% of her contributions up to 5% of her salary.

After taxes and expenses, Riley estimates that she can save a total of $6,000 per year toward financial goals, including building her emergency savings. She considers three approaches, as shown in **Figure 6**.

FIGURE 6

Three approaches to saving for financial goals

Notes: Portfolio expectations are based on a targeted 60% stock and 40% bond allocation held constant and the 10-year VCMM asset class forecasts as of December 31, 2022. Cash is assumed to have no return. Contributions are assumed to be at the end of each year. For more information about the VCMM, see the Appendix, on page 17.

Source: Vanguard.

IMPORTANT: The projections and other information generated by the VCMM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from the VCMM are derived from 10,000 simulations for each modeled asset class. Simulations are as of December 31, 2022. Results from the model may vary with each use and over time.

In **Approach 1**, Riley sets aside $2,000 in cash for spending shocks. She also decides to prioritize the employer 401(k) match, setting aside $3,000 each year, before contributing to the Roth IRA ($1,000 in year 1, then $3,000 each year thereafter). This approach balances meeting the liquid savings goal sooner with maximizing the employer 401(k) match. While it takes five years to reach the liquid savings target, this approach yields the highest 10-year expected median total wealth, at $117,716.

In **Approach 2**, Riley sets aside $2,000 in cash for spending shocks, as in Approach 1, but in this scenario she prioritizes Roth IRA contributions ($4,000 in year 1, $6,000 in year 2, and $3,000 each year thereafter) before meeting the employer 401(k) match ($3,000 starting in year 3). This approach prioritizes meeting her liquid savings goal and building her Roth IRA before meeting the full employer match. While the liquid target is reached within three years, the 10-year expected median total wealth is $107,824, nearly $10,000 lower than Approach 1.

In **Approach 3**, Riley focuses on saving cash until reaching the liquid asset target of $14,000, setting aside $6,000 in years 1 and 2 and $2,000 in year 3. After meeting that target, she contributes to her 401(k) plan to get the employer match ($3,000 starting in year 3) and contributes to her Roth IRA ($1,000 in year 3, then $3,000 each year). This approach prioritizes using only cash to reach the liquid savings goal, then meeting the employer match, followed by Roth IRA contributions. Due to focusing on the emergency savings target first and using only cash to do so, the 10-year expected median total wealth is the lowest of the three approaches, at $100,419.

Which approach is best? From an expected ending wealth prospective, Approach 1 wins, with about $17,000 higher median expected ending wealth over 10 years compared with Approach 3 and nearly $10,000 more compared with Approach 2. While Approach 1 takes about five years to reach the emergency savings target, compared to three years with Approaches 2 and 3, meeting the employer match early on offers the greatest potential for increasing long-term wealth. Deviating from Approach 1 could be considered if an individual's goals are otherwise on target despite the lower expected returns for other options, or if there is a significant need for additional safety or liquidity.

Conclusion

Planning for the unexpected can turn a potential crisis into a manageable setback. Everyone's financial picture is unique, so it's important to think through the potential risks you're exposed to and develop strategies that mitigate them while balancing financial priorities.

Spending shocks are a fact of life. Maintaining an appropriate cash reserve for them should be a top priority for all investors. It's prudent to have at least half a month to a month's worth of expenses in cash beyond what's needed for typical monthly expenditures.

Income shocks are less likely but can cause severe financial disruption. Take advantage of the flexibility afforded by certain account types, such as Roth IRAs, and understand how saving toward future goals can also help meet potential liquidity needs. Be sure to balance these needs with long-term goals, as doing so will allow for the best chance to improve future outcomes.

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Appendix

About the Vanguard Capital Markets Model®

IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model (VCMM) regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time. VCMM results presented are as of December 31, 2022.

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based. The simulations of market returns assume an investor invests 60% of their equity sub-asset allocation to U.S. equities and 40% to non-U.S. equities. For bonds, the simulations assume sub-asset allocations of 70% to U.S. bonds and 30% to non-U.S. bonds.

The VCMM is a proprietary financial simulation tool developed and maintained by Vanguard's Investment Strategy Group. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the VCMM is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta).

At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several simulation horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

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