

# A framework for allocating to cash: Risk, horizon, and funding level

- There is a clear need for cash in financial planning, but from a portfolio construction perspective, the need for cash depends on the investor's circumstances and mindset. While most investors will find that their objectives are better met without cash in their portfolio, others—especially very conservative investors—may find comfort with some cash allocation. This paper explores the distinct characteristics of cash and its uses in a portfolio.
- We present a comprehensive, easy-to-follow framework for considering the role cash might play in an investor's portfolio. The framework looks at how each of three fundamental factors—risk tolerance, investment horizon, and funding level—can drive this strategic asset allocation decision when considered in the context of specific investment goals.
- Although holding cash can provide a sense of security, that can come at the cost of underperformance and failure to achieve long-term financial goals. We quantify the cost of holding excess cash and recommend investors holistically evaluate their financial situation, and the impact that a cash allocation might have on their ability to reach their goals, before deciding what, if any, allocation to make to this asset class.

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## Introduction

All investors need *some* cash. The key questions are: How much cash should a particular investor hold, and where should they hold it?

Investors use cash regularly for their daily needs, and they also benefit from the feeling of security afforded by having a cash cushion. A Pew Charitable trust study (2015) found that more than half of U.S. households experience at least one financial shock over any 12-month period. Emergency savings can be crucial in such situations.<sup>1</sup> In addition, some investors include cash in their portfolios as part of their strategic asset allocation: Vanguard's 2023 report *How America Saves*, for example, found that around 8% of assets within defined contribution plans were allocated to investments resembling cash securities.<sup>2</sup> While cash has a clear and appropriate role in financial planning, its role in strategic asset allocation is part of a more nuanced story.

This paper presents a framework for exploring the uses of cash and its role for investors.

To set up this framework, we must first ask: *What is cash?* Cash can take many forms, including physical currency, money held in bank accounts, and short-term financial instruments. For the purposes of this paper, we define "cash" as a readily available short-term financial instrument with high liquidity, minimal or negligible market risk, and a maturity period of less than three months.<sup>3</sup>

Investors are drawn to cash for many reasons—its low volatility, for example, or the investor's perception of it as wealth-preserving. But inclusion of cash is not always appropriate, and when it is not, its presence in a portfolio can reduce the chances of reaching long-term financial goals. This paper mainly considers the strategic inclusion of cash within an investment portfolio. This is an intricate topic, and one that requires a close look at several factors. To fully explore the role of cash, we need first to go back to the fundamentals of the asset class.

## Notes on risk

**IMPORTANT:** The projections and other information generated by the Vanguard Capital Markets Model® (VCMM) and the Vanguard Asset Allocation Model (VAAM) 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 for the VCMM are as of December 2022. Results will vary with each use and over time. Please see Appendixes 2 and 3 for additional information about the VCMM and the VAAM.

*All investing is subject to risk, including the possible loss of the money you invest. Past performance is no guarantee of future results. Diversification does not ensure a profit or protect against a loss. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income.*

<sup>1</sup> Felton (2023) explores Vanguard's approach to emergency savings.

<sup>2</sup> Asset-weighted calculation.

<sup>3</sup> Our definition of "a maturity period of less than three months" is consistent with GAAP accounting, Ibbotson's definition, and the assumption used in the VCMM. For more details about the VCMM, see Appendix 2.

## Fundamental cash considerations

Investors' objectives tend to align with one or more aspects of cash. This section captures three key aspects of cash: its return, its relation to inflation, and its level of volatility.

These concepts can be used as anchors when discussing the role of cash as it relates to both financial planning and strategic asset allocation.

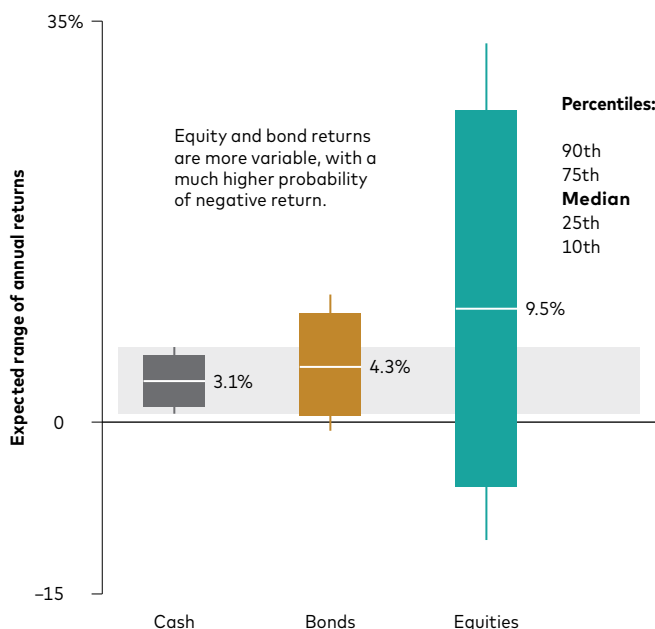
### Return—where cash sits on the risk-premium spectrum

At its most basic level, risk premium is simply the additional return that investors require to take on additional risk. Using Vanguard's proprietary return forecasting model, the Vanguard Capital Markets Model, we graphically represent the risk premium by showing three assets and how return and risk balance against each other (**Figure 1**).

As Figure 1 shows, while equities and bonds both have higher expected median returns than cash (exceeding them by 6.4% and 1.2% respectively), their returns are more variable, with a much higher probability of a negative outcome. This is because of the risks associated with bonds and equities that cash does not face, such as bonds' credit and interest rate risks or equities' factor or market risks. Investors demand a premium, or extra return, to compensate for taking on these extra risks. Historical data also confirm the existence of these premiums. From 1901 to 2022, global equities had an annual premium of about 6% over cash, while the average annual premium for bonds compared with cash was about 1.6%.

Similar to what we see in Figure 1, stocks and bonds had more volatile returns (17.5% and 11.3% standard deviation, respectively) compared to cash (4.5% standard deviation) for the same period.<sup>4</sup>

**FIGURE 1**  
**Risk and return for cash, bonds, and equities**



**Notes:** Returns shown are from the Vanguard Capital Markets Model (VCMM); one-year steady-state projections as of December 2022 were used. For more information about the VCMM, see Appendix 2. Equities are defined as 60% U.S./40% ex-U.S.; bonds, as 70% U.S./30% ex-U.S. Box-and-whiskers icons plot the 10th, 25th, 50th, 75th, and 90th percentiles of returns for each asset class. The light-gray horizontal bar behind the three icons represents the full provided range, from 90th percentile (top point of bar) to 10th (bottom point), of the expected returns for cash.

**Sources:** Vanguard calculations, using data from the VCMM.

<sup>4</sup> Historical results are calculated using the Dimson-Marsh-Stauton (DMS) Series 1901–2022, where cash return is the DMS Real World Bill, equity return is the DMS Real World Equity Total Return, and bond return is the DMS Real World Bond Total Return.

While the risk premium does not automatically mean better returns than cash, the longer an investor's time horizon, the more likely the investor is to capture the risk premium.

Taking the goal of retirement as an example, we note that this goal has two distinct phases: (1) accumulation and (2) decumulation with spending. The concept of risk premium plays a pivotal role in both phases and in different ways. During the accumulation period—especially in the early years—investors typically attempt to maximize their risk premium, since they want to capitalize on growth opportunity over a long time horizon. As investors approach retirement and begin to spend from their portfolio (decumulation phase), they may want to shift toward a less risky asset mix. However, even during the decumulation phase, capturing risk premium is important to support spending over a retirement that could last 30 years or more. While lower volatility can be valuable in the spending phase, given the need for stable spending without significant asset declines from market risk, this must be balanced against the longevity of the portfolio. This example highlights the importance of risk premium and the impact it has on reaching an investor's goals.

## **Wealth preservation—the impact of inflation on cash's return**

Inflation is a crucial factor to consider when evaluating investment opportunities because it erodes the real value of money, or its purchasing power, over time—and because this erosion becomes more detrimental as the investment horizon expands. For example, a \$1,000 investment that earns 2% per year during a period of 3% annualized inflation will be worth more than \$1,200 in 10 years. But in terms of purchasing power, that \$1,200 will be equal to just over \$900 of the originally invested money. Historically, a key shortcoming of cash has been that its limited ability to keep up with inflation means that it does not protect real wealth. For investors in the drawdown phase of their goal, whose expenses are increasing each year and whose accumulated assets may not be keeping pace with inflation, this is indeed a major shortcoming.

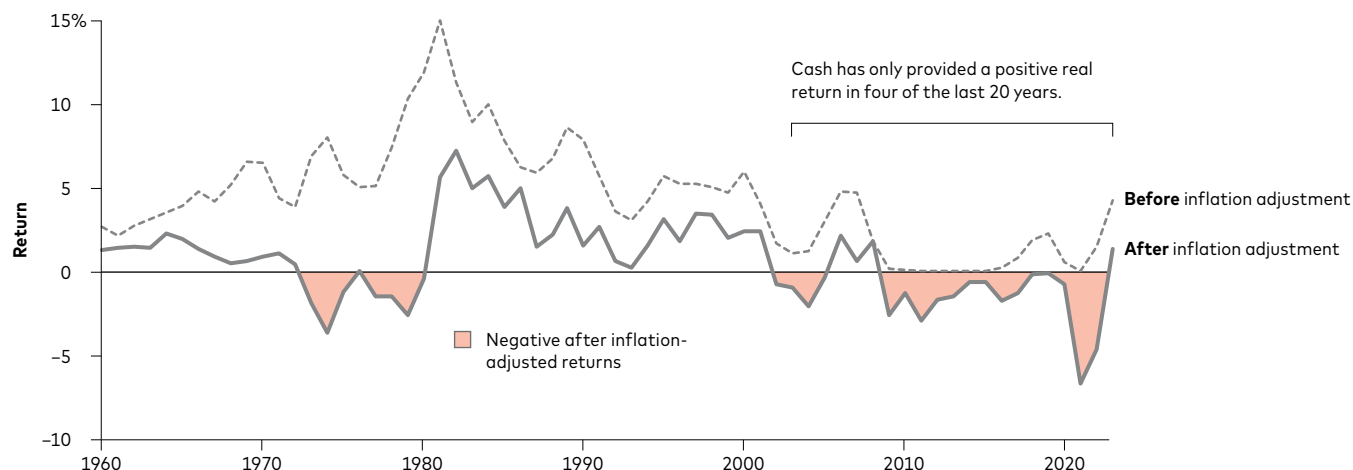
**Figure 2** shows the returns on cash going back to 1960. Both "nominal" (before inflation) and "real" (after inflation) returns are presented. As the chart shows, after taking inflation into account, cash provides a negative real return quite often and has only provided a positive real return in four out of the last 20 years.

From 1960 through 2022, in fact, cash produced an annualized real return of just 0.7%, compared with 6.3% for stocks and 2.0% for bonds. Put another way, cash has barely kept up with inflation, a fact that would seem to create a significant hurdle to including cash as part of a strategic asset allocation.

FIGURE 2

## Historically, cash's real return has tended to be negative

Cash return, before and after inflation, 1960–2022



**Notes:** For the years 1960–1977, cash is represented by the Ibbotson 1-Month T-Bill Index. For the years 1978–2022, cash is represented by the FTSE 3-Month T-Bill Index. Inflation is represented by the Consumer Price Index (Seasonally Adjusted) from St. Louis Federal Reserve Economic Data (FRED).

**Sources:** Vanguard calculations, based on data from FTSE and FRED.

**Past performance is no 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.**

### Don't forget taxes!

Another factor that impacts cash holdings? Taxes. Although almost all investments are taxed, taxes can have a bigger effect on cash than other types of investments because:

- 1 Unlike long-term capital gains, interest—which is where most of the total return of cash comes from—is generally taxed as ordinary income, which means that it's typically taxed at an investor's highest tax rate. This is why Vanguard believes it is usually preferable to shield higher taxed interest income in one's tax-advantaged account (Padmawar and Jacobs, 2022). Cash, however, is often held in taxable accounts, in which the interest earned is fully subject to taxation each year.
- 2 The relatively low returns for cash means that there is a smaller buffer between the inflation rate and the rate of return for cash compared to that of bonds or equities. Taxes are applied on the nominal return (which, assuming positive inflation, will be higher than the real return). Thus, taxes can take what would have been a small positive nominal return and turn it into a negative real one.

## "Safe haven"—cash's low volatility

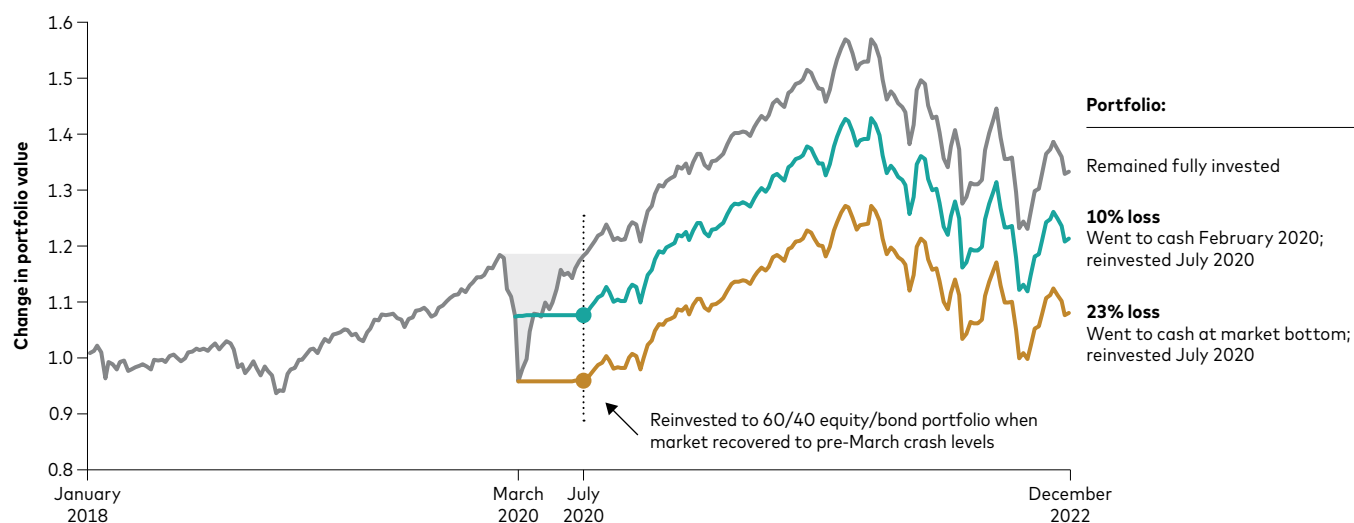
Many investors view cash as a safe haven because of its low volatility. However, looking at low volatility in isolation ignores other important considerations. While cash may appear to be a secure investment, maintaining an excess of cash and/or attempting to time the market can have a detrimental and permanent impact on an investor's financial outcomes. The most common misuse of cash as a safe haven is market timing. Staying invested through volatile times is one of the key investment principles for success identified by Vanguard research.<sup>5</sup> When attempting to use cash to time the market, an investor has two decisions to make: when to go to cash, and when to reenter the market. Luck or excellent foresight on both calls *could* mean the investor benefits, but getting either call wrong could have a negative material impact on the investor.

Figure 3 illustrates how going to cash for even just a few months can lead to significant long-term losses compared to staying invested. We show two examples of an investor leaving the market for cash in early 2020, hoping to preserve capital as they witness markets falling. As the figure shows, in both cases, the attempt to time the market could lead to a large and permanent impact on the investor's ability to reach their investment goals. In the end, both investors locked in a significant underperformance that could lead them to miss their long-term financial goals.

It is evident that missteps can occur when considering a cash investment. Failing to recognize and capture the risk premiums (where appropriate) of noncash assets, failing to keep pace with inflation, and taking risk off the table at the wrong time can all lead to worse outcomes. Therefore, we propose a framework to assist investors in considering cash for financial planning and strategic asset allocation.

FIGURE 3

### Going to cash for just a few months can lead to long-term losses



**Notes:** The 60% equity/40% bond portfolio shown in the figure is composed of a 40% allocation to the Bloomberg Global Aggregate Bond Index (USD Hedged), a 42% allocation to the MSCI U.S. Equity Index, and an 18% allocation to the MSCI ex-USA World Index. Cash is represented by the Bloomberg U.S. Treasury 1–3 Month U.S. Treasury Bill Index. Returns are in nominal terms. The lines of the chart trace portfolio results for the period from January 2018 through December 2022 for investors making one of three choices in 2020: staying in the original 60/40 allocation (gray line); going fully to cash the week of February 18, 2020, and returning to a 60/40 allocation the week of July 7, 2020 (blue line); or going fully to cash the week of March 20, 2020 (market bottom), and returning to a 60/40 allocation the week of July 7, 2020 (orange line). The change in portfolio value shown on the y-axis is based on a wealth multiplier, or a scaling factor of the initial investment where, for example, 1.3 = 30% growth.

**Sources:** Vanguard calculations, using data from Morningstar, Inc.

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<sup>5</sup> See Vanguard's *Principles for Investing Success* (2023).

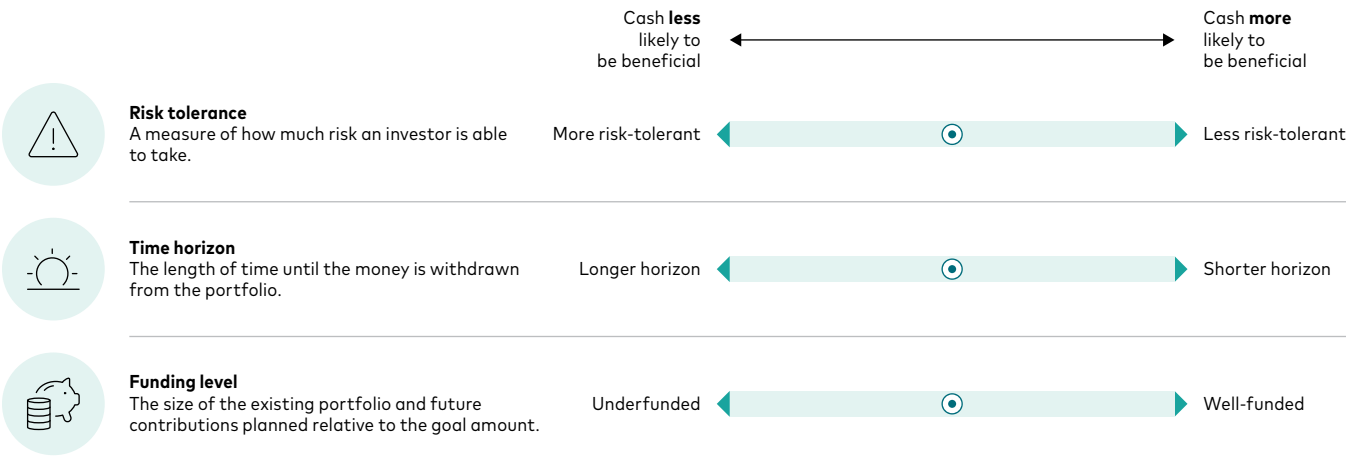
# The framework: Three pillars of cash investing

Including cash as an investment vehicle requires a well-informed framework that accounts for the dynamic relationship between cash, investment goals, and the various factors outlined earlier in this paper. **Figure 4** sets out our framework, which can be used to consider the role of cash for an investor and their goal(s). While the framework applies when making decisions around how much cash to hold in a portfolio, it also holds true when

thinking about cash from a financial-planning and practical perspective. We explain the individual components below.

For the sake of simplicity, we will explore the framework in the context of self-contained investment goals. While the framework does still apply when an investor has multiple goals, it can become more nuanced given the interaction among different goals. (See the callout box on page 13.)

**FIGURE 4**  
Three key pillars make up our framework for cash investing



Source: Vanguard.

**Risk tolerance**

According to Vanguard’s portfolio construction framework, an individual’s risk tolerance plays a significant role in determining their strategic asset allocation. Risk tolerance is a measure of how much market risk an investor is willing to take in their portfolio. It represents the level of market risk that an investor is comfortable taking based on their financial goals, time horizon, and psychological disposition. There is a strong link between risk tolerance and an investor’s ability to capture the risk premium. Investors with a higher

risk tolerance are more accepting of the inherent uncertainties associated with riskier assets and willing to accept higher risk for the hope of higher returns.

From a strategic asset allocation perspective, cash, moves the portfolio towards the more conservative end of the risk-reward spectrum. That is why, all else being equal, including cash in the portfolio will be more suitable for investors with a lower risk tolerance.

**Risk tolerance considerations**

In isolation, the term “risk tolerance” does not have a significant meaning. An investor’s risk tolerance should always be considered in combination with their investment goals.

**Financial planning goals**

While a given investor may have no strategic allocation to cash in their investment portfolio, that same investor will still likely want cash for their financial planning needs. They will need cash for ongoing transactions (such as groceries or mortgage payments), as well as in emergency savings where cash can help absorb spending shocks. It can also be important to preserve the accrued balance once a goal amount has been achieved. In such a situation, cash can play a significant role as a stabilizer, but the investor should aim to maximize yield while keeping risk under control.

**Investment goals**

The true relevance of risk tolerance emerges when the investor engages with a specific goal, such as a growth or wealth-preservation objective. An investor with a static level of risk tolerance will find that different goals can result in significantly different asset allocations including the amount of cash used. In a portfolio aimed at wealth preservation, cash might play a significant role, while a growth-oriented portfolio might see a reduced reliance on cash.

**FIGURE 5**  
**A matrix of investment goals and risk tolerance levels**

		Risk tolerance	
		High	Low
Investment goal	Wealth growth	Cash least likely to be recommended	Cash less likely to be recommended
	Wealth preservation	Cash less likely to be recommended	Cash more likely to be recommended

**Note:** The shades of blue in the matrix’s cells indicate the degree to which cash is likely to be recommended given the corresponding combination of investment goal and risk tolerance: least likely (light blue), less likely (medium blue), or more likely (dark blue).  
**Source:** Vanguard.



## Time horizon

Alongside risk tolerance, time horizon is another critical factor an investor should consider when deciding whether to include cash in their asset allocation. Although there does not appear to be a consistent industry categorization of time horizons, we tend to categorize them as short (up to two years), intermediate (two to 10 years), and long (over 10 years).

As we have mentioned in relation to risk premium, the longer the time horizon, the more likely it is that an investor will benefit from equities' and bonds' risk premiums. Using VCMM's forecast, **Figure 6** plots the annualized returns for one-year and 10-year horizons. We find that the distribution of returns for cash, bonds, and equities narrows with the longer horizon. This also implies that the chance of capturing the risk premiums over cash increases as the time horizon increases.

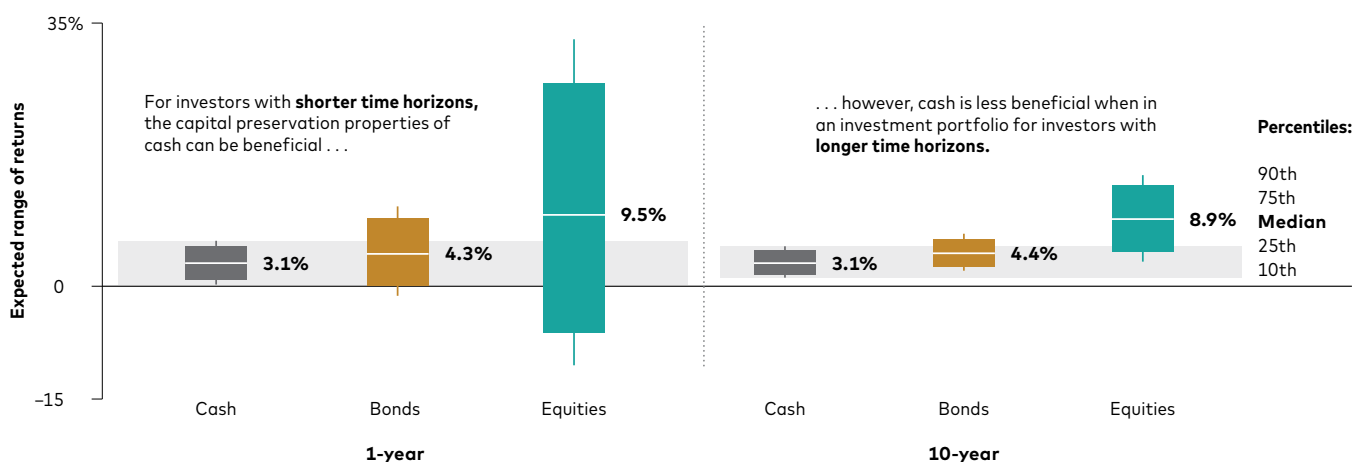
Simply put, cash is less beneficial for investors with longer time horizons.<sup>6</sup> For investors with shorter time horizons, however, the capital

preservation properties of cash can be beneficial, which is why investors tend to earmark funds in cash for near-term known expenses. It is also prudent for investors to keep at least some cash available for emergencies—the time horizon on these funds is potentially zero as they could be needed at any moment. Again using the VCMM forecast, but this time for a one-year period, we find that in any given year, the probability of cash declining 10% is essentially zero, compared to an 11% chance for equities. Including cash in an asset allocation with a short time horizon can help protect investors against a market decline from which they do not have time to recover.

It is important to note that an investor's time horizon changes over time, and with it, the potential benefits of including cash in the portfolio. An investor may start out with a long time horizon, but as they approach their goal, their time horizon becomes shorter, and they may want to shift some of their portfolio into cash to reduce shortfall risk.

**FIGURE 6**

**Over time, the distribution of returns for cash, bonds, and equities narrows**



**Notes:** Returns are from the Vanguard Capital Markets Model (VCMM); they are taken from the model's steady state as of December 2022. For more information about the VCMM, see Appendix 2. Returns for respective periods have been annualized. Equities are defined as 60% U.S./40% ex-U.S.; bonds, as 70% U.S./30% ex-U.S. Box and whiskers icons plot the 10th, 25th, 50th, 75th, and 90th percentiles of returns for each asset class. In each chart, the light-gray horizontal bar behind the three icons represents the full provided range, from 90th percentile (top point of bar) to 10th (bottom point), of the expected returns for cash.

**Sources:** Vanguard calculations, using data from the VCMM.

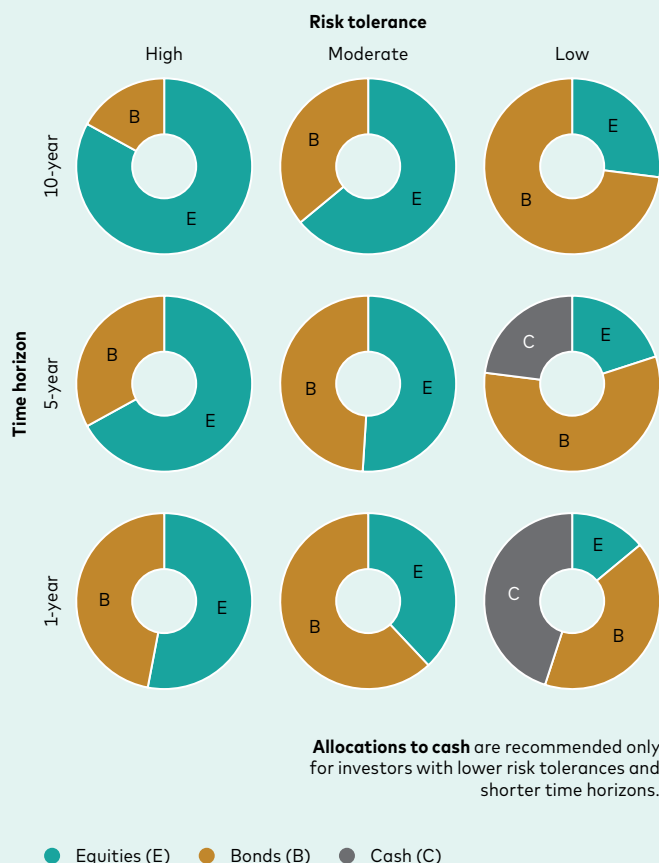
<sup>6</sup> In any given year, the risk remains constant for cash, bonds, and equities; however, the distribution over the extended time frames is significantly influenced by mean-reverting principles (assuming autocorrelation).

## When risk tolerance meets time horizon—and vice versa

To examine our hypothesis regarding the incorporation of cash we have used the Vanguard Asset Allocation Model, a proprietary model that makes asset allocation recommendations based on an investor's characteristics and circumstances. As can be seen in **Figure 7**, the VAAM only recommends an allocation to cash in cases when an investor has low risk tolerance and an intermediate-to-short time horizon. The result confirms our theoretical framework.<sup>7</sup>

Long-term investors benefit from the risk premium regardless of their risk tolerance, while investors with low risk tolerance benefit more psychologically from the capital preservation properties of cash, especially if they are investing over short time horizons. This example can apply both to an investor trying to maximize their wealth over a specific period, and to one saving for a specific goal.

**FIGURE 7**  
Asset allocation across time horizons and risk tolerances



**Notes:** The inputs used to generate these recommendations were chosen to illustrate how time horizon and risk tolerance impact the recommendation regarding cash in an investor's portfolio. Most investors would not be recommended the level of cash shown. Asset returns are drawn from the steady-state returns from the VCMM as of December 2022 for U.S. equity, ex-U.S. equity, U.S. bond, ex-U.S. bond, and cash. Equities are the sum of U.S. and ex-U.S. equity weights. Bonds are the sum of U.S. and ex-U.S. bond weights. For more information about the VCMM, see Appendix 2. For more information about the VAAM, see Appendix 3. Under *i.i.d.* (independently and identically distributed random variables), the optimal asset allocation of an investor with a constant relative risk aversion should not be impacted by time horizon, but this assumption breaks when mean-reverting properties are introduced in returns.

**Sources:** Vanguard calculations, using data from the VCMM.

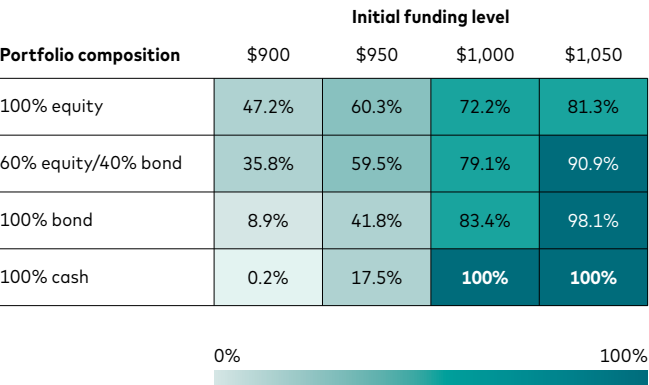
<sup>7</sup> We also ran this exercise using initial conditions and with portfolios that only have domestic assets available. We found no significant directional difference in the results.

Funding level

When an investor’s goal amount is known, the goal’s funding level—or how close the investor’s current balance plus future planned contributions is to the goal amount—may influence the decision to include cash as part of the strategic asset allocation. The better-funded a goal, the less return the investor needs and/or less risk they need to take to meet that goal. This is especially true for goals that are both well-funded and short-term. Over short time periods, the benefit of holding capital in less risky assets (such as cash) likely outweighs the risk premium forgone. Thus, some investors may prefer to earmark cash for their goals once they have either reached them or are close to doing so.

However, it may be riskier to hold cash for goals that are not well-funded, since giving up the risk premium increases the shortfall risk, especially over longer periods of time. **Figure 8** uses the VCMM-based returns to calculate the probability of reaching a value of \$1,000 in one year’s time, given different initial funding levels and asset allocations. For a well-funded goal (e.g., \$1,000 initial funding), an allocation of 100% cash provides the highest probability of success. However, as we reduce the funding level, capturing the risk premium becomes more important. In the not-as-well-funded scenario (\$950 initial funding), cash has a low probability of realizing the goal of \$1,000 (17.5%), while a balanced portfolio (60% equity, 40% bond) has close to a 60% chance of meeting the same goal. As Vanguard’s *Principles of Investing* emphasizes, “stocks are risky—and so is avoiding them.”

FIGURE 8  
Probability of reaching \$1,000 goal in one year



**Note:** Lightest to darkest blue is used to indicate lowest to highest probability of reaching funding goal in one year.  
**Sources:** Vanguard calculations, using data from the VCMM steady-state forecast as of December 2022. For more information about the VCMM, see Appendix 2.

While an allocation to risky assets can be an important tool in helping investors achieve their goals, it should be noted that an increased allocation to risky assets should not be seen as a substitute for savings. Investors who find themselves significantly short of their goal are much better off adjusting the goal amount, allowing more time to achieve it, or increasing their savings rate.

In sum, cautious, fully funded investors with short-horizon goals that are well funded can find it in their interest to allocate more of their portfolio to cash. However, the decision will always be context- or goal-specific, and this framework is meant to systematically guide the investor’s decision, not constrain it. While the recommended strategic asset allocation might not always include cash, some investors may wish to include cash anyway. If an investor intentionally decides to deviate from their recommended strategic asset allocation, it is important to understand the cost of that decision.

## The cost of cash

Even after considering factors such as goals, risk tolerance, investment horizon, and funding level to optimize asset allocation, some investors prefer to hold cash as a part of their portfolio strategy. Setting aside the market timing element in this section of the paper, we quantify the cost of holding excess cash in an investor's portfolio. In doing so, it is important to use a measure that does not just capture the impact on the portfolio's return alone, but on the investor's total welfare. For example, cash may return less over time, but cautious investors may find value in the increased stability of their portfolio—a benefit return alone does not capture. Our way of attempting to measure the change in the investor's overall welfare is through a certainty equivalent (CE).

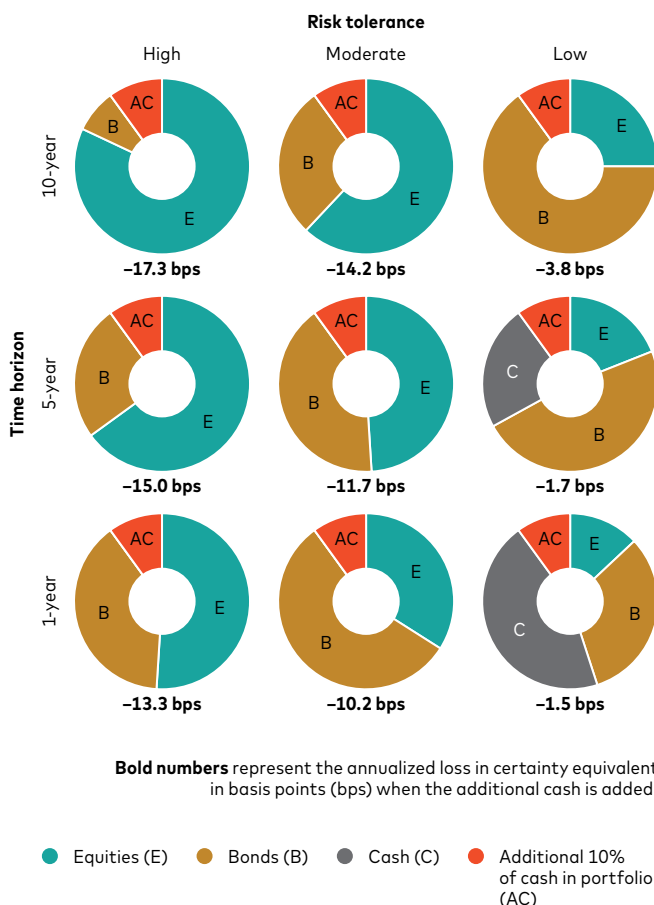
Using VAAM, we compare the optimal asset allocation for an investor given their risk preference and time horizon to an alternative allocation where the investor allocates an additional 10% of their portfolio to cash.<sup>8</sup> **Figure 9** demonstrates that the loss in CE ranges between 2 and nearly 20 basis points. (A basis point is one-hundredth of a percentage point.)

### Certainty equivalent

A certainty equivalent (CE) is the guaranteed level of return which an investor would require to achieve the same benefit as if they held a risky asset. More precisely, it is the amount of return that would make the investor indifferent between a risky asset (e.g., equity) which has higher risk and higher return and a riskless asset (i.e., a guaranteed return).

FIGURE 9

**Adding additional cash allocation results in CE loss compared to optimal portfolio**



**Notes:** Asset returns are drawn from the steady-state returns from the VCMM as of December 2022 for U.S. equity, ex-U.S. equity, U.S. bond, ex-U.S. bond, and cash. Equities are the sum of U.S. and ex-U.S. equity weights. Bonds are the sum of U.S. and ex-U.S. bond weights. For more information about the VCMM, see Appendix 2; for more information about the VAAM, see Appendix 3.

**Sources:** Vanguard calculations, using data from the VCMM.

<sup>8</sup> VAAM optimization with additional 10% cash allocation. See Appendix 3 for more information about the VAAM.

So, what's the cost of holding cash and where does it matter the most? Investors with longer time horizons incur a greater cumulative cost because of the equity and bond premiums forgone by holding cash compounds over time. Furthermore, investors with a higher risk tolerance incur a greater cost because they are less sensitive to portfolio volatility and therefore receive less benefit from the reduction in volatility.

While the choice to include cash in the portfolio indicates an investor's desire to minimize the impact of market fluctuations, it can have a significant negative impact on achieving their goals, assuming that other levers such as saving more, lowering the goal amount, or extending the saving horizon are not available. This negative impact compounds with longer horizons. It is a cautionary tale of a conflict between investment desires and goals. Cash is an important tool in the asset allocation toolbox, but it should be used with caution—and it should never be considered in isolation from other portfolio objectives.

### **Cash in a multigoal framework**

Throughout this paper, we have discussed the role of cash in the context of an investor with a single goal. We have done this for the sake of simplicity. However, many investors will have multiple goals they are working toward simultaneously. Some of these goals may be long-term; others, shorter-term. Because money is generally fungible across goals, the question of holding cash—especially to support short-term, well-funded goals—becomes more complicated. Although holding money in cash can reduce or eliminate the shortfall risk for their near-term goal or goals, by giving up the risk premium on that money, investors may make it more difficult to achieve their long-term goals. Investors should consider their risk tolerance, time horizon, and funding level for all their goals holistically when considering an allocation to cash. For many investors, maintaining their strategic asset allocation may be the better choice.

## **Conclusion**

All investors need some cash—the key questions are how much cash an investor should hold and where they should hold it. From a financial planning perspective, investors ought to have at least a small amount of cash in their current account to cover immediate expenses. Beyond this, they should have an emergency fund suited to their circumstances and level of expenses.

In this paper, we introduced a framework designed to assist investors in making informed decisions on their allocation to cash. This framework is built around the relationship between goals and three pillars: risk tolerance, investment horizon, and funding level. Our analysis shows that cash allocation is more plausible for investors with shorter time horizons, lower risk tolerances, and well-funded goals. Additionally, we highlight the cost of deviating from strategic asset allocation recommendations and overallocating to cash. Such costs may compound over time, affecting an investor's ability to reach their long-term investment goal or goals.

It is important to underscore that while using cash as a part of the investment strategy is acceptable, it should be done systematically and in accordance with a well-defined framework.

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## Appendix 1: Applying the framework

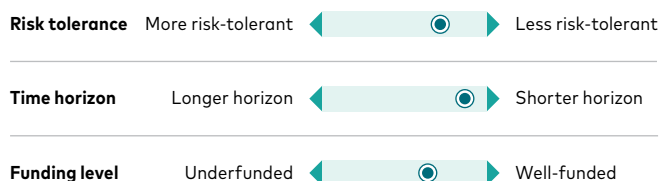
Here we consider two hypothetical investors, Dana and Johan, and look at how we might apply the framework to each of them.

**FIGURE 10**  
**Applying the framework—two case studies**

Consideration	Dana	Johan
<b>Life stage</b>	Early career	Later career
<b>Goal(s)</b>	<ul style="list-style-type: none"> <li>• Save up down payment for property.</li> <li>• Maintain emergency savings for spending shocks.</li> </ul>	<ul style="list-style-type: none"> <li>• Achieve a successful retirement.</li> </ul>
<b>Risk tolerance</b>	Low	High
<b>Time horizon</b>	Expects to need down payment in 18 months; prepared to replenish emergency fund if shocks happen, maintain it if they do not.	Plans to retire in 10 years.
<b>Funding level</b>	Well-funded: within a couple of percent of target amount for property down payment; enough cash for spending shocks.	Underfunded: far from the amount he is likely to need.

### Dana—recommendations

- 1 Hold a low-risk portfolio including cash for the property down payment.
- 2 Hold the spending shocks portion of emergency savings in cash.



Source: Vanguard.

### Explanation—property goal

Given her risk tolerance and her time horizon, as well as her funding level, Dana should consider a cash allocation for her property goal. She would not feel comfortable with a significant loss of capital value and will likely feel that the upside of the risk premium is less worthwhile for her over the period in question.

- **Risk tolerance.** Dana has a low level of risk tolerance and would not feel comfortable with a significant loss of capital value.
- **Time horizon.** Her property goal has a short time horizon. The risk premium would likely seem less worthwhile for her over this short period.
- **Funding level.** Dana's property goal is well-funded. If she can reach it with a very modest return, she will be able to use a higher cash allocation, in keeping with her low level of risk tolerance, because she will not need to take on higher risk to meet her target. However, if the expected return from cash is too low to allow her to reach her goal, she may need to include less of it in her portfolio (and more bonds and stocks instead, hoping for sufficient returns).



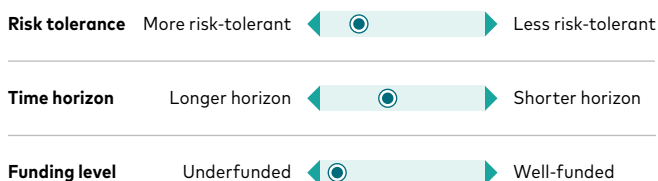
### Explanation—emergency savings goal

We would argue that this is more about financial planning than an investment strategy, since having emergency savings is a perpetual goal to maintain a reserve, not a one-and-done goal. Here we would advocate the use of cash for the portion of her emergency savings intended to cover spending shocks. While common sense bears this out, applying our framework to this goal reveals the whys behind the common sense:

- **Risk tolerance.** Since any loss would render her emergency savings less effective in meeting their intended purpose, Dana—who has a low level of risk tolerance—is not willing to tolerate much, if any, loss here.
- **Time horizon.** Because it is an emergency reserve, the time horizon for this goal could, in theory, be zero.
- **Funding level.** Dana's goal could be described as “fully funded,” as she already has an amount dedicated for emergencies; hence, the allocation to cash.

### Johan—recommendation

- 1 Do not hold cash in retirement portfolio at this time.



Source: Vanguard.

### Explanation—retirement

Johan's main goal is funding his retirement. There are two stages to this goal: the accumulation phase and the decumulation phase. Because Johan knows he plans to retire in 10 years, the time horizon of the accumulation part of his goal can be said to be certain. However, the time horizon of the decumulation part of his goal is uncertain. Given this uncertain horizon of decumulation, his elevated risk tolerance, and his not-well-funded status it is unlikely that cash would play a role in Johan's asset allocation strategy. Again, using the framework's three pillars to unpack the likely decision:

- **Risk tolerance.** Johan has a high level of risk tolerance, so he can handle a significant degree of volatility in returns. This means he is more likely to allocate towards high-risk, high-return assets such as equities, rather than cash.
- **Time horizon.** While Johan's accumulation goal has a set date, his spending goal has a long and uncertain horizon. By taking higher risk—which is what his level of risk tolerance and his time horizon would indicate is called for—he can aspire for higher returns which would give him either (1) a larger portfolio to retire on or (2) the flexibility to retire earlier than planned.
- **Funding level.** Johan's retirement goal is not well-funded. Given that he also has a long time horizon and a high level of risk tolerance, it is unlikely an excess allocation to cash would benefit him.



## Appendix 2. The Vanguard Capital Markets Model

**IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model 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.**

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 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 time 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.

The VCMM has two sets of conditions: initial and steady state. The initial conditions capture asset returns by taking into account current equity, bond, and cash valuations as well as short-term interest rates. Steady state conditions capture the asset returns when the economy is in its equilibrium or according to long-run assumptions.

## Appendix 3. The Vanguard Asset Allocation Model

The VAAM is employed to determine asset allocation among active, passive, and factor vehicles, simultaneously optimizing the three dimensions of risk/return trade-offs (alpha, systematic, and factor).

The model incorporates Vanguard's forward-looking capital market return and client expectations for alpha risk and return to create portfolios consistent with the full set of investor preferences, solving for portfolio construction problems conventionally addressed in an ad hoc, suboptimal manner. It assesses risk and return trade-offs of portfolio combinations based on user-provided inputs such as risk preferences, investment horizon, and which asset classes and active strategies are to be considered.

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