

Making the implicit explicit: A framework for constructing active-passive portfolios

- How should an investor allocate across active and passive investments? It is a challenging decision that involves many considerations. In the absence of a structured decision-making process, investors are left making arbitrary choices based on implicit assumptions.
- In this paper, we provide a quantitative framework for active-passive decision-making and aim to shed light on those implicit assumptions by highlighting the explicit attributes affecting the process. We employ a model using four key variables—gross alpha expectation, cost, level of active risk, and investor active-risk tolerance—to establish blended active-passive portfolios.
- Indexing is a valuable starting point for all investors, and many may index their entire portfolio. But our analysis shows that, for those comfortable with the characteristics of active investments, an allocation to active may also be a viable solution.

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Introduction

Imagine you live in a world with only two fund options: a passively managed fund¹ and an actively managed fund,² with similar levels of volatility.³ You, the investor, are trying to determine how to allocate your capital across these two choices.

The expected return of the active fund, above that of the passive, is simply a function of two variables—gross alpha expectation and cost.⁴ If the expected net alpha (gross alpha minus cost) is positive, the simple choice would be to allocate 100% to the active fund. If the expected net alpha is negative, the choice would be equally straightforward—allocate 100% to the passive fund. This approach results in a binary choice—either all active or all passive.

It is this dynamic that is often at the heart of the active-passive debate, which tends to focus on all-or-nothing views and recommendations. Proponents of passive investing point to research demonstrating that the average dollar invested with active managers underperforms after costs and that outperformers are difficult to identify in advance.⁵ Proponents of active investing argue that despite underperformance of the average dollar invested in active funds, many active managers do still add value, and the impact of possible outperformance can be significant. And so the debate rages on.

We reject this basic, binary decision. Both active and passive investments have potential benefits in a portfolio. Passive funds offer the opportunity for low-cost benchmark tracking, leading to a tight range of relative returns. Active funds offer the opportunity for outperformance in exchange for a wider range of relative returns (in other words, greater uncertainty)—albeit typically with a higher cost.⁶

With this in mind, let's return to our original thought exercise. But this time, in addition to gross alpha and cost, let's consider two more variables: active risk (defined as the uncertainty of future manager performance⁷) and active-risk tolerance (the degree to which an investor can tolerate this uncertainty). Now we can consider a more nuanced trade-off between active and passive fund strategies by incorporating an "uncertainty penalty" in our alpha expectations. This can help balance the positive impact of alpha expectations on allocation decisions with the uncertainty of achieving a favorable outcome.

We can then incorporate more details to guide our decision. For example, would it be prudent to invest in an active fund that is expected to provide 0.1% net annualized outperformance? Some degree of uncertainty is inherent in any active decision—that is, despite a positive net annualized outperformance expectation, there is still a chance that the manager won't realize that expected outperformance. In this case, the modest size of the potential reward may not be substantial enough to justify a 100% allocation to the active fund, given its uncertainty.

- ¹ The passive fund in the context of our paper is a market-capitalization-weighted index fund in a single asset or sub-asset class that tracks a specified benchmark—for example, a broad-based U.S. equity index fund that seeks to track the Russell 3000 Index.
- ² The active fund in the context of our paper is a traditional actively managed fund that is in the same asset or sub-asset class as the passive fund but that seeks to outperform the segment's benchmark—for example, a U.S. equity active fund that uses bottom-up security selection to seek to outperform the Russell 3000 Index.
- ³ For more context on using index and active fund strategies in gaining exposures to chosen market segments, please see Lawrence, Patterson, and Ertl (2024) and Patterson, Lawrence, and Ertl (2024).
- ⁴ Gross alpha can also be referred to as gross excess return. For consistency and ease of comparison with passive strategies, we will refer to it as alpha in this paper.
- ⁵ The performance of the "average dollar invested" considers the asset-weighted performance of all funds within that strategy.
- ⁶ Active funds, on average, tend to have higher expense ratios as well as higher tax costs for investors subject to tax. As an example, see Philips, Kinniry, Walker, Schlanger, and Hirt (2014).
- ⁷ Active risk is typically measured by metrics such as tracking error and often the terms are used interchangeably. For consistency and ease of communication, we will refer to the uncertainty of future manager performance as active risk throughout this paper.

But what about a 5% allocation to this fund as part of a market segment exposure that includes both active and passive funds?⁸ What about 25%? How does the level of active risk inherent in the fund affect this decision? How does your own (or your organization's, or your client's) tolerance for taking on active risk affect it? What if we increase or decrease the gross alpha expectation or cost of investing in the fund, which would alter the net alpha expectation? These are the questions we ask in this paper.

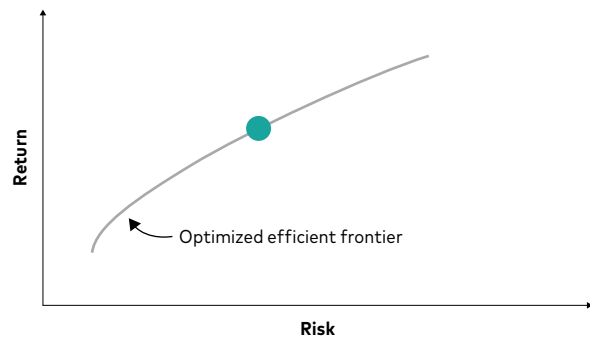
We aim to assist the active-passive decision-making process by enabling investors to think more deliberately about their return expectations and the expected risks they're willing to accept. Our framework makes these expectations explicit, a valuable contribution to ongoing due diligence and regular assessment of the conditions and expectations that justify a given active-passive mix.⁹

The active-passive decision framework

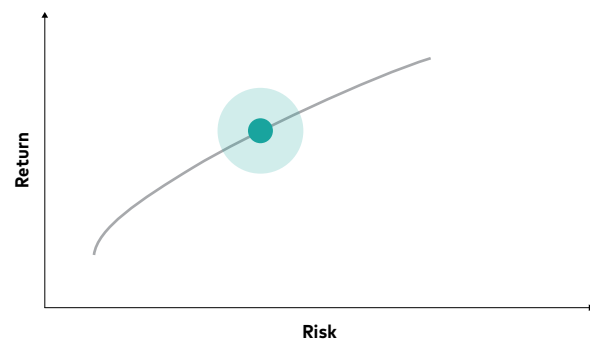
Typically, the portfolio construction process begins with establishing an appropriate strategic asset allocation. A second—but still important—decision then is made on how to implement the chosen asset class and sub-asset class exposures. It is at this second step that specific investment products are evaluated and the decision to allocate between active and passive investments is made. See **Figure 1** for an illustration of the hierarchy of portfolio decisions.

FIGURE 1
Active-passive decision-making during portfolio construction

- a. Step 1. Choose strategic asset allocation based on asset class expectations, investor preferences, and constraints (turquoise dot).



- b. Step 2. Choose how to implement strategic asset allocation with specific investment products. Adding active funds adds active risk—that is, they introduce idiosyncratic outcomes that can increase or decrease both the risk and return of the portfolio (turquoise shading).



Note: This illustration of a hypothetical efficient frontier does not represent a particular investment or set of investments.

Source: Vanguard.

⁸ Market segments can be defined as broadly, such as equities and bonds, or as narrowly, such as industry sectors, as an investor desires.

⁹ Grinold (1989) outlines the need for conviction in, and an accurate assessment of skill on the part of, the active manager or investors in active funds. These should inform risk and return expectations and are therefore vital to allocation decisions involving active and index funds.

This paper proposes a framework that enables investors to more explicitly and quantitatively approach the blending of active and passive investments in their portfolios.¹⁰ It identifies the key decision factors all investors are subject to when determining a reasonable balance based on their individual preferences.¹¹ It does not purport to promise better returns but rather to make transparent a decision-making process investors can use to establish a target allocation of active and passive funds. This framework can also be used with other strategies such as factor investing (see **Appendix** for details), as well as for portfolios in which some assets can be accessed only through active investing or in which the investment deviates, by construction, from a diversified indexed solution.¹²

Our framework considers the impact of four key variables related to the tenets of active management success:

- Gross alpha expectation
- Cost
- Active risk
- Active-risk tolerance

Gross alpha expectation: A judgment about talent

Gross alpha expectation is the degree to which investors expect their active fund managers to outperform. It relies on one's own skill in selecting successful active fund managers and is a critical component of the active allocation decision. It is important to note that an expectation of alpha does not necessarily translate into actual alpha and that not all decision-makers can be above average. The implications of this for investors are made clear under the zero-sum game theory.¹³

10 This framework has also been codified as part of the Vanguard Asset Allocation Model; details on this model are contained in Aliaga-Díaz et al. (2019).

11 See Baks, Metrick, and Wachter (2001), Waring et al. (2000), and Waring and Siegel (2003) for prior research on the active-passive allocation decision process and methods of addressing investors' underlying assumptions.

12 For further details, see Aliaga-Díaz et al. (2022) and Grim, Renzi-Ricci, and Madamba (2023).

13 For further details, see Sharpe (1991).

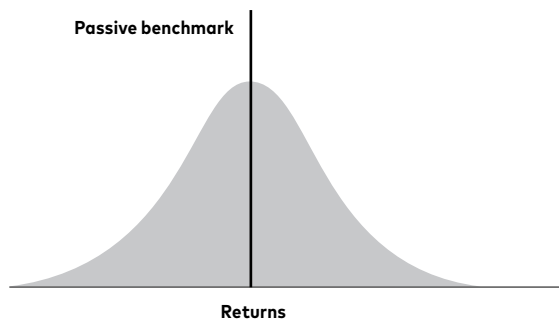
The level of expected alpha is a subjective measurement; realized future alpha levels are uncertain. In our framework, the term “alpha expectation” carries a statistical meaning: The active-manager assessment can be thought of in terms of a distribution of potential alpha outcomes (see **Figure 2**), with the central tendency of this theoretical distribution the expected alpha.

Cost: The enemy of net alpha

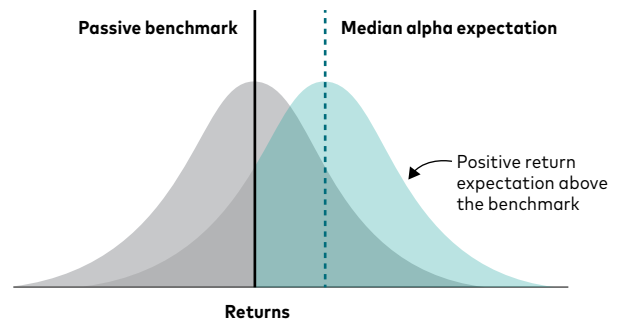
Evidence shows the odds of outperformance increase as investors reduce their cost of investing in active strategies, with the cost of an active fund also much more predictable than gross alpha.¹⁴ Gross alpha expectation and cost combine to form the net alpha expectation for the fund.

FIGURE 2
Alpha expectation is not guaranteed outperformance

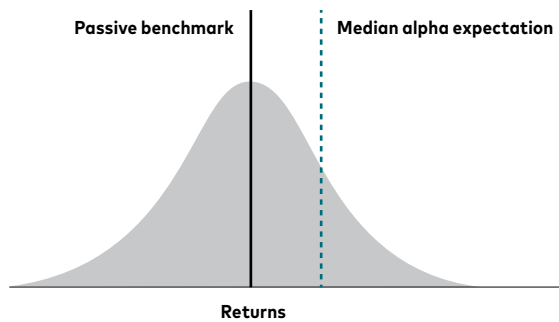
a. Performance probability distribution for a randomly chosen active manager



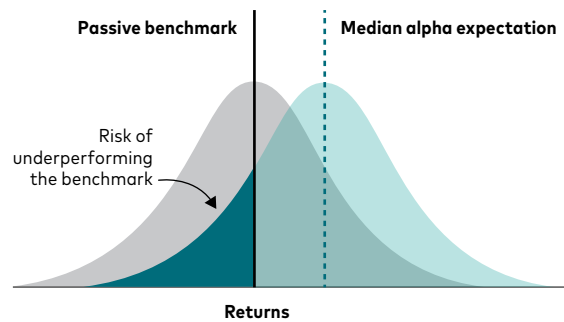
c. Performance can span a variety of possible outcomes



b. Investor’s (subjective) performance expectation for a given active manager



d. Active-manager risk and the possibility of underperformance must be considered



Notes: The pale and dark turquoise areas represent a hypothetical distribution for a given active manager for which the investor has a positive alpha expectation. The dark turquoise area represents the hypothetical risk of underperforming the benchmark.

Source: Vanguard.

¹⁴ Further details are contained in Wallick, Wimmer, and Balsamo (2015b).

Active risk: Uncertainty quantified

Active funds by nature deviate from their benchmark in trying to improve returns—but no active manager will outperform the market every day, week, month, or even year. Even managers with successful performance over longer time frames have typically experienced extended periods of underperformance.¹⁵

This inconsistent pattern of relative returns can be quantified as active risk (i.e., tracking error), or the volatility of a fund relative to its target benchmark. It can be thought of as the uncertainty the investor attaches to the expected performance of a particular active manager. In other words, active risk and gross alpha expectation have a straightforward statistical interpretation in terms of the standard deviation and median derived from the bell curve of potential performance outcomes as depicted in Figure 2. This distributional interpretation of active-manager performance has been missing in the traditional active-passive debate, in which a manager's alpha is typically thought of in terms of a point forecast.

Active-risk tolerance: A proxy for patience

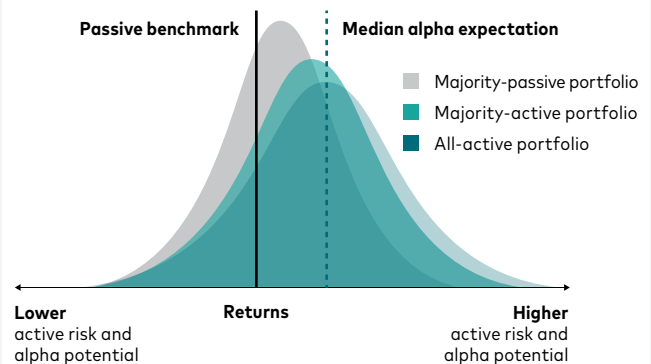
The final element in evaluating the potential use of active strategies is the degree to which an investor is willing to take on active risk in the pursuit of outperformance. This element is specific to the investor, not the fund. The heart of the active-passive framework is a trade-off between an investor's subjective net alpha expectation, with its inherent uncertainty, and the subjective tolerance for active-fund underperformance. The optimal active-passive decision seeks to balance this risk-return trade-off.

Not putting all your eggs in one basket: Why blend active and passive in a portfolio?

Under the interpretation of active-passive allocations as a solution to the active-risk-return trade-off, one can think of the passive fund as a diversifier of active-manager risk. Investors uncomfortable with assuming the full level of active risk associated with a given manager may mitigate some of this uncertainty by adding more of the indexed asset (which can be thought of as "active-risk-free") to the portfolio—however, they should be aware that doing so also dilutes the alpha expectation for the portfolio.

As shown in **Figure 3**, a greater allocation to passive in the portfolio not only makes the range of outcomes narrower (less uncertain) but it also pulls the theoretical distribution to the left (less alpha potential). The optimal allocation is the one that strikes the right balance between active risk and expected active reward based on investor preferences.

FIGURE 3
More indexing can reduce active-manager risk, but also limits alpha potential



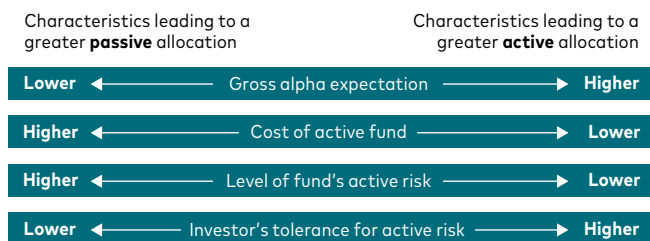
Source: Vanguard.

¹⁵ Previous Vanguard research has discussed patience as one of the keys to successful use of active management. Active-risk tolerance can also be thought of as how much patience an investor exhibits regarding fund volatility relative to the benchmark over time. Wimmer, Chhabra, and Wallick (2013) contain further discussion of successful active managers' patterns of returns.

How the variables affect active-passive allocation

Before moving on to the quantitative application of this approach, it's helpful to consider at a high level how the underlying assumptions for each of our four variables would qualitatively influence the allocation (**Figure 4**). These attributes can be thought of in terms of a sliding scale, with each one leading an investor to lean more toward active or passive.

FIGURE 4
Key decision factors and their impact on the active-passive mix

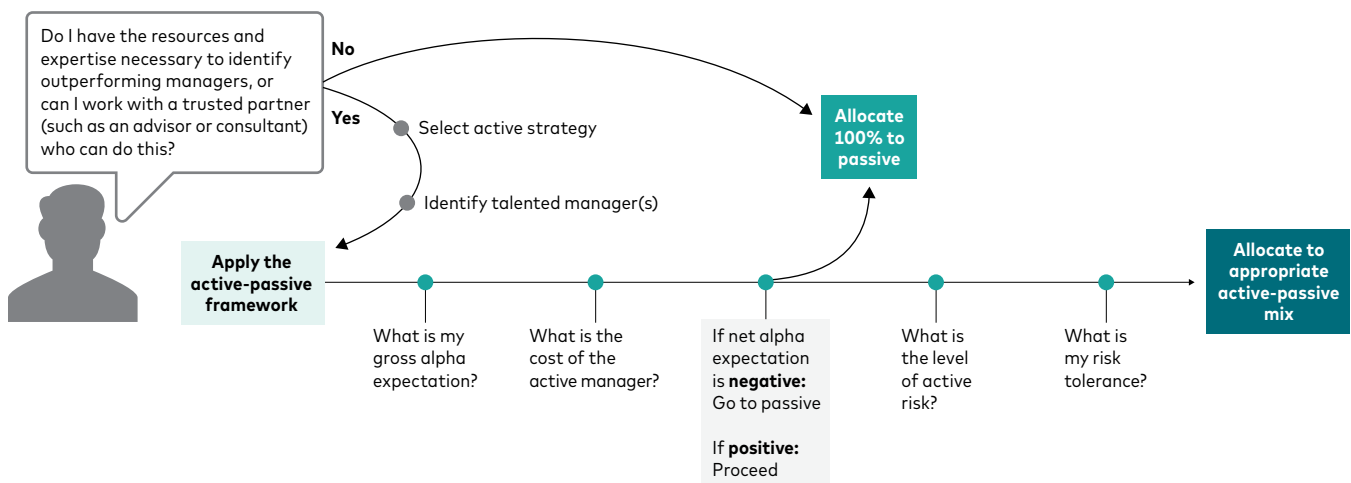


Source: Vanguard.

Were we to stop here, we would be left with a completely qualitative allocation process. As described so far, our process has outlined the importance of each factor, but is incomplete if our goal is to be explicit about how to weigh one characteristic against another based on investor preferences. For example, suppose a fund has a lower level of active risk—implying a greater allocation to active—but the investor's tolerance for active risk is lower—implying a greater allocation to passive. What should the investor then do? Indeed, any final decision using solely what has been described thus far would still be arbitrarily based on underlying assumptions.

Going one step further, we apply a quantitative model that can consider different levels of each of the decision factors above and build solutions for specific circumstances.¹⁶ **Figure 5** illustrates the sequence of decisions an investor needs to make when considering an active-passive mix. The final step, allocate to the optimal active-passive mix based on investor preferences, is where the quantitative model is applied.

FIGURE 5
The active-passive decision flowchart



Note: This chart does not purport to promise better returns, but rather to offer a clear decision-making process for use in establishing a target allocation.

Source: Vanguard.

¹⁶ The complete model, the Vanguard Asset Allocation Model, is a full-scale utility-based optimizer for constructing active-passive-factor portfolios, as first described in Aliaga-Díaz et al. (2019).

From qualitative to quantitative: A three-step process

Our quantitative simulation framework to consider active investments within a portfolio consists of three steps:

1. Build simulations of expected returns for active managers.
2. Calculate distribution of potential manager outcomes, to account for risk.
3. Solve for the active-passive allocation that strikes the right balance among expected active risk, investor-specific active-risk tolerance, expected gross alpha, and cost.

This framework provides investors with tailored active-passive allocation targets based on their inputs and preferences.

Next, we describe each component of the framework and how these three steps lead to the target allocation.

A quantitative framework for active-passive decisions

The simulation engine shown in **Figure 6** exhibits the three steps: active fund return simulation, a manager risk and performance calculation, and a risk-return optimization to find the allocation that best suits the investor's attitude toward active risk.

Active manager simulation

The first component, the active manager return simulation, creates a theoretical universe of active-fund outcomes based on inputs of gross alpha expectation, cost, and active risk. Each combination of these three variables is used to generate Monte Carlo simulations for many potential future performance paths over a multiperiod investment horizon.

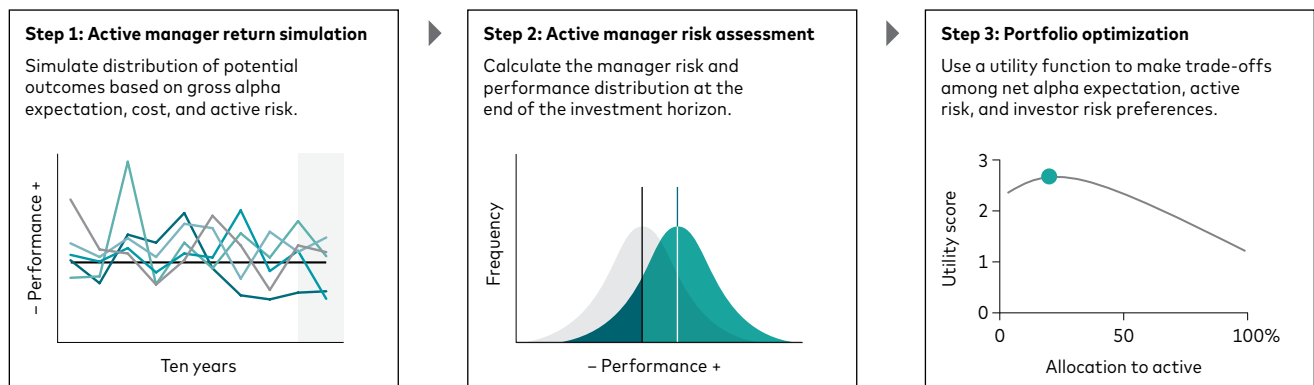
Performance distribution and manager risk

The second component of the model is the manager-risk calculation. This compiles every simulated return path for the active fund to capture the inherent uncertainty in actual fund performance. A sample distribution of returns of a hypothetical manager with positive net alpha expectation is illustrated by the turquoise curve. Although the median return at the end of the investment horizon for this fund is positive, uncertainty remains, as evidenced by the range of possible outcomes and the sizable risk of negative net alpha shown in dark green.

Constructing the blended active-passive allocation

The third component of the quantitative framework is a utility-function-based calculation.¹⁷ Using the return simulations and active-risk tolerance, we make trade-offs between the active fund and the passive alternative. The suggested allocation is the one that maximizes the investor's expected utility (or "happiness") across all future return scenarios.¹⁸

FIGURE 6
The quantitative process for active funds



Source: Vanguard.

¹⁷ For discussions on the merits of utility-based optimization for portfolio construction, see Adler and Kritzman (2007) and Sharpe (2007).

¹⁸ The process underpinning this step is described in more detail in Aliaga-Díaz et al. (2019).

Calibrating the simulation parameters

Thus far, a discussion on estimation of the parameters for a given active fund (i.e., cost, alpha, and tracking error) has been sidestepped. This is deliberate because the model presented is agnostic about how these expectations are formed—allowing investors to apply their preferred methodologies to generate these expectations and plug them as inputs into this active-passive framework.

Each investor will have specific methods of attempting to identify talented managers and develop a performance expectation for them. This is typically best done through a rigorous due diligence process combined with an understanding of alpha ranges and deference to the probability of

success.¹⁹ Behavioral biases such as overconfidence can lead to unreasonable expectations here, so a realistic assessment is critical.

The hypothetical case study that follows applied the active-passive framework using a simplified historical approach to provide reasonable ranges for parameters and subsequent allocations. We used asset-weighted, factor-adjusted U.S. equity active-fund data for the 10-year period ended December 31, 2023. We partitioned this fund universe into five levels of gross alpha, three levels of costs, and three levels of tracking error—combined with three hypothetical levels of investor active-risk aversion. In doing so, we exhibited a range of hypothetical active-passive portfolios for different investor and fund types.

Applying the framework to a U.S. equity portfolio: A case study

To further demonstrate how the quantitative approach can be applied in practice, from here on we discuss the framework in the context of a hypothetical investor determining a U.S. equity allocation. Although we focus on one asset class—U.S. equities—a similar approach is applicable to a wide range of asset classes, even multiple asset classes and active funds simultaneously.

We conducted our analysis in two parts. Part One included gross alpha expectations and cost but excluded a consideration of how active risk and active-risk tolerance affect the results—leading to all-active or all-passive portfolios. Part Two accounted for the uncertainty of active-manager performance and varying levels of investor tolerance for that uncertainty—leading to active-passive blended portfolios.

¹⁹ Vanguard's experience with active managers has found that successful identification of future performers is not based on quantitative assessment alone. It should also incorporate qualitative assessments of the manager's people, process, philosophy, and firm. More information on Vanguard's approach to selecting managers is contained in Wallick, Wimmer, and Balsamo (2015a) and Wallick, Wimmer, and Martielli (2013). For more on combining active managers, once they've been identified, see Shtekhman et al. (2024).

Part One analysis: Gross alpha expectation and cost

Gross alpha expectation

To determine gross alpha expectation—the expectation of selecting outperforming active managers—we subdivided our simulation’s population into five skill levels: very low, low, neutral, high, and very high (Figure 7):

- **Very low gross alpha expectation:** An expected random selection from the bottom one-third of the entire active-manager population (asset-weighted annualized gross alpha expectation of -2.07%).
- **Low gross alpha expectation:** An expected random selection from the bottom two-thirds of the entire active-manager population (asset-weighted annualized gross alpha expectation of -0.59%).
- **Neutral gross alpha expectation:** An expected random selection from the entire active-manager population (asset-weighted annualized gross alpha expectation of 0.29%).

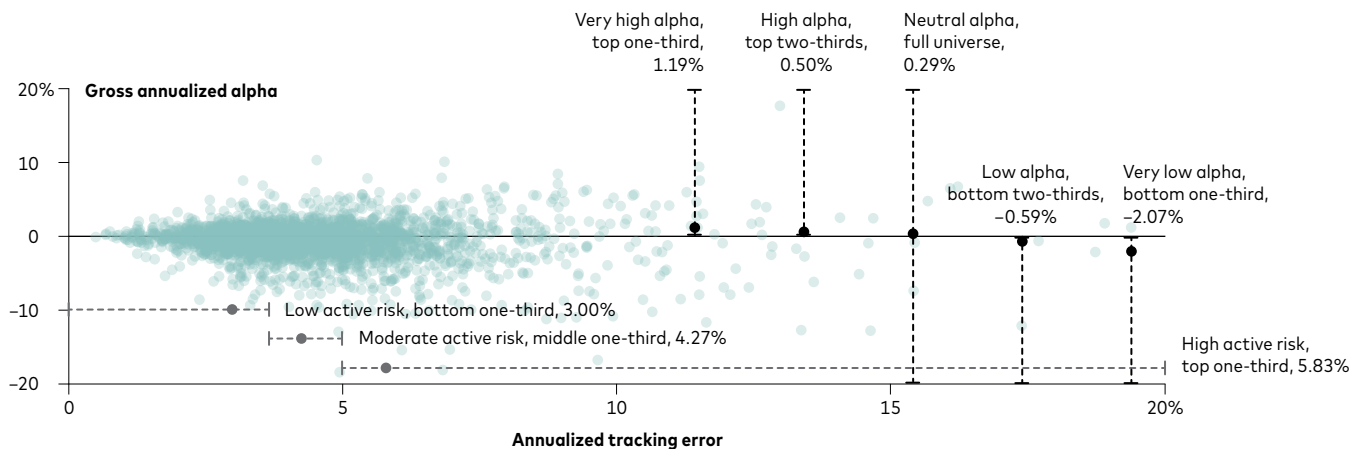
- **High gross alpha expectation:** An expected random selection from the top two-thirds of the entire active-manager population (asset-weighted annualized gross alpha expectation of 0.50%).
- **Very high gross alpha expectation:** An expected random selection from the top one-third of the entire active-manager population (asset-weighted annualized gross alpha expectation of 1.19%).

Cost

Gross alpha expectation addresses gross returns; however, in the end it is net returns (gross returns less cost) that matter to investors.²⁰ In this analysis, we applied three separate tranches of cost—higher, moderate, and lower—to the entire population of simulated active funds:

- **Higher cost:** The 75th percentile asset-weighted expense ratio (annualized cost of 0.88%).
- **Moderate cost:** The median (or 50th percentile) asset-weighted expense ratio (annualized cost of 0.69%).
- **Lower cost:** The 25th percentile asset-weighted expense ratio (annualized cost of 0.49%).

FIGURE 7
Gross alpha expectations and active risk



Notes: Data are for the 10-year period from December 31, 2013, to December 31, 2023, in U.S. dollars, and represent active equity funds with at least 12 months of history available to U.S. investors in the following categories: small-capitalization value, small-cap growth, small-cap blend, mid-cap value, mid-cap growth, mid-cap blend, large-cap value, large-cap growth, and large-cap blend. Funds that died or merged were included in the analysis. This generates a sample of $n=2,569$ funds. The oldest single share class was used to represent a fund when multiple share classes existed. Asset-weighted results were calculated using each fund’s average reported monthly assets for months when that fund existed. Alpha was calculated by regressing monthly gross returns minus the risk-free rate of return against the Fama-French five-factor model (2015); tracking error was calculated as the standard error of the regression. The graph is cropped to display the main body of the data, meaning a small number of outliers are not shown.

Sources: Vanguard calculations, based on data from Morningstar, Inc., and the Kenneth R. French data library.

²⁰ It is important to remember that there can be additional costs beyond a fund’s expense ratio—for example, tax costs. Although tax costs vary among investors, countries, funds, and time frames, the tax costs of active funds have been, in many periods, higher than those of index funds. Donaldson et al. (2015) contains further discussion.

Part One results: When alpha and cost are everything

After running the two critical attributes of gross alpha expectation and cost through our model (with no consideration for active risk or active-risk tolerance), we arrived at the results shown in **Figure 8**. It displays the outcomes of the 15 scenarios ranging from the lower gross alpha expectation and higher-cost active managers (the top left corner of the grid) to the higher gross alpha expectation and lower-cost active managers (the bottom right corner).

FIGURE 8
Potential active-passive allocations when only alpha and cost matter

		Cost of active		
		Higher 0.88%	Moderate 0.69%	Lower 0.49%
Gross alpha expectation	Very low -2.07%	P	P	P
	Low -0.59%	P	P	P
	Neutral 0.29%	P	P	P
	High 0.50%	P	P	A
	Very high 1.19%	A	A	A

■ P All-passive portfolio
■ A All-active portfolio

Note: This hypothetical illustration does not represent any particular investment.
Source: Vanguard.

Two items are most striking. First, without a positive net alpha expectation, an investor would be better off investing 100% in passive funds. Second, without incorporating the impact of active risk and active-risk tolerance, we are left with a binary choice of either 100% passive funds (when net alpha expectation is negative) or 100% active funds (when net alpha expectation is positive).

These simplified conditions result in all-active or all-passive portfolios, depending on whether positive net alpha is expected. For example, the box at the intersection of high gross alpha expectation (+0.50%) and low cost (+0.49%) has a net alpha expectation of just 0.01% (+0.50%–0.49%), yet the recommendation is still an all-active portfolio.

An investor concerned about active risk might not allocate 100% to the active fund in this instance. That investor might prefer to incorporate some portion of passive funds to moderate the risk. Part Two of our analysis reflected this reality.

Part Two analysis: Net alpha expectations plus risk considerations

Next, we added risk considerations (active-risk level and tolerance for active risk) to alpha expectations and cost for our active portfolio to reassess how the combination influences the active-passive decision. That involved expanding each of the 15 scenarios in Figure 8 by adding nine sub-scenarios reflecting low, medium, and high levels of active risk and low, medium, and high levels of active-risk tolerance.

Active risk

Taking on active risk is a necessary condition for producing outperformance but obviously not a guarantee. We assessed a range of active risks (for example, tracking error) for the funds:²¹

- **Higher active risk:** An expected random selection from the top one-third of the entire active-manager population (annualized tracking error expectation of 5.83%).
- **Moderate active risk:** An expected random selection from the middle one-third of the entire active-manager population (annualized tracking error expectation of 4.27%).
- **Lower active risk:** An expected random selection from the bottom one-third of the entire active-manager population (annualized tracking error expectation of 3.00%).

Active-risk tolerance

The critical final element is active-risk tolerance, essentially an investor's ability to handle a given level of alpha variability through time and willingness to accept the uncertainty of achieving outperformance. We used a risk aversion parameter within a utility function to penalize alpha variability by differing amounts, with ensuing implications for the optimal allocation to active and index funds:

- **Higher active-risk tolerance:** A lesser active-risk aversion penalty in the utility function.
- **Moderate active-risk tolerance:** A moderate active-risk aversion penalty in the utility function.
- **Lower active-risk tolerance:** A greater active-risk aversion penalty in the utility function.

The use of a utility function, with an embedded risk tolerance parameter, may be an abstract concept to some. Here, it enabled us to quantify different investor risk preferences for dealing with the uncertainty of active management, where risk is associated with the alpha variability of the active portfolio.²²

This portion of the analysis allowed us to calculate utility-adjusted wealth (rather than simply total wealth, as we saw in Part One) and understand the risk-driven trade-offs between active management (which has some degree of manager uncertainty) and passive management for a range of active-risk tolerance levels. Without it, the model would produce only all-or-nothing active or passive allocations.

²¹ Active risk was calculated using the standard error of the residuals of the Fama-French five-factor regressions.

²² The actual parameters used in the model for this example were active-risk aversion coefficients of 10, 8, and 6, corresponding to lower, moderate, and higher active-risk tolerances, with the utility function as described in Aliaga-Díaz et al. (2019). An investor with a lower level of active-risk tolerance could be thought of as one who has either a strictly defined tracking error budget or a lower likelihood of remaining invested in an active fund during periods of underperformance. An investor with a higher level of active-risk tolerance, on the other hand, would likely have a more flexible active-risk budget (if one is used at all) and expect to remain invested during periods of underperformance.

Part Two results: When net alpha and risk considerations lead to a wider range of outcomes
 Combining the elements of active risk and active-risk tolerance with gross alpha expectation and cost results in four variables, each with three different measurement levels. All the scenarios in

Figure 9 for investors with neutral (or worse) gross alpha expectations remained unchanged from the Part One analysis (see Figure 8). If outperformance is the goal, then cost, active-risk level, and active-risk tolerance do not supersede the importance of identifying talent.

FIGURE 9
Potential active-passive allocations when active risk and active-risk tolerance matter in addition to alpha and cost

		Cost of active									
		Higher, 0.88%			Moderate, 0.69%			Lower, 0.49%			
		Active risk									
		Higher 5.83%	Moderate 4.27%	Lower 3.00%	Higher 5.83%	Moderate 4.27%	Lower 3.00%	Higher 5.83%	Moderate 4.27%	Lower 3.00%	
Gross alpha expectation	Very low -2.07%	Lower	P	P	P	P	P	P	P	P	P
		Moderate	P	P	P	P	P	P	P	P	P
		Higher	P	P	P	P	P	P	P	P	P
	Low -0.59%	Lower	P	P	P	P	P	P	P	P	P
		Moderate	P	P	P	P	P	P	P	P	P
		Higher	P	P	P	P	P	P	P	P	P
	Neutral 0.29%	Lower	P	P	P	P	P	P	P	P	P
		Moderate	P	P	P	P	P	P	P	P	P
		Higher	P	P	P	P	P	P	P	P	P
	High 0.50%	Lower	P	P	P	P	P	P	D	D	D
		Moderate	P	P	P	P	P	P	D	D	D
		Higher	P	P	P	P	P	P	D	D	D
Very high 1.19%	Lower	D	D	C	D	C	B	C	C	A	
	Moderate	D	C	B	C	C	A	C	B	A	
	Higher	C	C	B	C	B	A	C	A	A	

P	All passive
D	Limited active (1-25%)
C	Moderate active (26-50%)
B	Significant active (51-75%)
A	Predominantly active (76%+)

Note: This hypothetical illustration does not represent any particular investment.

Source: Vanguard.

Even among investors with high and very high gross alpha expectations (the expectation that they will select from the top two-thirds or one-third of all managers), indexing still makes up a sizable portion of many allocations. Cost remains a factor, as does risk tolerance. But when higher assumptions for gross alpha and tolerance for active risk are combined with lower assumptions for cost and active risk, we begin to see more prominent active allocations.

This approach allows us to move from simple binary solutions of all-active or all-passive investment to a more nuanced set of results that demonstrates the trade-off between net alpha expectations and tolerance for active risk. Furthermore, the quantitative nature of our framework discloses otherwise embedded assumptions and enables investors to assess a range of inputs and incorporate their own preferences into the active-passive asset allocation decision.

Conclusion

Our simulation analysis identifies three overall conclusions.

First, indexing may be a valuable starting point for all investors. Per our research, a lack of conviction in identifying active manager talent results in an all-indexing solution.

Second, our research reiterates prior Vanguard research demonstrating that the use of active management depends on talent, cost, and patience (represented in our analysis by gross alpha expectation, cost, and active-risk tolerance).

The greater an investor's ability to identify talented active managers, access them at a low cost, and remain patient amid the inconsistency of alpha through time, the greater the suggested allocation to active funds.

Third, investors considering both active and passive investments will benefit from explicitly identifying assumptions regarding four key components: gross alpha, cost, manager risk, and risk tolerance. Because this tailored approach is based on an investor's specific expectations, there will be no one-size-fits-all result.

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Appendix

This paper has focused on alpha expectations, but our framework can also accommodate the active returns and risk that can result from factor exposures. Rather than set expectations for gross alpha levels, active-risk levels, and cost, the investor estimates those variables for factors.²³ The due diligence process for factors has many similarities with the search for alpha. For example, the investor must:

- Assess the talent of the people designing the strategy and understand how it's implemented.
- Have a logical rationale for why the active investment process will have a reasonable chance of producing a certain outcome.
- Evaluate to what extent management and various implementation costs will erode the strategy's desired benefit.
- Have the patience to handle sharp, prolonged periods of underperformance relative to a broad, capitalization-weighted index.

Our framework allows investors to consider alpha and factor-seeking strategies together to determine the mix consistent with their goals, beliefs, and circumstances. A critical step is to assess the combined attributes of the active allocation when it consists of multiple alpha or factor strategies. This analysis will reveal whether the strategies' aggregate active exposures (their combined security, sector, factor, country, and regional weights, for example) reflect the investor's objectives. If they do not, it can help determine the trade-offs inherent in shifting to more suitable weightings.

Finally, as part of ongoing due diligence, the investor must regularly gauge whether the active results have been and will likely continue to be driven by the desired exposures in the most cost-effective way.²⁴

²³ General information on factor-based investing is contained in Pappas and Dickson (2015). A detailed discussion of important considerations for equity factor-based investment vehicles is contained in Grim et al. (2017).

²⁴ For an example of a famous ex-post assessment conducted on the Norwegian Government Pension Fund, see Ang, Goetzmann, and Schaefer (2009).

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