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October 2026

The power of diversification: Why skewness in stock returns makes it so difficult to beat the market

- **Most stocks don't beat the market.** Since 1990, around 75% of US equities underperformed the index, making successful stock picking harder than many investors realise.
- **A handful of winners drive long-term returns.** Just 10 stocks accounted for more than 30% of all wealth created by the US stock market across US equities between 1990 and 2025.
- **Missing the winners hurts more than avoiding the losers helps.** Long-term market performance is driven by a small number of exceptional companies, making broad exposure critical.
- **Diversification reduces the odds of underperformance.** Holding more stocks reduces the likelihood of missing the market's biggest contributors and underperforming the index.
- **Indexing captures tomorrow's winners.** A broadly diversified market portfolio helps investors participate in the full return potential of the market without needing to identify future outperformers in advance.

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Over the past three decades, most individual stocks have failed to outperform either the broader equity market or even the risk-free rate – yet equity markets have delivered strong long run returns. Using Russell 3000 data, we show that this apparent contradiction reflects a defining feature of equity investing: long term outcomes are driven by a small number of stocks. The magnitude of this concentration is striking. Just 10 stocks out of 12,500 contributed as much as 31% to total wealth creation between 1990 and 2025 **(see Figure 1)[1].**

FIGURE 1

Top 10 contributors to wealth creation

Name	Share of total wealth creation	Share of total wealth creation (cumulative)	Years in index
Alphabet (A & C)	6.18%	6.18%	21
Microsoft	5.33%	11.51%	36
Apple	4.21%	15.72%	36
Altria	4.11%	19.83%	36
Eli Lilly	2.67%	22.50%	36
NVIDIA	2.47%	24.97%	26
Wal-Mart	2.10%	27.07%	36
Exxon Mobil	1.59%	28.66%	36
IBM	1.38%	30.04%	36
GE Aerospace	1.27%	31.31%	36

Note: The table displays the share of wealth creation based on stocks that were included in the Russell 3000 at any point between January 1990 and December 2025. Each stock's wealth creation is computed by an investment into the stock to the extent of its market capitalisation by the time it was first included in the index, which then grew either with the stock's performance (while in the index) or with the risk-free rate (while outside of the index). Over the time period observed, we counted around 12,500 individual securities. Capital increases and/or reductions are not taken into account. Returns are measured in USD total return. For Alphabet, we combine both share classes, A and C (with class A having been in the index for 21 years and C for 11 years as of December 2025).

Source: Vanguard calculations based on data from FactSet.

What's more, as many as 75% of the roughly 12,500 stocks included in the Russell 3000 since 1990 underperformed the index itself, and 56% even failed to outperform the risk-free rate[2].

This skewness has an important implication: matching or even exceeding market returns depends on holding the few stocks that generate them. This asymmetry becomes even more apparent when we consider the importance of holding the market's biggest winners. As we illustrate in this paper, capturing a small number of exceptional performers matters far more than avoiding a similar number of losers. Missing the top 10, 50 or 100 contributing stocks would have reduced overall portfolio returns far more than excluding an equivalent number of the worst performers would have improved them **(Figure 5)**.

This phenomenon is not unique to finance. It reflects a broader **power law** dynamic that appears across many economic and social systems, whereby a relative change in one quantity gives rise to an outsized relative change in the other quantity. A relatively small set of songs capture a large share of Spotify listens[3] and the top tennis player can earn as much as 33x more than the 100th-ranked player[4]. Equity market wealth creation follows the same pattern: the right tail of the distribution dominates the aggregate outcome.

1 The computation of wealth creation assumes an initial investment to the extent of the company's market capitalisation at time of IPO and/or index inclusion. To disentangle the effect of return skewness (which evolves through time) from the weighting effect (i.e., the initial condition), we reran the analysis by assuming all companies to have the same size. While seven out of the top ten companies are different, the return skewness is still highly pronounced with the top ten companies accounting for 22% of all value created. What's more, the company-rank correlation between cap-weighted and equal-weighted value creation is as high as 87%. The cross-sectional skewness of equity returns is not just a US phenomenon. Bessembinder (2023) finds this phenomenon exists across global equity markets.

2 The cross-sectional skewness of equity returns is not just a US phenomenon. Bessembinder (2023) finds this phenomenon exists across global equity markets.

3 Source: Spotify, Music Business Worldwide, Chartmasters and DemandSage, 2025.

4 Source: Association of Tennis Professionals, 2025.

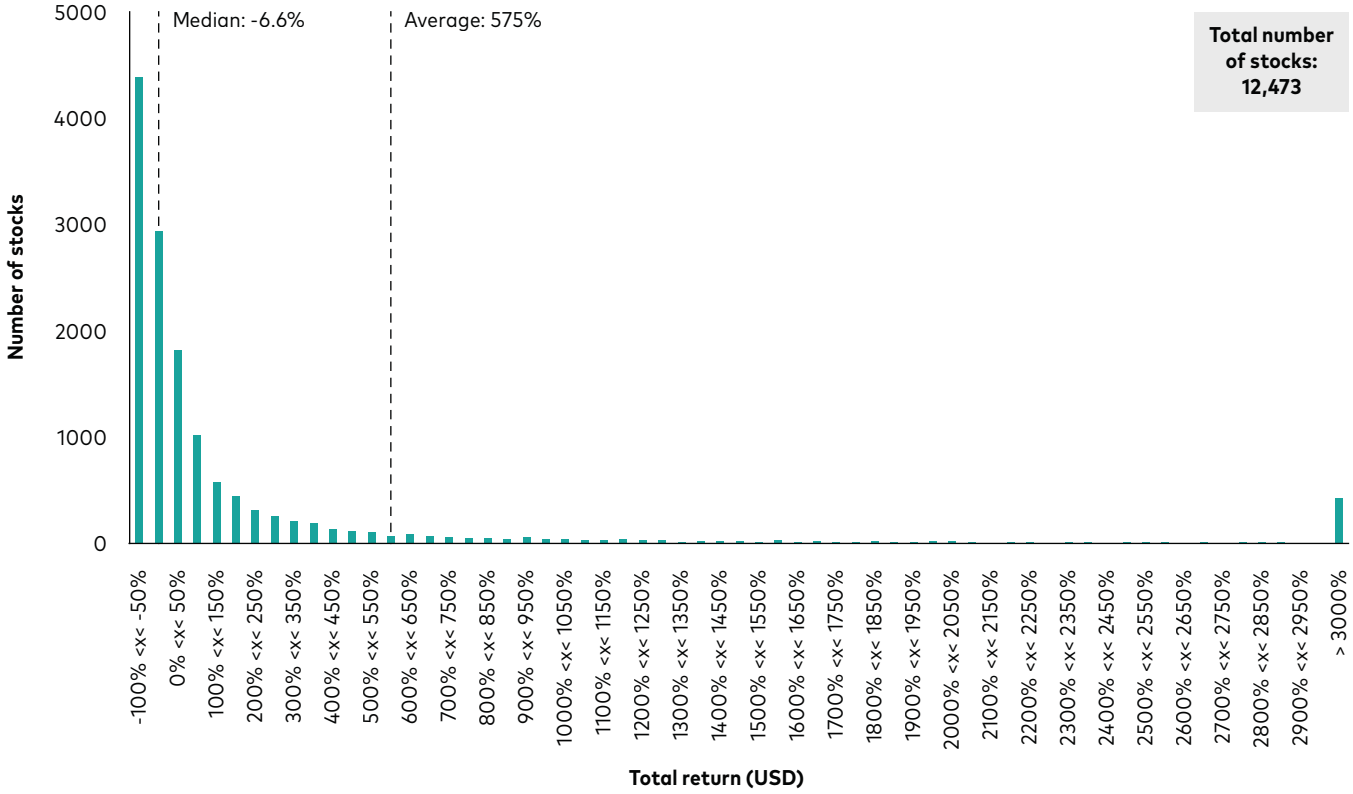
Why stock returns are inherently skewed

The roots of this positive skewness lie in a simple first principle of investing. For any individual stock, the maximum loss is limited to 100% of the capital invested, while the potential gain is theoretically unlimited. Over long horizons, this asymmetry compounds dramatically. We are often taught that "trees do not grow to the sky," but in equity markets some do. The gains generated by a handful of extraordinary winners can overwhelm the losses from a much larger number of disappointing investments. As a result, long-term equity returns are driven less by avoiding losers than by successfully identifying – and, crucially, continuing to hold – the rare companies that compound value for decades.

Figure 2 displays this phenomenon for stocks included in the Russell 3000 since January 1990.

FIGURE 2

The winners make it all: stock returns are heavily skewed



Note: The charts display the distribution of returns of Russell 3000 constituents while they were in the index. The time period observed ranges from January 1990 to December 2025. Returns are measured in USD total return.

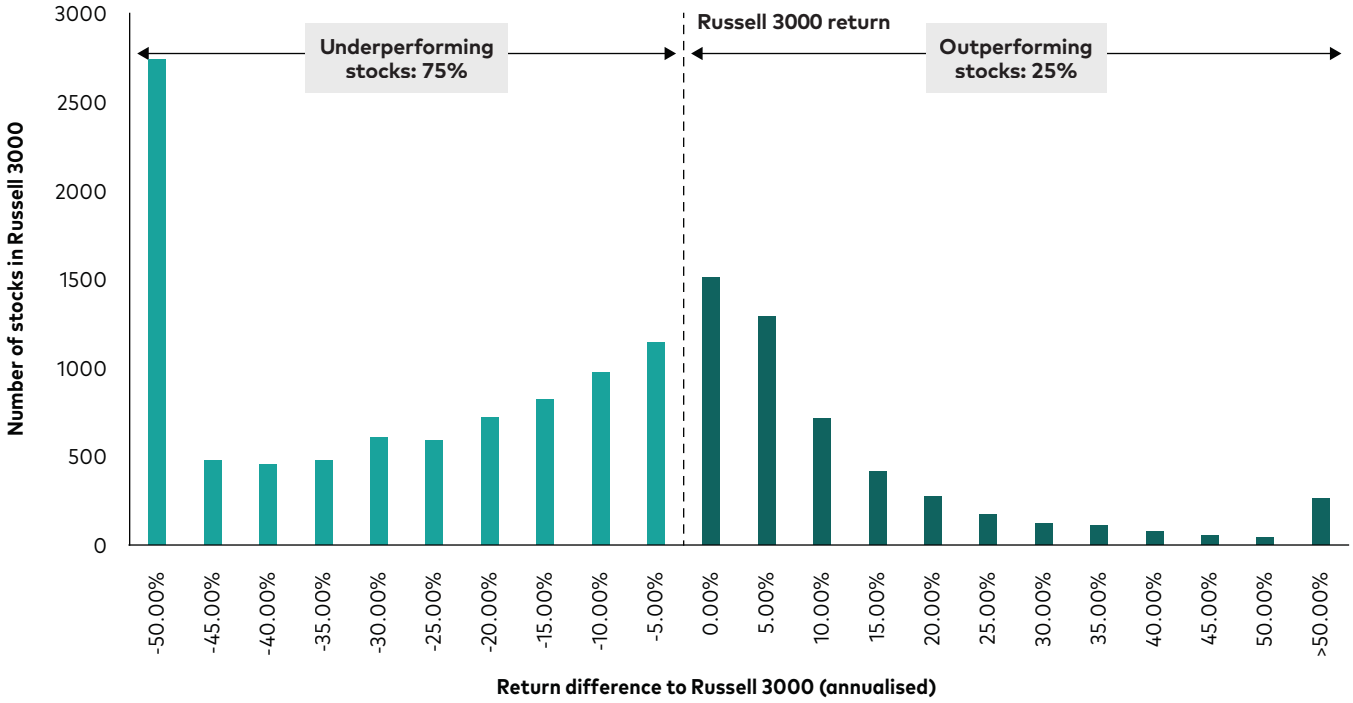
Source: Vanguard calculations based on data from FactSet.

While the average performance across all companies in the index was as high as 575%, the performance of the median stock in our sample declined by -6.6%. This is another manifestation of the positive skewness of returns: averages are impacted by (in our case positive) outliers while medians are not.

Another and perhaps more intuitive way to show this is to compare each stock's return with the index return over the same period. **Figure 3** displays the results.

FIGURE 3

Since 1990 the majority of stocks *underperformed* the Russell 3000



Notes: The charts display the distribution of annualised returns of stocks in excess of the Russell 3000 index while they were in the Russell 3000. Only stocks that were included in the index for at least 1 year have been taken into account. The time period observed ranges from January 1990 to December 2025. Returns are measured in USD total return.

Source: Vanguard calculations based on data from FactSet.

As many as three-quarters of stocks underperform the index they belong to – highlighting how difficult it is to beat the market. Investors must identify and hold the minority of stocks that don't underperform the index for their portfolio to outperform. In practice, this means selecting a sizeable portion of the roughly 25% of stocks that lie to the right of the Russell 3000 threshold in the distribution.

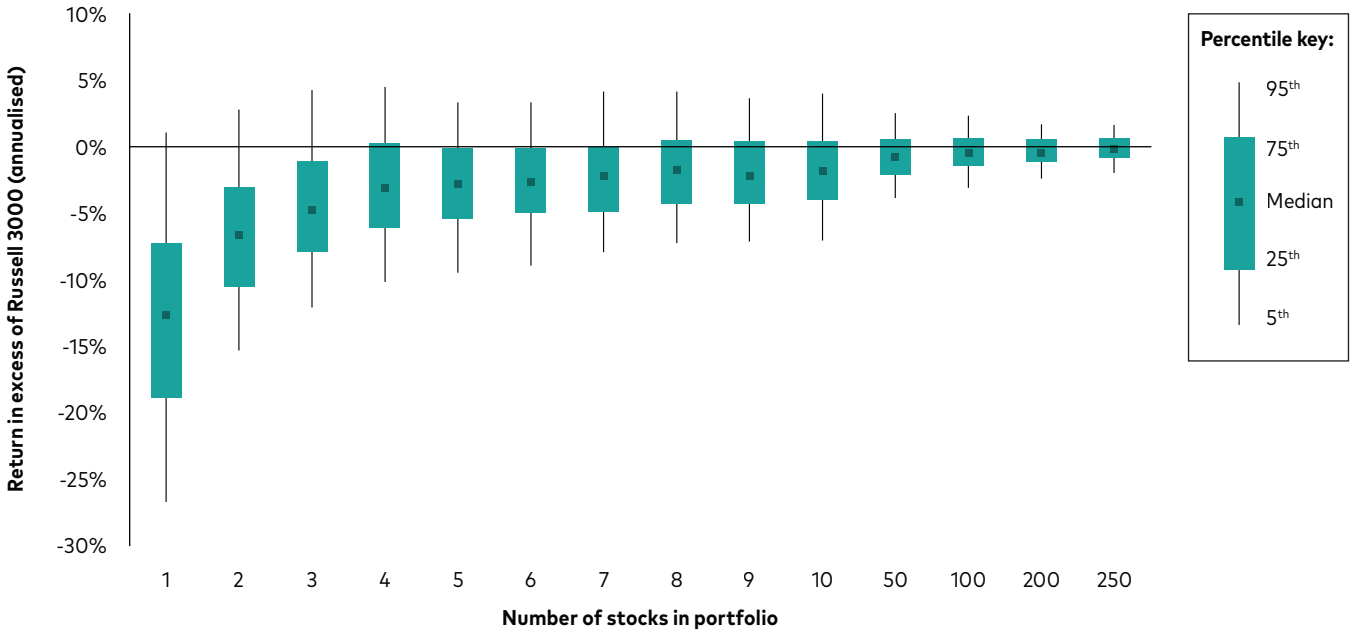
Outperformance becomes harder as portfolio size decreases. With fewer holdings, the probability of missing the relatively small set of outperforming stocks rises materially. **Figure 4** illustrates this effect, showing the distribution of outcomes for portfolios constructed by randomly selecting stocks from the Russell 3000[5,6].

5 This phenomenon has been discussed in detail in Tidmore et al. (2019).

6 To disentangle the skewness effect from the weighting effect, we reran the analysis based on an equal weighted Russell 3000 and find the pattern to be identical.

FIGURE 4

Increasing the number of holdings reduces the likelihood of underperforming the market



Notes: The charts display the distribution of returns of hypothetical portfolios made up of a varying number of randomly selected securities held at a time in excess of the return of the Russell 3000 index. With this varying number ranging from 1 to 250 (see x-axis). Each box-and-whisker plot is based on 500 simulated backtests. The time-period observed ranges from January 1990 to December 2025. Returns are measured in USD total return.

Had we selected just one stock out of the 3000 stocks in the Russell 3000 at random, each quarter the median expected return would have been 13 percentage points per year *lower* than that of the Russell 3000. As the data shows, increasing the number of stocks in a portfolio reduces this performance disadvantage.

From FOMO to 'ROMO'

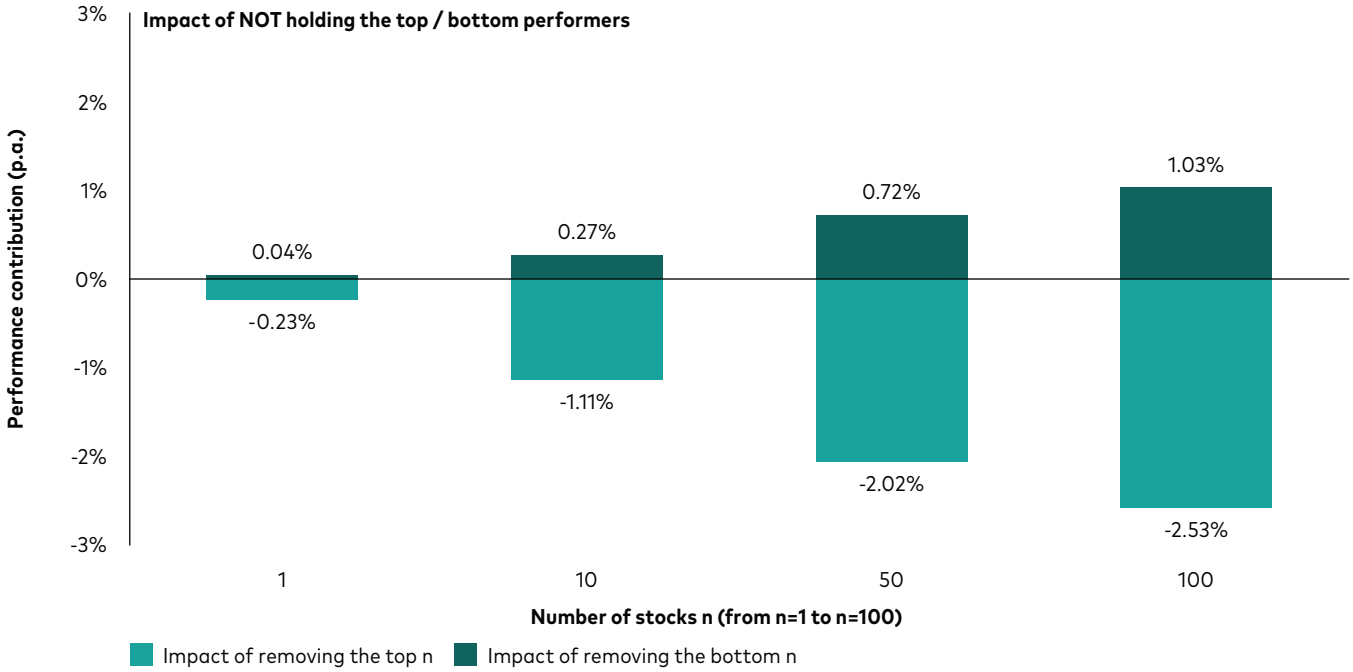
So far, we can conclude that equity investors face a substantial risk that we might call 'ROMO' – the **R**isk **O**f **M**issing **O**ut on the small number of stocks that drive returns.

However, as we saw in **Figure 2**, a sizeable number of stocks have had highly negative returns while they were in the index, leading some investors to the conclusion that it is more efficient to avoid the biggest detractors rather than trying to pick the winners.

Which side is correct – is it more effective to avoid the biggest detractors or to hold the biggest winners? The answer is displayed graphically in **Figure 5**.[7]

FIGURE 5

Missing winners outweighs avoiding losers



Notes: The charts display return difference between the Russell 3000 TR and the Russell 3000 TR excluding individual stocks. For the computation of "Russell 3000 ex stocks n" indices, the weight of all excluded stocks n has been distributed across all remaining stocks in proportion with their (freefloat) market capitalisation. Returns of stocks that did not span a full calendar year's quarter have been excluded from our simulation. Time-period considered: Jan. 1990 to Dec. 2025. Returns are in USD Total Return.

Source: Vanguard calculations based on data from FactSet.

For the Russell 3000, we find that missing out on the best, 10-, 50- or even 100-best contributing stocks would have far outweighed the benefit of not holding the worst, 10-, 50- or 100-worst contributing stocks[8].

7 To disentangle the skewness effect from the weighting effect, we reran the analysis based on an equal weighted Russell 3000 and find the pattern to be identical (albeit with lower magnitudes in performance impact).

8 Over shorter periods, however, we find that the dominating side is significantly driven by the performance of large caps vs. small caps. If large caps underperform small caps, not holding the worst performers of cap weighted markets (i.e., large caps) would have typically helped, of course.

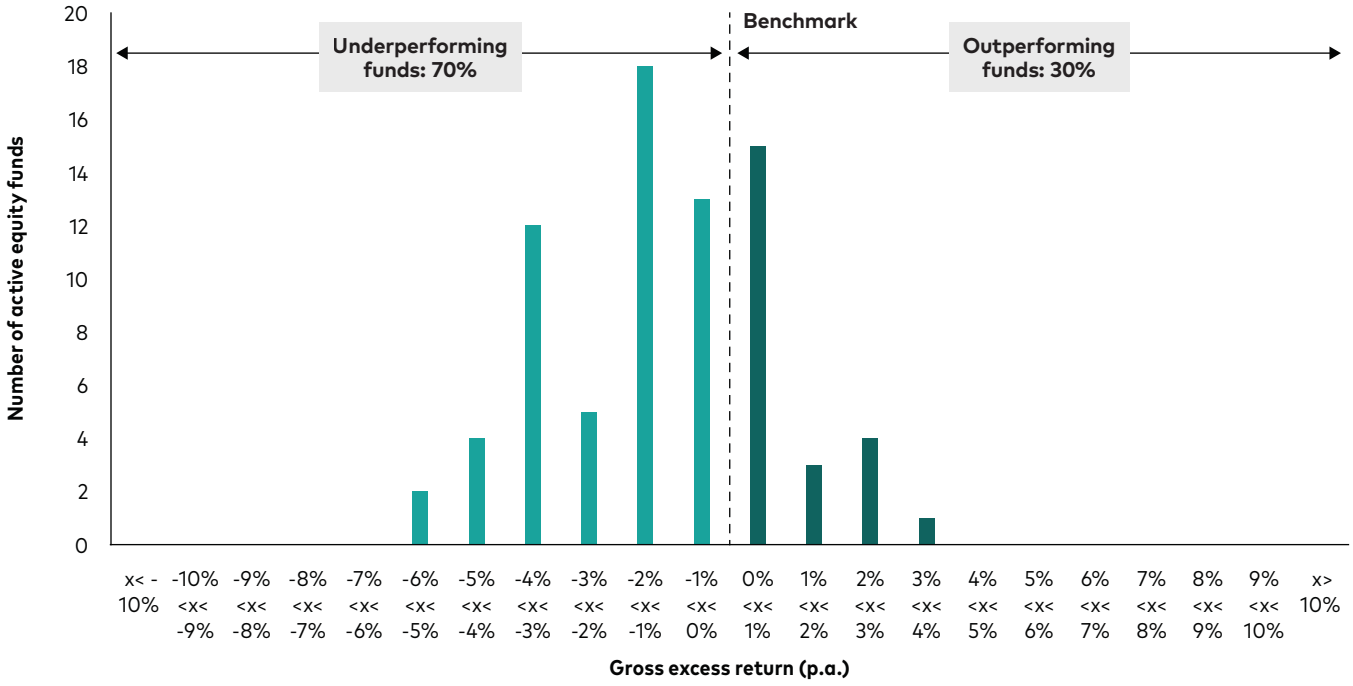
This asymmetry has direct implications for portfolio construction

Non-total market portfolios are, by definition, less likely to capture stocks that outperform the market, let alone the few extreme winners to the very right of the cross-sectional distribution of returns. This has implications for more narrow portfolios, such as most actively managed funds. If they happen to hold those stocks that outperform in a large enough proportion, so will they. However, the odds to do so are stacked against them – odds that active managers must overcome with skill.

Figure 6 shows that only about 30% of active funds benchmarked against broad indices, such as the Russell 1000 and the Russell 3000, outperformed their benchmark over a ten-year period – even on a *before-cost* basis[9].

FIGURE 6

Most active funds benchmarked against the Russell 3000 underperform



Notes: The chart displays the difference in return between US-domiciled active funds that benchmark themselves against the Russell 1000 and Russell 3000 and fall into the Morningstar categories large cap blend, large cap value and large cap growth. Returns are measured in USD before fees over 10 years ending on 31 December 2025. Past performance information is given for illustrative purposes only and should not be relied upon as, and is not, an indication of future performance.

Source: Vanguard calculations based on data from Morningstar.

9 Further supporting our simulation-based assumption, Tidmore et al. (2019) find a positive correlation between the return of actively managed US equity funds in excess of their benchmarks and their number of holdings: the larger (fewer) the number of holdings, the higher (lower) excess returns tended to be. This finding, robust to the addition of controls such as turnover, costs, sector and factor concentration, underscores that reducing the number of stocks in a portfolio increases the hurdle that active managers need to take to outperform.

Conclusion

Equity returns are not evenly distributed. Instead, they are highly concentrated, with a small number of stocks accounting for a disproportionate share of long-term wealth creation.

This concentration creates a fundamental challenge for investors. To match the market – and even outperform it – an investor must own parts of the relatively small number of stocks that generate a disproportionate share of long-term wealth creation.

One approach is to try to identify these winners in advance. Active managers seek to do this through stock selection and market timing. While some managers are successful, the proportion that outperforms after-costs is relatively small. By definition, pursuing outperformance requires accepting the risk of underperformance.

For investors who do not wish to bear that risk, owning the entire market offers a compelling alternative. A broadly diversified market portfolio ensures exposure to the winners of today and tomorrow, including the handful of extraordinary companies that may go on to drive a large share of future market returns.

Viewed through this lens, diversification is about more than reducing portfolio risk. It is also a powerful way of increasing the likelihood of capturing the market's full return potential. In a world where a small number of exceptional companies account for a large share of wealth creation, broad diversification helps ensure that those future winners are included in the portfolio before they are known.

As John Bogle famously put it: "Don't look for the needle in the haystack. Just buy the haystack."

Addendum: Evidence from the literature

Our findings are consistent with a well-established body of academic research.

Bessembinder (2018) shows that the majority of US stocks have failed to outperform Treasury bills over their lifetime, with aggregate equity market gains driven by a relatively small subset of outperformers. This reinforces the idea that equity returns are highly positively skewed. Bessembinder (2023) extends this analysis to 64,000 global stocks.

More recently, Fletcher & O'Connell (2026) document similar patterns over 50 years of UK equity market data.

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