

The global case for strategic asset allocation

Vanguard research

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Executive summary. The importance of choosing a strategic asset allocation is now common knowledge to those in the investment advisory community. For general investors the question remains, however: How *does* asset allocation affect your risk-and-return expectation?

Research over the past 25 years has attempted to answer this question. The seminal paper by Brinson, Hood, and Beebower (henceforth BHB), “Determinants of Portfolio Performance,” published in 1986, concluded that asset allocation is the primary driver of a portfolio’s return variability for broadly diversified portfolios. Our research expands upon BHB’s and other studies, including previous Vanguard research (notably, Davis, Kinniry, and Sheay, 2007), by applying the BHB methodology and enlarging the dataset to four key mutual fund markets—the United States, Canada, the United Kingdom, and Australia—spanning various periods from January 1962 through December 2011. Similar to Vanguard’s earlier conclusions, we found that:

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Note: This paper is a revised and updated version of a 2007 Vanguard paper by Davis, Kinniry, and Sheay titled *The Asset Allocation Debate: Provocative Questions, Enduring Realities*.

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- Broadly diversified balanced funds with limited market-timing tended to move in tandem with the overall financial markets over time in all four countries studied. Our empirical analysis, as originally performed by Brinson and colleagues, illustrated the significance of a broadly diversified asset allocation maintained through index funds.
- Significant performance dispersion across portfolios was produced by active management in the four countries studied. Our analysis, based on work first published by William W. Jahnke (1997), also supported the possibility of outperformance based on an investor selecting a “winning” actively managed fund.
- The ultimate concern in the active/passive decision is whether active management can increase the returns and/or decrease the experienced volatility of a portfolio. We found, on average, that active management has reduced a portfolio’s returns and increased its volatility compared to a static index-based implementation of the portfolio’s asset allocation policy. At the same time, our findings supported the view that active management can create an opportunity for a portfolio to outperform appropriate market benchmarks.

Brinson, Hood, and Beebower’s landmark 1986 findings on asset allocation and its effect on a portfolio’s return variability are well known to the portfolio management community. Yet, disagreements over the findings’ relevance to investors and varied interpretations of the research within the investment management industry have inspired a 25-year debate. To provide a framework for Vanguard’s own updated analysis and results, this paper first briefly reviews two studies at the core of this debate: BHB’s paper and William W. Jahnke’s “The Asset Allocation Hoax” (1997). We then expand upon Vanguard’s past research, most notably *The Asset Allocation Debate: Provocative Questions, Enduring Realities* by Davis et al. (2007).

A look back at the asset allocation debate

In 1986, Brinson and his colleagues concluded that a portfolio’s static target asset allocation explained the majority of a broadly diversified portfolio’s return variability *over time*. These findings were subsequently confirmed by Ibbotson and Kaplan in 2000, as well as by Vanguard research (in Davis et al., 2007), suggesting that a portfolio’s investment policy is an important contributor to return variability (Hood, 2005). Investment advisors have generally interpreted the research to mean that selecting an appropriate asset allocation is more important than selecting the individual funds that are used to implement the allocation. Vanguard’s findings indicate that both are important, yet we

Notes on risk: All investing is subject to risk. Past performance is no guarantee of future results. Investments in bond funds are subject to interest rate, credit, and inflation risk. Foreign investing involves additional risks including currency fluctuations and political uncertainty. Diversification does not ensure a profit or protect against a loss in a declining market. 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. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

suggest the following sequence for decision-making in the portfolio-construction process: The asset allocation policy decision should be the priority, and the strategy used to implement it should be secondary.

In 1997, Jahnke argued that Brinson et al.'s focus on explaining return variability over time ignored the wide dispersion of total returns among broadly diversified active balanced funds over a specific time horizon. In other words, Jahnke claimed that a portfolio could achieve very different wealth levels as of the end of an investment time horizon, depending on which (active) fund or funds were selected. Jahnke's analysis emphasized that, as a result of active management strategies, actual returns earned should be examined *across* different active balanced funds with a set time horizon. It is correct that the BHB study did not show that two funds with the same asset allocation can have very different total returns. The research we report here confirms the findings of both studies and views them as separate analyses that ultimately helped us address the question: Can active management increase a portfolio's returns without increasing the volatility experienced?

Our analytical framework

To determine the relative performance of asset allocation and active management, we needed to distinguish between a portfolio's *policy return* (or asset-allocation return)—that is, what a portfolio could have earned if it recreated its policy allocation with passively managed index funds—and its *actual return*, the active balanced fund's return earned over the period. Our empirical case tested BHB's and Jahnke's (1997) studies on a global scale, using a greater number of balanced mutual funds for the first time.

For our analysis, we selected balanced mutual funds from the Morningstar Direct database. The data included monthly net returns and fund characteristics such as expense ratios and turnover rates. To ensure reliability, we only analyzed funds with at least 48 months of return history. We constructed each balanced fund's policy portfolio using Sharpe-style analysis (1991). (See box on page 9, for a listing of

benchmarks used in our analysis, by country.) Among these funds, we selected total-return funds, income funds, asset allocation funds, and traditional balanced funds. For more details on our data and procedures, see the appendix.

Time-series regression (per Brinson et al., 1986)

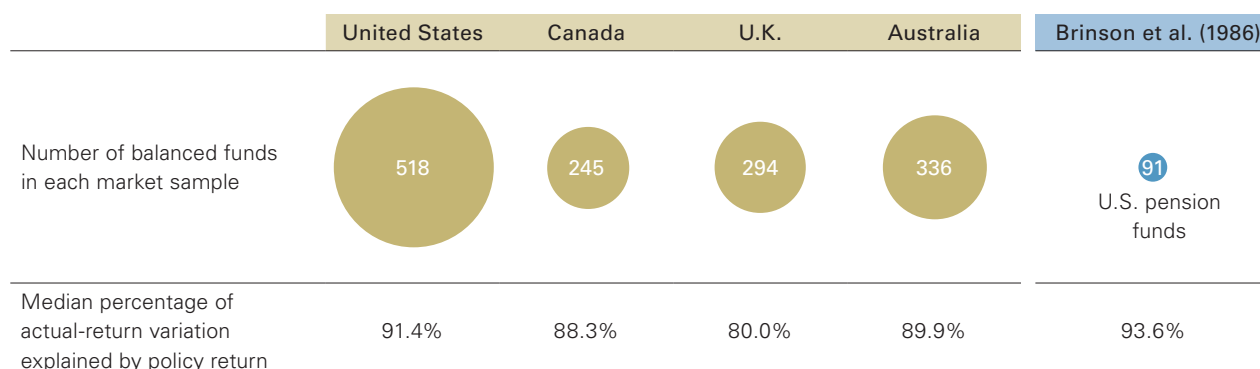
Return variability measures the extent to which actual returns diverge from the policy returns. Therefore, greater variability in returns would suggest a wider possibility of returns and a lessened ability to predict results, inherently indicating increased portfolio volatility. The variation in the policy return that explains the percentage of variation in the actual return is measured by the adjusted R-squared (R^2) derived from a time-series regression analysis of the fund's actual return versus its policy return. Therefore, a high adjusted R^2 would mean that variations in the policy return explained a high percentage of the variation in fund returns.

BHB's 1986 conclusions were derived from the results of a time-series analysis measuring the effect of asset allocation on return variability. As stated, a time-series analysis compares the performance of a policy (long-term) asset allocation represented by appropriate market indexes with the actual performance of a portfolio over time. Our results confirmed BHB's findings that, on average, most of a portfolio's return variability over time was attributed to the ups and downs of its policy asset allocation. Active investment decisions—such as market-timing and security selection—had relatively little impact on return variability over time.

It is important to acknowledge that BHB's dataset was pension funds, which are typically exposed to a high level of systematic market risk, resulting in high R^2 numbers in relation to the funds' actual returns versus the returns of their policy portfolios over time. BHB's analysis concluded that more than 90% of return variability over time could be explained by the asset allocation policy. Ibbotson and Kaplan (2000), Vanguard research in Davis et al. (2007), and our current research found similar results for the balanced mutual fund universes in the United States,

Figure 1. Role of asset allocation policy in return variation of balanced funds

Selected periods, January 1962 through December 2011



Notes: For each fund in our sample, a calculated adjusted R^2 represented the percentage of actual-return variation explained by policy-return variation. Percentages stated in the figure—91.4%, 88.3%, 80.0%, and 89.9%, for the United States, Canada, the U.K., and Australia, respectively—represent the median observation from the distribution of percentage of return variation explained by asset allocation for balanced funds. For the United States, the sample included 518 balanced funds for the period January 1962–December 2011; for Canada, 245 balanced funds for January 1990–December 2011; for the U.K., 294 balanced funds for January 1990–December 2011; and for Australia, 336 balanced funds for January 1990–December 2011. Calculations were based on monthly net returns, and policy allocations were derived from a fund’s actual performance compared to a benchmark using returns-based style analysis (as developed by William F. Sharpe) on a 36-month rolling basis. Funds were selected from Morningstar’s Multi-Sector Balanced category. Only funds with at least 48 months of return history were considered in the analysis, and each fund had to have a greater-than-20% long-run equity exposure, both domestic and international (based on the average of all the 36-month rolling periods), and a greater-than-20% bond allocation (domestic and international) over its lifetime. The policy portfolio was assumed to have a U.S. expense ratio of 1.5 basis points per month (18 bps annually, or 0.18%) and a non-U.S. expense ratio of 2.0 bps per month (24 bps annually, or 0.24%).

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

Canada, the United Kingdom, and Australia, with percentages slightly lower than BHB’s findings (see **Figure 1**). As the figure shows, asset allocation largely contributed to return variability over time. We again stress that, in our view, determination of a portfolio’s asset allocation should take priority over its implementation strategy. The asset allocation is key in managing the range, or variability (experienced volatility), of a portfolio’s returns over time.

Cross-sectional regression (per Jahnke, 1997)

The adjusted R^2 derived from a cross-sectional regression analysis of the fund’s actual return versus its policy return is used to measure the degree to which an asset allocation (passive) policy compared with an active management strategy explains the dispersion of returns across funds over the same time horizon.

In considering Jahnke’s (1997) emphasis on determining how much asset allocation affects actual portfolio return dispersion across funds, we ran a cross-sectional analysis to compare actual returns to policy returns. Both our and Jahnke’s analyses resulted in low R^2 numbers (see **Figure 2**). In other words, active management implemented by taking idiosyncratic risks and differential exposure to systematic risk factors (such as factor or tactical overweights) can create significant return dispersion across active balanced funds, resulting in a low R^2 . Jahnke believed that investors care about actual returns and the range of possible investment outcomes at the end of their time horizons, rather than about return variability, or the volatility experienced over time. Jahnke’s analysis confirmed that some actively managed funds can outperform their policy portfolios on an individual basis.

Vanguard’s previous and latest research supports BHB’s finding that “broadly diversified” balanced-fund returns move in tandem with broad markets over time. And Jahnke’s (1997) study found that

Figure 2. Role of asset allocation policy: Return dispersion of balanced funds

Selected periods, January 1962 through December 2011

| | United States | Canada | U.K. | Australia |
|--|---------------|--------|-------|-----------|
| Median dispersion explained by policy return | 38.0% | 22.5% | 23.0% | 32.8% |

Notes: See notes to Figure 1 for details of study sample for each country. The policy portfolio was assumed to have a U.S. expense ratio of 1.5 bps per month (18 bps annually, or 0.18%) and a non-U.S. expense ratio of 2.0 bps per month (24 bps annually, or 0.24%).

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

actual returns can vary across funds over a specific time horizon. Thus, an investor may ultimately be concerned with whether active management can increase a portfolio's return without increasing the portfolio's experienced volatility.

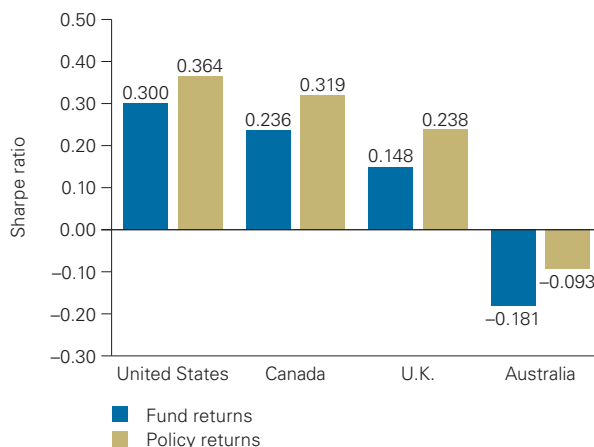
What matters most to investors: Return and risk

Brinson et al.'s (1986) most important contribution was to attribute a portfolio's return variability to indexed static asset allocation policy, security selection, and market-timing components. The authors showed that, on average, the actively managed pension funds they studied had been unable to add value, either through market-timing or security selection, beyond their static indexed policy returns. This result was consistent with the observation that indexing outperforms a significant portion of active portfolios in equity and bond markets (Philips, 2012).

We examined actual-return performance by comparing actual versus policy returns. We thus calculated the average return of a fund's asset allocation policy as a percentage of the fund's long-term average return and computed the ratio of a fund's policy volatility over its actual volatility. These two calculations helped us determine how both an investor's policy and active management strategies have performed in the past. We found that active funds added to volatility levels and underperformed the benchmark, on average (as reflected in **Figures 3** and **4**). From January 1962 through December 2011, 68% of active balanced funds in the United States underperformed their policy portfolios. We found that, on average, a greater degree of active management reduced both time-series and cross-sectional R^2 , but

Figure 3. Sharpe ratio of median fund returns and policy (asset-allocation) returns

Selected periods, January 1962 through December 2011



Notes: The Sharpe ratio calculates return (reward) per unit of risk. For each fund, we calculated the Sharpe ratio as the arithmetic average of the time-series fund returns adjusted for each country's domestic cash rate, divided by the respective standard deviation for each fund. We did the same for each fund's policy returns and took the median across all funds for both the fund returns and policy returns and annualized each figure by multiplying by the $\sqrt{12}$. For each country's cash index, see box on page 9.

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

did not necessarily increase performance. On average, active management risk is not compensated (Sharpe, 1991), yet it is compensated if skill overcomes hurdles such as tendencies toward higher costs and turnover of active management. In addition, in recent Vanguard research, Wallick, Bhatia, and Cole (2010) attempted to quantify an optimal active and index allocation for investors with differing skill levels for choosing managers who outperform their benchmark; that study's results

showed that indexing was valuable for all investors when considering the level of return per unit of risk taken.

The Sharpe ratio helps us measure the risk-and-return trade-off. The ratio is the equity-risk premium versus the standard deviation, which provides a better measure of how much return we derive for every unit of risk taken. The higher the ratio, the better risk-adjusted return you will have on the chosen investment. Figure 3 shows a clear spike in returns per unit of risk taken in the policy over the fund's actual returns. The higher risk taken in the fund relative to the policy comes from active management strategies such as market-timing and stock selection.

Characteristics of funds with positive and negative alpha

Our results show that the average actively managed fund reduced returns and increased return variability compared with funds that mirrored the policy

benchmark. The analysis also highlighted some actively managed balanced funds that have significantly outperformed their policy benchmarks over time. What are the general characteristics of these “winning” funds? And how do they compare with the broader universe of active balanced funds?

Figure 4 sorts the study's universe of U.S. balanced funds into three cohorts: (1) funds that posted a statistically significant positive “excess return,” or alpha, over their estimated policy benchmarks (that is, 28 of the 518 U.S. balanced funds, or about 5% of the sample), (2) those funds that significantly trailed the performance of their policy allocations (18% of U.S. funds), and (3) the remainder of the funds, whose average excess return was calculated at approximately zero (77% of the U.S. funds).¹

Figure 4 reveals that the “winning” active balanced funds in the United States outperformed their policy benchmark returns by 2.5 percentage points per year, on average. The funds that consistently underperformed trailed their policy benchmarks by

Figure 4. Averages of fund characteristics across study's U.S. balanced funds

| | All U.S. balanced funds | Funds with statistically significant positive alpha | Funds with statistically significant negative alpha | Funds with zero alpha |
|--|-------------------------------|--|--|--------------------------|
| Risk and return (average across funds) | | | | |
| Average annualized alpha | −0.76% | 2.51% | −2.65% | −0.54% |
| Policy return as percentage of actual return | 104.9% | 72.7% | 122.8% | 102.9% |
| Policy volatility as percentage of actual volatility | 93.9% | 93.6% | 96.7% | 93.2% |
| Return variability explained by policy variability | 87.9% | 84.4% | 91.2% | 87.4% |
| Average fund characteristics | | | | |
| Expense ratio | 0.89% | 0.70% | 1.17% | 0.84% |
| Net assets (\$ millions) | \$781.3 | \$5,231.4 | \$419.5 | \$552.2 |
| Turnover | 69.59% | 67.13% | 83.04% | 66.62% |
| Number of funds | 518 | 28 | 93 | 397 |

Note: Funds with consistent positive (or negative) excess return (alpha) had statistically significant alpha using a 95% one-sided *t*-test for statistical significance.

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

¹ Funds whose excess returns were statistically different from zero at the 95% confidence level using a one-sided *t*-test were classified into the “statistically significant alpha” categories in Figure 4.

an average of –2.7 percentage points per year. As shown in the figure, outperforming funds achieved higher returns than their policy allocations (72.7% policy-to-actual-return ratio) by incurring more active management risk (93.6% policy-to-actual-volatility ratio). Conversely, underperforming funds earned a lower return than their policy allocations (122.8% policy-to-actual-return ratio) while incurring more active management risk than their benchmarks (96.7% policy-to-actual-volatility ratio).

Although manager skill certainly plays a role in distinguishing positive-alpha from negative-alpha funds, other differences shown in Figure 4 are noteworthy. In general, we found that “winning” active funds had lower expenses, lower portfolio turnover, and more assets under management than the consistently underperforming funds.

Conclusions for all markets

Results of Vanguard’s latest research for U.S., Canadian, U.K., and Australian funds were proportionately much the same in terms of the degree to which asset allocation was found to explain return variability over time and dispersion of returns across funds. Our analysis—which expanded upon the work of Brinson et al. (1986), whose findings were later confirmed in Vanguard research by Davis et al. (2007)—reinforced the view that asset allocation explains the majority of a portfolio’s return variability. For investors who held broadly diversified portfolios, asset allocation was the primary driver for return variability. In addition, we found that indexed policy portfolios provided, on average, higher returns and lower volatility than actively managed funds. Furthermore, we concluded that the portfolio construction process should begin with an investor choosing an asset allocation policy. An investor can then determine the strategy for implementing the policy decision, based on his or her risk-and-return expectations.

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Some key terms

Alpha. A risk-adjusted measure of the “excess return” provided by an investment compared with a benchmark. Alpha can be positive, negative, or zero.

Expense ratio. A mutual fund's annual operating costs expressed as a percentage of average net assets.

Net assets. The closing market value of a fund's assets minus its liabilities.

R-squared (R^2). A measure of how much of a portfolio's performance can be explained by the returns from the overall market (or a benchmark index).

Regression analysis. Statistical technique that can be used to explain the nature and strength of the relationship between a dependent variable (Y) and one or more other independent variables.

Return dispersion. The difference in funds' cumulative returns. In this paper, return dispersion means the difference between multiple funds' returns over a specific time horizon relative to the funds' appropriate policy benchmarks. We use the term to discuss Jahnke's (1997) study, which

measured return dispersion through a cross-sectional analysis.

Returns-based style analysis. A statistical method for inferring a fund's effective asset mix by comparing the fund's returns with the returns of asset-class benchmarks. Developed by William F. Sharpe, RBSA is a popular attribution technique because it doesn't require tabulating the actual asset allocation of each fund for each month over time; rather, it regresses the fund's return against the returns of asset-class benchmarks.

Return variability. The difference in returns between a balanced fund and its appropriate policy benchmark. We use this term in discussing Brinson et al.'s (1986) study, which focused on measuring return variability through a time-series analysis.

Sharpe ratio. A measure of excess return per unit of deviation in an investment.

Systematic risk. A security's vulnerability to events that affect broad-market returns.

Turnover. An indication of a fund's trading activity. Turnover represents the lesser of aggregate purchases or sales of securities divided by average net assets.

Benchmarks used in our analysis (all returns in local currency):

United States. *Equities:* S&P 500 Index (January 1962–August 1974), Wilshire 5000 Total Market Index (September 1974–April 2005), MSCI US Broad Market Index (May 2005–December 2011). *Bonds:* S&P High Grade Corporate Index (January 1962–December 1968), Citigroup High Grade Index (January 1969–December 1972), Lehman Brothers U.S. Long Credit Aa Index (January 1973–December 1975), Barclays Capital U.S. Aggregate Bond Index (January 1976–December 2011). *Cash:* Ibbotson U.S. 30-Day Treasury Bill Index (January 1962–December 1977), Citigroup 3-Month U.S. Treasury Bill Index (January 1978–December 2011).

Canada. *Equities:* S&P/TSX Composite Index (January 1990–December 2011). *International equities:* MSCI All-Country World Index ex-Canada (January 1990–December 2011). *Bonds:* DEX Universe Bond Index (January 1990–December 2011). *International bonds:* Barclays Capital Global Aggregate Hedged Index converted from USD to CAD (January 1990–January 1999), Barclays Capital Global Aggregate Hedged Index CAD (February 1999–December 2011). *Cash:* DEX Capital 91-Day T-Bills (January 1990–December 2011).

United Kingdom. *Equities:* FTSE All-Share Index (pounds) (January 1990–December 2011). *International equities:* MSCI All-Country World Index ex-UK converted from USD to GBP (January 1990–April 2005), MSCI All-Country World Index ex-UK (pounds) (May 2005–December 2011). *Bonds:* FTSE British Government Fixed All Maturity Index (January 1990–March 2004), FTSE Sterling Corporate All Maturity Index (April 2004–December 2011). *International bonds:* Barclays Capital Global Aggregate Hedged Index (January 1990–December 2000), Barclays Capital Global Aggregate ex-GBP Hedged Index (January 2001–December 2011). *Cash:* 3-Month Sterling LIBOR Rate (January 1990–December 2011).

Australia. *Equities:* S&P/ASX 300 Index (January 1990–December 2011). *International equities:* MSCI World ex-Australia Index (January 1990–December 2011). *Property:* S&P/ASX 300 Property Index (January 1990–December 2011). *Bonds:* UBS Australian Composite Bond Index (January 1990–December 2011). *Cash:* UBS Australian Bank Bill Index (January 1990–December 2011).

Appendix. Empirical methodology and fund characteristics for Canada, U.K., and Australia

1. Estimation of policy allocation

The policy weightings, or asset allocation, for each fund were estimated by performing returns-based style analysis over each fund's rolling three-year history. Style analysis (Sharpe, 1988) is a statistical method for inferring a fund's effective asset mix by comparing the fund's returns with returns of asset-class benchmarks. Style analysis is a popular attribution technique because it does not require tabulating the actual asset allocation of each fund for each month over time. Rather, style analysis facilitates return attribution by regressing the return of the fund against the returns of asset-class benchmarks.* The following regression was estimated:

$$r_t^{\text{fund}} = \alpha + w_s r_t^{\text{stock}} + w_b r_t^{\text{bond}} + w_c r_t^{\text{cash}} + \epsilon_t$$

For our purposes, style analysis required not only that the asset-class weight parameters sum to 1, but also that each asset-class weight be positive (no short sales).

* Additional asset-class benchmarks may be used for non-U.S. mutual fund markets, expanding the equation with the appropriate added terms.

2. Calculation of policy return

$$r_t^{\text{policy}} = w_s r_t^{\text{stock}} + w_b r_t^{\text{bond}} + w_c r_t^{\text{cash}} - \text{cost}$$

Cost is the approximate expense ratio, as a percentage of assets, of replicating the policy mix using indexed mutual funds. The policy portfolio was assumed to have a U.S. expense ratio of 1.5 bps per month (18 bps annually, or 0.18%) and a non-U.S. expense ratio of 2.0 bps per month (24 bps annually, or 0.24%).

Formula components

w_s = policy allocation attributed to stocks, ranges from 0 to 1

w_b = policy allocation attributed to bonds, ranges from 0 to 1

w_c = policy allocation attributed to cash, ranges from 0 to 1

r_t^{stock} = return on the equity benchmark in period t

r_t^{bond} = return on the bond benchmark in period t

r_t^{cash} = return on the cash benchmark in period t

α = excess return of the fund that cannot be attributed to benchmark returns

$\epsilon_{t,i}$ = residual that cannot be explained by the asset-class returns

r_t^{fund} = total return of the fund in period t

r_t^{policy} = total return of the policy in period t

r_i^{fund} = total return across funds

r_i^{policy} = total return across policies

β = sensitivity of changes in the fund return to changes in the policy return

N = total number of monthly net returns for each fund

3. Time-series regression of actual returns against policy returns

To compare variation in the policy and actual returns, we calculated an R^2 for each fund by regressing its actual return against its policy return:

$$r_t^{\text{fund}} = \alpha + \beta r_t^{\text{policy}} + \varepsilon_t$$

4. Cross-sectional regression of actual returns against policy returns

To compare variation in the policy and actual returns across different funds, we calculated an R^2 in a given month by regressing the actual returns against the policy returns for all funds in that month:

$$r_i^{\text{fund}} = \alpha + \beta r_i^{\text{policy}} + \varepsilon_i$$

5. Ratio of the cumulative policy return to the cumulative actual return

The policy return as a percentage of the actual return of each fund is the ratio of its cumulative policy return to its cumulative actual policy return. When cumulative policy return is greater than cumulative actual return, this ratio is greater than 100%.

$$\prod_{t=1}^N \frac{(1+r_t^{\text{policy}})}{(1+r_t^{\text{fund}})}$$

6. Ratio of policy volatility to actual volatility

The policy volatility as a percentage of the actual return volatility of each fund is the ratio of the standard deviation of the policy return to the standard deviation of the actual return. When policy return volatility is smaller than actual return volatility, this ratio is less than 100%.

$$\frac{\sqrt{\frac{1}{N-1} \sum_{t=1}^N \left[r_t^{\text{policy}} - \frac{1}{N} \sum_{t=1}^N r_t^{\text{policy}} \right]^2}}{\sqrt{\frac{1}{N-1} \sum_{t=1}^N \left[r_t^{\text{fund}} - \frac{1}{N} \sum_{t=1}^N r_t^{\text{fund}} \right]^2}}$$

Figure A-1. Fund characteristics for non-U.S. funds

| Canadian balanced funds | All Canadian balanced funds | Funds with statistically significant positive alpha | Funds with statistically significant negative alpha | Funds with zero alpha |
|--|--|--|--|----------------------------------|
| Risk and return (average across funds) | | | | |
| Average annualized alpha | -0.29% | 3.51% | -1.69% | -0.44% |
| Policy return as percentage of actual return | 102.6% | 77.4% | 118.0% | 102.0% |
| Policy volatility as percentage of actual volatility | 93.0% | 93.8% | 96.7% | 92.0% |
| Return variability explained by policy variability | 82.0% | 68.4% | 91.5% | 81.4% |
| Average fund characteristics | | | | |
| Expense ratio | N.A. | N.A. | N.A. | N.A. |
| Net assets (millions) | C\$367.6 | C\$679.4 | C\$414.3 | C\$315.2 |
| Turnover | 36.60% | 25.17% | 32.59% | 39.10% |
| Number of funds | 245 | 23 | 45 | 177 |

| U.K. balanced funds | All U.K. balanced funds | Funds with statistically significant positive alpha | Funds with statistically significant negative alpha | Funds with zero alpha |
|--|--|--|--|----------------------------------|
| Risk and return (average across funds) | | | | |
| Average annualized alpha | -1.10% | 5.05% | -3.81% | -1.04% |
| Policy return as percentage of actual return | 105.4% | 70.5% | 131.8% | 103.4% |
| Policy volatility as percentage of actual volatility | 92.7% | 83.3% | 95.0% | 92.9% |
| Return variability explained by policy variability | 75.8% | 54.9% | 81.2% | 76.1% |
| Average fund characteristics | | | | |
| Expense ratio | 1.49% | 1.35% | 1.65% | 1.48% |
| Net assets (millions) | £98.8 | £189.1 | £81.6 | £96.4 |
| Turnover | 67.05% | 68.93% | 69.00% | 66.67% |
| Number of funds | 294 | 13 | 35 | 246 |

Notes: Funds with consistently positive (or negative) excess return (alpha) had statistically significant alpha using a 95% one-sided *t*-test for statistical significance.
N.A. = not available (insufficient data to provide an accurate metric).

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

| Australian balanced funds | All Australian balanced funds | Funds with statistically significant positive alpha | Funds with statistically significant negative alpha | Funds with zero alpha |
|--|-------------------------------------|--|--|--------------------------|
| Risk and return (average across funds) | | | | |
| Average annualized alpha | −0.81% | 1.34% | −1.83% | −0.51% |
| Policy return as percentage of actual return | 105.9% | 91.9% | 113.9% | 103.5% |
| Policy volatility as percentage of actual volatility | 92.9% | 99.0% | 94.7% | 92.1% |
| Return variability explained by policy variability | 86.2% | 94.6% | 89.1% | 84.8% |
| Average fund characteristics | | | | |
| Expense ratio | N.A. | N.A. | N.A. | N.A. |
| Net assets (millions) | A\$59.2 | A\$196.3 | A\$16.0 | A\$70.3 |
| Turnover | N.A. | N.A. | N.A. | N.A. |
| Number of funds | 336 | 8 | 87 | 241 |

Notes: Funds with consistently positive (or negative) excess return (alpha) had statistically significant alpha using a 95% one-sided *t*-test for statistical significance.
N.A. = not available (insufficient data to provide an accurate metric).

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



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