Asset location for equity

- Most value in asset location comes through the placement of bonds and equities across accounts with different tax treatments to maximize after-tax return. Padmawar and Jacobs (2022) found this value to be up to 30 basis points (bps). There are situations, however, where investors may be able to gain significant additional return through thoughtful placement of the portfolio's equity subclasses.

- Specifically, consideration of differences in the equity's distribution (dividend yield or realized gains), foreign tax withholding, and taxation of its income and price return may yield additional value.

- We build on previous research by demonstrating the additional return that can be attained from asset location according to three equity subclass characteristics: region (ex-U.S., U.S.), dividend yield (growth, high dividend yield) and management style (passive, active).

- We find that for most investors, ex-U.S., growth, and passive equity are best placed first in a taxable account, while U.S., high-dividend-yield, and active equity are best placed first in a tax-advantaged account.

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Introduction

Investors generally hold not just different assets, but different investment accounts with different tax treatments (tax-advantaged, taxable, etc.). As a result, they are faced with the question of asset location—that is, where to place each asset. An investor using an asset location strategy seeks to place assets across investment accounts in a way that maximizes total after-tax returns. Padmawar and Jacobs (2022) found that because of differences in the tax treatment of equities and bonds, and differences in their respective price and income return, the best asset location strategy for most investors is to preferentially place taxable fixed income first in tax-advantaged accounts and equities in taxable accounts.

Equity subclasses present investors with similar trade-offs. For any given asset allocation, the most tax-efficient asset location for a particular equity type will vary according to the equity's distribution (as dividend or realized capital gain), foreign tax withholding, and mix of qualified versus non-qualified distributions.

Previous research (Dammon, Spatt, and Zhang, 2004, among others) has primarily analyzed how a particular equity subclass—active equity, for example—may affect the overall asset location of equities and fixed income. However, little research has been done on asset location for equity subclasses. Murray (2022) focused on the dividend side of equities, but other aspects may influence asset location. Apart from dividend yield and capital gains realization, there is one more salient equity characteristic that is sometimes overlooked: foreign tax credit. Given the same tax rate and the same distribution of capital gains and dividends, equities from different regions may still have different after-tax returns, thanks to the foreign tax withholding for ex-U.S. equities.

In this paper, we build on previous asset location work by demonstrating the additional return that can be attained through equity asset location according to geographic region (ex-U.S., U.S.), dividend yield (high, low), and type of management (active, passive).

We first present an overview of our methodology and assumptions. We then explore how each of the following equity characteristics can affect an investor's equity asset location strategy.

- **Geographic region.** We find that it is best for most U.S. investors to locate ex-U.S. equity in their taxable account and U.S. equity in their tax-advantaged accounts. The added value of this strategy ranges from 5 to 10 bps in annualized after-tax return, depending on an investor's tax bracket and the tax-efficiency of their ex-U.S. equity holdings.

- **Dividend yield.** From there, we augment our analysis by splitting the U.S. equity into high dividend equity and growth equity. We find that for most investors, it is best to place high dividend equity in their tax-advantaged accounts and growth equity in their taxable account. The added value of this strategy grows as the dividend spread between high dividend and growth equity increases.

- **Type of management.** Finally, we analyze the active/passive trade-off in an investor's taxable account. We find that in such an account—and under reasonable expectations for alpha and tracking error—a 100% passive equity fund will outperform 100% active equity fund. This outperformance comes from the greater hurdle an active equity fund must cross to overcome its tax drag and outperform passive equity after taxes.

Methodology and assumptions

We study the value of asset location using a proprietary cash flow model that incorporates granular tax accounting and various tax-advantaged and taxable accounts. To simulate dynamic asset return forecasts, our model uses 10,000 asset-class returns paths generated by the Vanguard Capital Markets Model® (VCMM).

We assume an investor with $30,000 equally distributed between three accounts (traditional, Roth, and taxable) and an investment horizon of 20 years. At the end of that time, the investor liquidates all accounts, incurring taxes from their traditional and taxable accounts. They do not contribute money to any account during the 20 years, but they do rebalance their portfolio to meet target asset allocation. Since investors generally follow a glide path, which is a dynamic asset allocation, over their investment horizon, we present results for three glide paths: one where the allocation is primarily equity over the modeling horizon, one where the allocation is equity-heavy over the modeling horizon, and one where the allocation is a mix of equity and fixed income over the modeling horizon. Fixed-income-heavy allocations are excluded, as such allocations would put all equity in taxable accounts.

All of the asset location values in this paper are in addition to the value created by strategic placement of fixed income and equity following a traditional, then Roth, then taxable preference for the fixed income allocation. As noted at the start of this paper, Padmawar and Jacobs (2022) found that this value can be up to 30 bps.

Detailed results

Equity by geographic region

Domestic and international equity differ from each other when it comes to two important characteristics—tax-efficiency and foreign tax withholding—that impact the ideal asset location of these equity subclasses.

- **Tax-efficiency.** Ex-U.S. equities tend to be relatively less tax-efficient than domestic equities; a greater proportion of ex-U.S. equities have non-qualified dividend income, and this income is taxed at an investor's income rate, which is usually greater than their dividend tax rate. **Figure 1** plots the qualified dividend income proportions, from 2003–2022, for four Vanguard international funds (Vanguard International Explorer™ Fund, Vanguard FTSE All-World ex-US Index Fund, Vanguard Total International Stock Index Fund, and Vanguard International High Dividend Yield Index Fund) that regularly pass through the foreign tax credit. For comparison with U.S. equities, we also plot the qualified dividend income proportion for Vanguard Total Stock Index Fund. The qualified dividend income proportion for the international funds is about 75% on average, while U.S. equity funds tend to have a 100% qualified dividend income proportion.

FIGURE 1.

Qualified dividend income proportions for ex-U.S. equity and U.S. equity, 2003–2022

Vanguard International Explorer Fund

Vanguard Total Stock Index Fund

Vanguard FTSE All-World ex-US Index Fund

Vanguard Total International Stock Index Fund

Vanguard International High Dividend Yield Index Fund
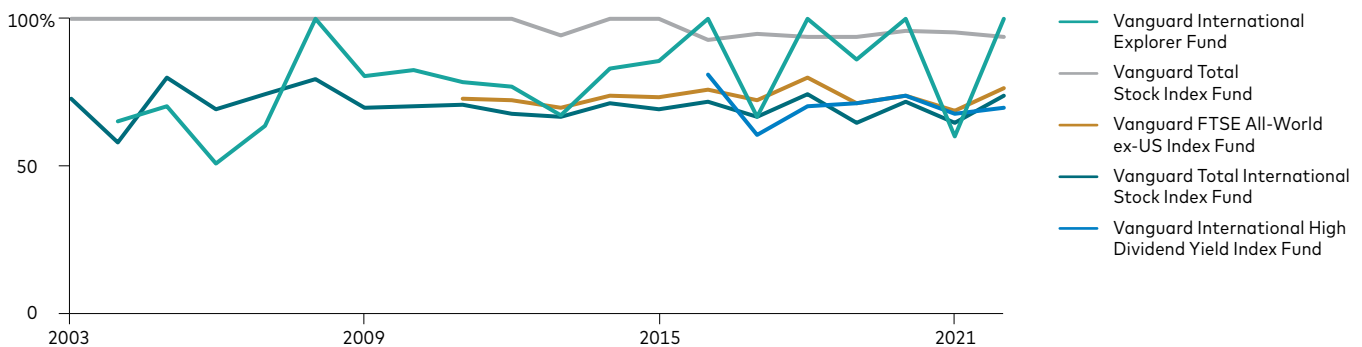
Note: Time series data shown are for the period from January 1, 2003, through December 31, 2022.
Source: Vanguard.

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- **Foreign tax withholding.** Ex-U.S. equity is subject to a foreign tax withholding on its dividend income. A hypothetical case study showing how foreign tax withholding works and why it could matter for asset location follows.

Maria, a U.S. citizen, has a marginal or income tax rate of 32% and a preferred or dividend tax rate of 15%. She has an ETF in her taxable brokerage account; more than half of its holdings are domiciled outside the U.S. The fund distributes $100 annually in the form of dividend income. Of this income, 80% is qualified (taxed at preferred/dividend rate) and 20% is non-qualified (taxed at income rate). The net dividend income is subject to a 15% withholding rate.

The U.S. tax liability for Maria's $100 of dividend income—before any foreign tax credit is taken into account—would be $80 multiplied by 0.15 (for the qualified proportion) plus $20 multiplied by 0.32 (for the non-qualified proportion): $12 + $6.40 = $18.40.

However, 15% of that $100—or $15—is withheld by ex-U.S. sovereigns prior to Maria receiving the income.

Assuming that she receives her dividend income from treaty nations, Maria can claim the lesser of the U.S. tax liability or foreign withholding as a tax credit.[1]

In this case, because Maria can claim $15 as a foreign tax credit, she reduces her net tax liability after withholding to $18.40 – $15, or $3.40. Her after-tax income, therefore, is $81.60.

If the ETF was held in one of Maria's tax-advantaged accounts rather than in her taxable brokerage account, she would not be able to claim this foreign tax credit—but her after-withholding income would be $85.

Figure 2 summarizes the tax trade-offs for domestic and international equity by account type.

The effective dividend tax for ex-U.S. and U.S. equity varies by account type

	If held in tax-advantaged account	If held in taxable account
U.S. equity	None	Qualified dividend rate
Ex-U.S. equity	Foreign withholding	Foreign withholding + net domestic liability

Source: Vanguard.

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[1] A "treaty country" is a foreign country that has an income tax treaty with the United States that qualifies their foreign income for foreign tax credit. See IRS (2021) for more detail.
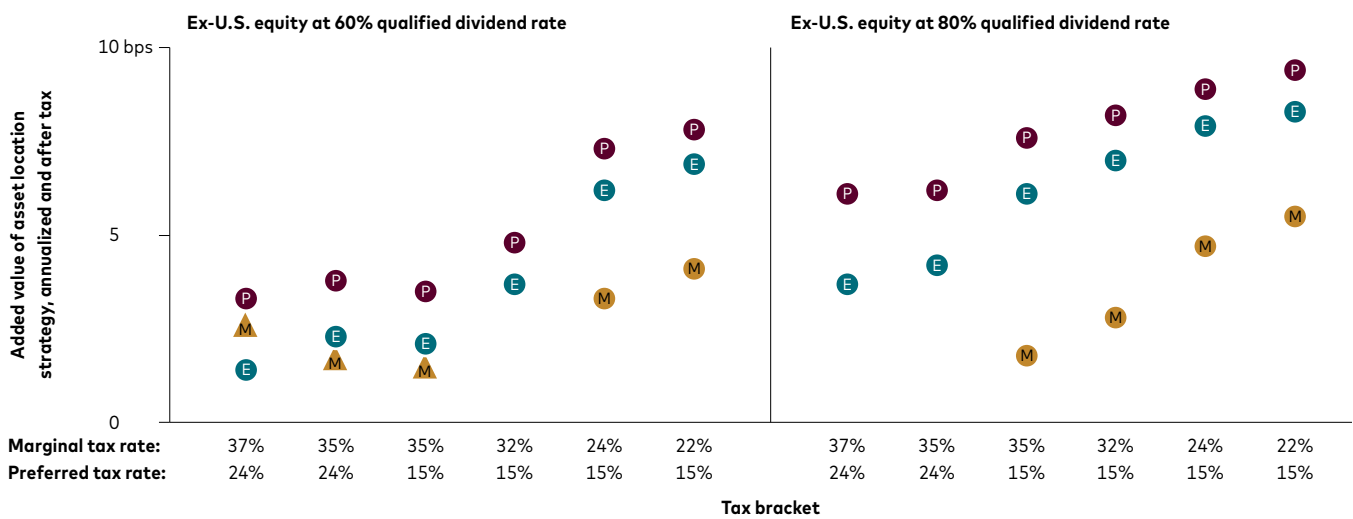
Taking all this into consideration, we can then look at how optimal placement of ex-U.S. equities can be affected by these two salient characteristics, foreign tax withholding and level of tax efficiency. We factor in the common foreign withholding rate of 15%. We consider two different levels of tax-efficiency of ex-U.S. equity by using two different qualified dividend proportions (60% and 80%) and a variety of tax brackets. We assume in all scenarios that the investor's equity allocation is 60% U.S./40% ex-U.S.

The purchase order for the fixed income portion of the portfolio follows the order (traditional, then Roth, then taxable) recommended for most investors in Padmawar and Jacobs (2022). We compare two asset location strategies for U.S./ex-U.S. equities: one that preferentially places ex-U.S. in the investor's taxable account, and one that preferentially places ex-U.S. in their tax-advantaged accounts.

Figure 3 showcases the baseline results in two charts. The chart on the left assumes a 60% qualified dividend rate for ex-U.S. equity; the chart on the right assumes an 80% qualified dividend rate for ex-U.S. equity.

Across glide paths, asset location by region tends to add value

Ex-U.S. equity at 60% qualified dividend rate						Ex-U.S. equity at 80% qualified dividend rate					
Marginal tax rate: 37%	35%	35%	32%	24%	22%	37%	35%	35%	32%	24%	22%
Preferred tax rate: 24%	24%	15%	15%	15%	15%	24%	24%	15%	15%	15%	15%

Tax bracket

Wealth-maximizing asset location strategy:	Ex-U.S. equities placed in taxable accounts	U.S. equities placed in taxable accounts
Glide path:	P Primarily equity E Equity-heavy M Mix of bond and equity	M Mix of bond and equity

The absence of a symbol indicates that results for that particular intersection of glide path and tax bracket are indifferent between ex-U.S. equities or U.S. equities in taxable accounts.

Notes: Added-value figures are relative to an asset-location-agnostic strategy. Circles indicate that ex-U.S. stocks are preferentially placed in taxable accounts. Triangles indicate that U.S. equities are preferentially placed in taxable accounts. The absence of a symbol indicates there is no difference between these two asset location strategies for that glide path at that tax bracket. Three hypothetical portfolios denote a range of equity allocations along a glide path, with "primarily equity" having the most allocation to stocks and "mix of bonds and stocks" having the least. The charts assume the following: a foreign tax withholding rate of 15%; the equity portion of the portfolio is allocated 60% U.S. stocks and 40% ex-U.S. stocks; the purchase order for the fixed income portion of the portfolio is traditional accounts, then Roth accounts, and then taxable accounts; the ex-U.S. stocks have a QDI rate of either 60% (left chart) or 80% (right chart). Portfolio return data and calculations are based on VCMM returns. **See Appendix 1 for more information on the VCMM.**

Source: Vanguard, as of March 2023.

Past performance is not a guarantee of future results. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.
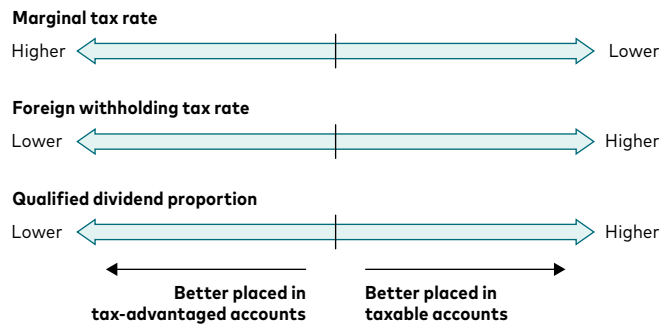
Figure 2 can help here in thinking about the total tax liability posed by U.S. and ex-U.S. equities and the trade-offs that come into play for an investor who holds these assets. On the one hand, as the foreign tax withholding on ex-U.S. equities increases, the net domestic tax liability on them diminishes—and it becomes more tax-efficient for an investor to place these assets in a taxable account. On the other hand, ex-U.S. equities tend to have a lower qualified dividend rate—which makes them less tax efficient, and therefore more appealing in a tax-advantaged account. For those in higher tax brackets, the lower tax-efficiency of ex-U.S. equities shifts the asset toward a tax-advantaged account.

Thus, the threshold for placing ex-U.S. equities in an investor's taxable account is dependent on foreign withholding amount and relative tax-efficiency. We find that investors can potentially add up to 10 bps of additional after-tax return to their portfolio by thoughtful asset location of ex-U.S. equities. For most investors, preferentially placing ex-U.S. equity in a taxable account is the asset location strategy that maximizes after-tax return. The higher end of the added value is associated with portfolios that have both high levels of qualified dividend income and high foreign withholding rates. Only investors in the top tax bracket, who hold relatively tax-inefficient

ex-U.S. equities, may find it beneficial to shield their ex-U.S. equity in a tax-advantaged account. **Figure 4** summarizes the investor and portfolio characteristics that can shape this asset location decision.

FIGURE 4.

Considerations for asset location for ex-U.S equity

Three characteristics need to be taken into consideration when deciding between taxable and tax-advantaged placement.

Marginal tax rate
Higher ⟵―――――――――――――――――⟶ Lower

Foreign withholding tax rate
Lower ⟵―――――――――――――――――⟶ Higher

Qualified dividend proportion
Lower ⟵―――――――――――――――――⟶ Higher

⟵――――――― **Better placed in tax-advantaged accounts** | **Better placed in taxable accounts** ―――――――⟶

Source: Vanguard.

In the next section, we will analyze how the trade-off between yield and price return can influence asset location strategy.

Asset location by dividend and price return

We now broaden our investigation to consider the asset location strategy of high-dividend-yield and growth equity. Murray (2022) found that because high-dividend equity has a greater dividend tax drag than growth equity, it is preferable to place high dividend in a tax-advantaged account and growth in a taxable account. However, that analysis leaves out capital gains realization. If growth equity has greater price appreciation than high dividend or needs to be rebalanced more often, the tax liability on its total return may nullify the added value of asset locating according to dividend. Building on our work assessing regional differences, we embed high-dividend and growth equities into the model described above, which already includes U.S./ex-U.S. equity, fixed income, rebalancing, and glide-path allocation.

To simulate high-dividend and growth equity assets, we gather the trailing 12-month dividend yields for Vanguard Total Stock Market Index Fund, Vanguard High Dividend Yield Index Fund, and Vanguard Growth Index Fund from December 2006 through January 2023. (We provide details of this modeling in **Appendix 2**.) Using the VCMM equity total return, we construct high-dividend and growth equity assets by redistributing the income and price components to match empirical moments (e.g., median). We find that historically, the median dividend yield for high dividend is about 300 bps greater than that of growth. To account for possible uncertainty in our estimate, we consider two dividend spreads: one of 300 bps and one of 200 bps.
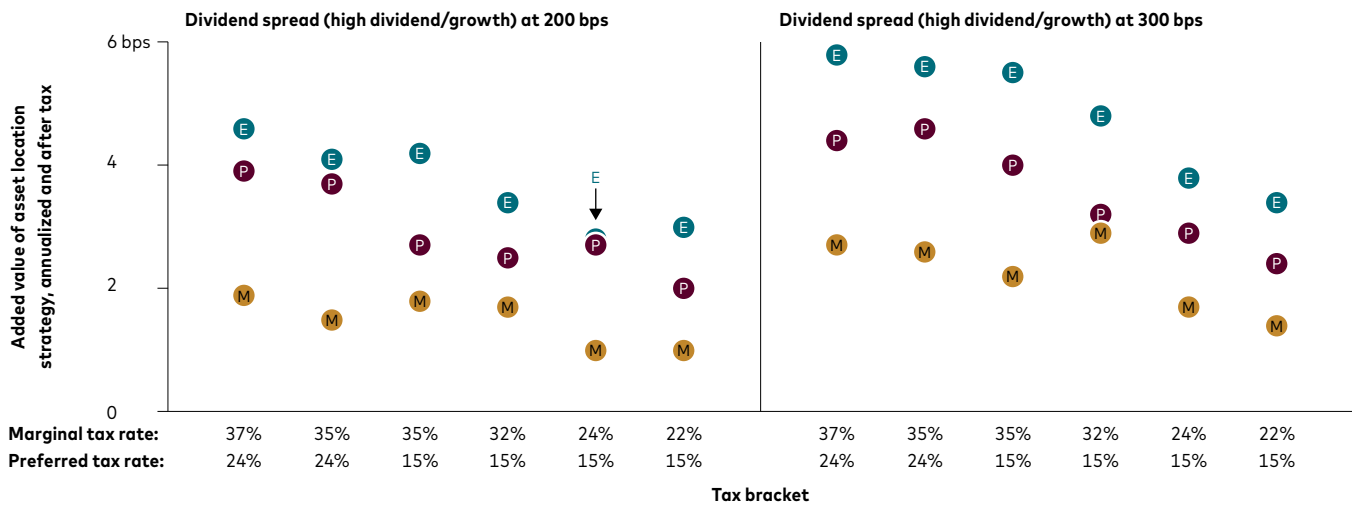
We build on our earlier U.S./ex-U.S. equities analysis by breaking the U.S. equity weight (60% of the equity portion of the portfolio) into 50% high dividend and 50% growth. Thus, for example, a 60/40 equity/fixed income portfolio would be 18% high-dividend equity, 18% growth equity, 24% ex-U.S. equity, and 40% fixed income. We analyze two asset location strategies that rank the four assets according to placement in tax-advantaged accounts:

1. Preferentially placing fixed income and growth equity in tax-advantaged accounts and high-dividend and ex-U.S. equity in taxable accounts.

2. Preferentially placing fixed income and high-dividend equity in tax-advantaged accounts and growth equity and ex-U.S. equity in taxable accounts.

Figure 5 shows the results from our two dividend spreads. These results suggest that for most investors, placing high-dividend equities in a tax-advantaged account and growth equities in a taxable account could be a better strategy for maximizing after-tax return. As discussed earlier, asset allocations that skew toward fixed income shift most of an investor's equity into one account, removing opportunities to asset locate equity subclasses across accounts.

Asset location by dividend-price split can add value

Dividend spread (high dividend/growth) at 200 bps | Dividend spread (high dividend/growth) at 300 bps

Added value of asset location strategy, annualized and after tax

Marginal tax rate:	37%	35%	35%	32%	24%	22%	37%	35%	35%	32%	24%	22%
Preferred tax rate:	24%	24%	15%	15%	15%	15%	24%	24%	15%	15%	15%	15%

Tax bracket

Wealth-maximizing asset location strategy:	Ex-U.S. equities placed in taxable accounts

Glide path:
- P Primarily equity
- E Equity-heavy
- M Mix of bond and equity

Notes: Added-value figures are relative to an asset-location-agnostic strategy. Circles indicate that ex-U.S. and high-dividend stocks are preferentially placed in taxable accounts. Three hypothetical portfolios denote a range of equity allocations along a glide path, with "primarily equity" having the most allocation to stocks and "mix of bonds and stocks" having the least. The charts assume the following: a foreign tax withholding rate of 15%; the equity portion of the portfolio is allocated 60% U.S. stocks and 40% ex-U.S. stocks; the purchase order for the fixed income portion of the portfolio is traditional accounts, then Roth accounts, and then taxable accounts; the ex-U.S. stocks have a QDI rate of either 60% (left chart) or 80% (right chart).
Portfolio return data and calculations are based on VCMM returns. **See Appendix 1 for more information on the VCMM.**

Source: Vanguard, as of March 2023.

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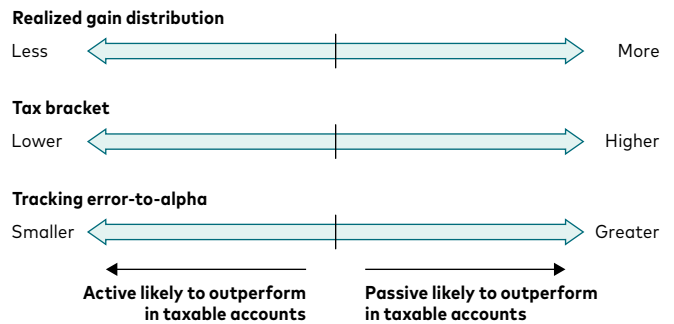
Active and passive equity

Passive equity funds are often preferentially placed in an investor's taxable account because of their low costs and tax-efficiency relative to active funds. Over the past 15 years, however, expense ratios have fallen for both active and passive equity funds, and active managers have pursued more tax-efficient investment strategies (Arnott, Kalesnik, and Schuesler, 2018). Therefore, we complete our deep dive into equities by revisiting the active/passive trade-off for the asset class.

We compare a 100% passive equity portfolio with a 100% active equity portfolio for an investor with only a taxable account. We analyze the trade-off by looking at different active fund characteristics (alpha, tracking error, and capital gains realization rate).[2] We also model the active equity so that it distributes a portion of its net asset value (NAV) as a realized capital gain each year. Active equity usually has a higher tax drag than passive equity because of regular capital gains realization.[3] Over time, the tax drag compounds, reducing the investor's after-tax wealth.

We find that under reasonable assumptions of realization rate, alpha, and tracking error, it is preferable for most investors to hold passive equity in a taxable account and place the active equity in tax-advantaged accounts. **Figure 6** summarizes the active/passive trade-off in the taxable account.

Active/passive equity trade-off in an investor's taxable account

Three characteristics need to be taken into consideration when deciding between active and passive placement.

Realized gain distribution
Less ⟵————————————⟶ More

Tax bracket
Lower ⟵————————————⟶ Higher

Tracking error-to-alpha
Smaller ⟵————————————⟶ Greater

⟵ **Active likely to outperform in taxable accounts**   **Passive likely to outperform in taxable accounts** ⟶

Source: Vanguard.

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2   Wallick, Wimmer, and Balsamo (2015) find the average annualized alpha to be between 17 and 54 bps for the period from June 30, 1984, through May 31, 2014.

3   Looking at a sample of Vanguard active funds from 2011–2022, we find that the average realization rate is about 4.5%.

Conclusion

When implementing asset location by equity subclass, investors should focus on the mix of the equity's distribution and the taxation structure. That said, we find several simple heuristics that can be adopted by most investors for optimizing their asset location.

First, it can be beneficial for most investors to place their ex-U.S. equity in their taxable account. The greater the foreign tax withholding, the smaller the marginal tax rate and the greater the qualified proportion of dividends for ex-U.S. equity—and the greater the added value of placing ex-U.S. equities in a taxable account. Only investors in the top tax bracket with relatively tax-inefficient ex-U.S. equities and little foreign tax withholding may find it preferable to place ex-U.S. equities in their tax-advantaged accounts.

Second, we find that it is preferential for most investors to place their high-dividend equities in a tax-advantaged account and their growth equities in a taxable account. The added value here is dependent upon the dividend spread between the two subclasses.

Third, we find that under reasonable alpha, tracking error, and realization rates based on historical data, passive equity is likely to outperform active equity for most investors in terms of after-tax return in taxable accounts. However, if active equity management can maintain performance and reduce the realized gains distributed in a year, investors may find that active equity can more reliably outperform passive equity in their taxable accounts.

Finally, before implementing an asset location strategy for equity, investors should first make sure they have optimized the asset location of their fixed income and equity, in accordance with Padmawar and Jacobs (2022). While it is valuable to optimize asset location for the equity subclass, this added value is smaller than when optimizing equity/fixed income asset location—and the added value is only relevant for investors when equity is placed in different investment accounts.

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Appendix 1

About the Vanguard Capital Markets Model:

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

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The VCMM is a proprietary financial simulation tool developed and maintained by Vanguard's primary investment research and advice teams. 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 primary value of the VCMM is in its application to analyzing potential client portfolios. VCMM asset-class forecasts—comprising distributions of expected returns, volatilities, and correlations—are key to the evaluation of potential downside risks, various risk-return trade-offs, and the diversification benefits of various asset classes. Although central tendencies are generated in any return distribution, Vanguard stresses that focusing on the full range of potential outcomes for the assets considered, such as the data presented in this paper, is the most effective way to use VCMM output.

The VCMM seeks to represent the uncertainty in the forecast by generating a wide range of potential outcomes. It is important to recognize that the VCMM does not impose "normality" on the return distributions, but rather is influenced by the so-called fat tails and skewness in the empirical distribution of modeled asset-class returns. Within the range of outcomes, individual experiences can be quite different, underscoring the varied nature of potential future paths. Indeed, this is a key reason why we approach asset-return outlooks in a distributional framework.

Appendix 2

Following Schlanger, O'Connor, and Ahluwalia (2021), we define the ratio, M_t, as the 12-month trailing dividend yield for Vanguard High Dividend Yield Index Fund (VHYAX) to the 12-month trailing dividend yield for Vanguard Total Stock Market Index Fund (VTSAX):

$$M_t = \frac{VHYAX_t}{VTSAX_t}$$

for month t.

With this ratio, we estimate a demeaned, autoregressive process of lag order 1 (i.e., AR(1)):

$$M_t = \mu + \theta(M_{t-1} - \mu) + \varepsilon_t$$

where μ is the mean and ε_t is an independent and identically distributed (i.i.d.) error term distributed normally with variance σ^2:

$$\varepsilon_t \sim N(0, \sigma^2), \text{ i.i.d.}$$

One way to interpret θ is as the persistence of deviations from the mean of the high-yield index's income premium.

Given the estimated mean ($\hat{\mu}$), the estimated lag parameter ($\hat{\theta}$), and the estimated variance ($\hat{\sigma}^2$), we simulate 10,000 x 20 multipliers (N x T) to adjust the Vanguard Capital Markets Model (VCMM) equity income paths. To account for uncertainty, we randomly sample from a normal distribution and produce an error term for the multipliers; we define this error term as $v_{n,t}$, which is subscripted according to path (out of 10,000) and year (out of 20). Using the estimated variance ($\hat{\sigma}^2$) from the AR(1) estimation, we simulate from a normal distribution, where each draw is independent and identically distributed (i.i.d.):

$$v_{n,t} \sim N(0, \hat{\sigma}^2), \text{ i.i.d.}$$

Thus, the multipliers simulated are:

$$\hat{M}_{n,t} = M_{n,t} + v_{n,t}$$

for year t and path n.

The multipliers are used to simulate a distribution of high-dividend income. We then take the total return from the VCMM 2022 forecasts and back out the high-dividend price return from the baseline VCMM total return.[4] In other words, we match the total return of the VCMM 2022 equity forecasts and shift the composition of price and income proportions within the VCMM 2022 equity forecasts. We repeat the same estimation for growth assets.

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4 In calculating the high-yield equity asset's price return in this manner, 0.02% of the VCMM of the price returns fall below a −99% return. Because we are not modeling levered assets, we winsorize these price returns to −99%.

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