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Buying local: Local bias in individual stock portfolios

- Local bias is the tendency of investors to own individual stocks of domestic companies whose headquarters are geographically closer to the investor's home. Although local bias has been addressed in the academic literature, no Vanguard research has explored to what extent investors exhibit local bias.
- Using a multiyear sample of over 1.19 million Vanguard investors who hold individual U.S. stocks, we determine to what extent Vanguard investors exhibit local bias. We also analyze the impact to investor portfolios and quantify the related investment exposures.
- We find that our sample of investors consistently exhibits local bias across geographic regions and over time. Local bias is positively correlated with more concentrated individual stock positions, but such stock positions do not appear to also constitute a larger proportion of investors' overall equity allocations. With respect to stock-specific characteristics, local bias is associated with smaller, more levered, value-style, and less-liquid stocks.
- Investors who wish to alleviate the stock concentration associated with individual stock positions but perhaps maintain the smaller-capitalization and value-style tilts might consider diversified small-cap and mid-cap funds with varying amounts of value-style exposure.

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Overview

Research has identified two biases related to the proximity of investors to their investments. The first is commonly known as home bias, the tendency for investors to overweight domestic equities relative to a diversified global benchmark. The second could be referred to as local bias, the tendency of investors to own stocks of domestic companies whose headquarters are relatively closer to the investor's home. Home bias has been discussed extensively in academic literature[1] and in research published by Vanguard.[2] Local bias has also been addressed in the academic literature. However, to date, no Vanguard research has explored to what extent investors exhibit local bias.

Prior literature has explored various reasons that investors demonstrate local bias. Coval and Moskowitz (1999) conclude that U.S. investment fund managers prefer more geographically proximate firms because of information asymmetries. Huberman (2001) explains that individual U.S. investors prefer local stocks simply because they are familiar. Grinblatt and Keloharju (2001) use a sample of individual and institutional investors in Finland to show that investors hold, buy, and sell stocks that are located closer to the investor. Zhu (2002) shows that individual investors invest locally but for reasons other than information asymmetry. Ivković and Weisbenner (2005) find that individual investors exhibit local bias because they exploit local knowledge to generate positive abnormal returns.

We contribute to the literature by studying the relationship between local bias and overall portfolio characteristics, using a large sample of investors. Specifically, we focus on concentration and size-and-style exposure. We hold aside the specific reasons for local bias as an area of future research. Using a sample of Vanguard investors, we assess local bias from a few perspectives. First, we test to what extent a sample of Vanguard investors exhibits local bias. Second, we analyze the relationship between local bias and investor portfolio concentration. Third, we demonstrate the association between local bias and stock-specific characteristics.

We find that our sample of investors consistently exhibits local bias across geographic regions and over time. Local bias is positively correlated with more concentrated individual stock positions. With respect to stock-specific characteristics, local bias is associated with smaller, more levered, value-style, and less-liquid stocks.

In this research note, we introduce local bias, describe our sample and methodology, present our results, and discuss implications and suggested remedies for portfolio construction.

1 See, for example, French and Poterba (1991), Cooper and Kaplanis (1994), and Kang and Stulz (1997).

2 See Donaldson et al. (2021).

Introducing local bias

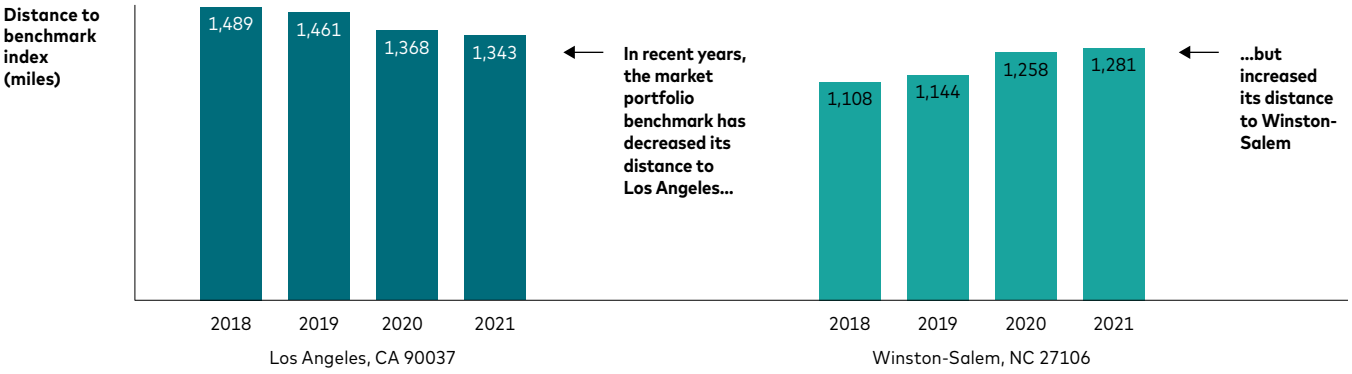
Local bias essentially measures how close investors live to their portfolio of individual stocks versus how close they live to the market portfolio. More formally, it is the asset-weighted average distance between the investor and their portfolio relative to the market-capitalization-weighted average distance between the investor and the benchmark index. To compute the relevant metrics for the investor's portfolio, we need to know each stock in the portfolio, the weighting of the stock in the portfolio, and the distance between the stock's headquarters and the investor's home. To compute the relevant metrics for the benchmark index, we need to know each stock in the index, the weighting of the stock in the index, and the distance between the stock's headquarters and the investor's home. Specifically, we measure distance based on the zip codes of the investor's home address and the stock's headquarters address.[3] With that data, we leverage the measurement of local bias—and even the term "local bias"—from Coval and Moskowitz (1999).[4]

We highlight that although the benchmark index itself is the same for all investors, the market-capitalization-weighted average distance from the benchmark index will differ according to an investor's zip code. A U.S. total equity market index is the relevant benchmark index for all investors because it represents the opportunity set of U.S. stocks available to all investors. However, different investors—or at least different zip codes—have different distances to each stock in the benchmark index. **Figure 1** displays the distance to the benchmark for two zip codes across four as-of dates as an illustration of this.

It's noteworthy that for both zip codes, the market-cap-weighted distances change over time. Although the locations of Winston-Salem, North Carolina, and Los Angeles, California, don't change, the market caps of the companies in the index do change over time, and public companies enter and exit the index every year. As a result, in recent years, the market portfolio has become farther away from Winston-Salem but closer to Los Angeles.

FIGURE 1.

The distance from the benchmark is not the same for all investors



Notes: "Distance to benchmark index" is the market-capitalization-weighted average distance from a hypothetical investor's home (in miles) in either of the two locations to the company headquarters of each stock in the CRSP Total Market Index that is domiciled in the U.S. Distances are measured according to zip codes.

Sources: Vanguard, using the National Bureau of Economic Research ZIP Code Distance Database, FactSet, and Morningstar.

3 The location of company headquarters (rather than the address of incorporation), as well as zip codes, has been used extensively. See for example Coval and Moskowitz (1999) and Ivković and Weisbenner (2005). Zhu (2002) uses 3-digit zip codes.

4 **Appendix 1** explains local bias in more detail.

Sample and methodology

Our sample is based on a group of U.S. Vanguard investors and individual U.S. stocks. Specifically, we identify self-directed taxable and IRA investors who live in the United States or Puerto Rico and who hold individual U.S. stocks. We select the CRSP Total Market Index as our benchmark index because it represents nearly the entire U.S. investable equity market.

From Vanguard systems, we capture each investor's zip code, state of residence, age, length of account ownership at Vanguard, total assets in eligible accounts, and the asset allocation of the eligible accounts (i.e., the proportion held in equities, fixed income, and cash). For each individual stock position, we record the stock name and assets held. We include investors that are between ages 18 and 99. We also require an investor's total retail balance at Vanguard to be at least $1,000.

From FactSet, we obtain the list of constituents in the CRSP Total Market Index and their weights in the index. We also obtain the market capitalization, leverage ratio, current ratio, market-to-book ratio, number of employees, industry classification, and average daily turnover of shares outstanding from FactSet. From Morningstar, we use the "post_code" field to obtain the zip code of the company headquarters. We use the National Bureau of Economic Research (NBER) ZIP Code Distance Database to calculate the distance between zip codes.[5] From the overall sample, we remove any stocks whose headquarters are not in the United States or stocks that are not the constituents of the CRSP Total Market Index.

We follow this process and capture data as of December 31 for the years 2018, 2019, 2020, and 2021 (**Figure 2**). Our final sample consists of over 1.19 million unique investors and over 3 million investor-by-year observations. Investors in our sample have an average balance of over $750,000 and an average equity allocation of 75.8%, with 45.1% of that equity invested in individual stocks. Cumulatively, this represents annual average assets of $577 billion and average individual stock assets of $141 billion.

FIGURE 2.
Summary statistics

	Overall		Mean as of year-end			
	Mean	Standard deviation	2018	2019	2020	2021
Individual stocks concentration	5,593.2	3,410.2	5,689.8	5,774.8	5,491.9	5,516.4
Individual stocks proportion of equity	45.1%	37.0%	40.4%	45.4%	48.6%	44.7%
Balance	$756,225	$3,373,011	$712,939	$826,748	$746,324	$746,885
Equity allocation	75.8%	25.0%	70.8%	73.6%	75.6%	80.1%
Length of account ownership (years)	14.1	10.1	15.0	15.3	13.7	13.2
Age	53.4	17.7	56.0	55.8	52.7	51.2
Number of investors (total count)	1,194,632		569,945	605,207	845,400	1,032,050
Number of observations (total count)	3,052,602		569,945	605,207	845,400	1,032,050

Notes: Concentration is proxied by the Herfindahl-Hirschman Index (HHI). HHI is typically used to measure concentration in industries, and we adopt it as a measure of stock concentration. It is calculated by summing the squared market shares of firms in an industry and is bounded by values between 0 and up to 10,000. In our application, we consider the individual stock portfolio to be the industry, and the stock's weight in that portfolio is its market share. An increasing HHI indicates more concentration.

Source: Vanguard.

5 See https://www.nber.org/research/data/zip-code-distance-database.

Results

Our results indicate that our sample of investors lives closer to the stocks in their portfolios than to the stocks in the benchmark index. This also seems to be the case consistently across time. **Figure 3** displays several metrics to highlight the effect of local bias.

Conceptually, it is likely easier to understand local bias in terms of distance. Investors on average live approximately 1,211 miles from the stocks in their portfolios but approximately 1,295 miles from the stocks in the benchmark index. Over the four-year period, each distance seems to have slightly increased. However, on a percentage difference basis, it appears that investors lived slightly closer to their portfolios in the latter two years (6.7% in 2021 and 7.3% in 2020) than in the two earlier years (3.9% in 2018 and 5.2% in 2019).[6] From a hypothesis-testing standpoint, the local bias metric helps determine whether the difference in distances is statistically significant. Over the full sample and for each of the four as-of dates, local bias is positive and highly statistically significant, suggesting that our sample does exhibit local bias.

Figure 4 shows that local bias has been consistent across geographical regions. For visual acuity, we place zip codes into their corresponding metropolitan statistical area (MSA).[7]

FIGURE 3.

Investors live closer to their portfolios than to the benchmark

As of date	Investor distance to portfolio (miles)	Investor distance to benchmark (miles)	Local bias	Observations
December 31, 2018	1,180.4	1,245.7	0.039****	569,945
December 31, 2019	1,186.3	1,264.1	0.052****	605,207
December 31, 2020	1,218.5	1,314.8	0.073****	845,400
December 31, 2021	1,236.2	1,323.8	0.067****	1,032,050
Full sample	1,211.0	1,294.9	0.060****	3,052,602

******** indicates statistical significance at 0.1%.

Notes: "Investor distance to portfolio" is the mean asset-weighted average distance (in miles) from an investor's home to the headquarters of the stocks in the investor's portfolio. "Investor distance to benchmark" is the mean market-capitalization-weighted average distance (in miles) from an investor's home to the headquarters of each stock in the CRSP Total Market Index. Distances are measured according to zip codes. The "local bias" metric is as introduced by Coval and Moskowitz (1999); a positive (negative) value suggests investors hold stocks that are closer to (further from) their homes than stocks in the benchmark index.

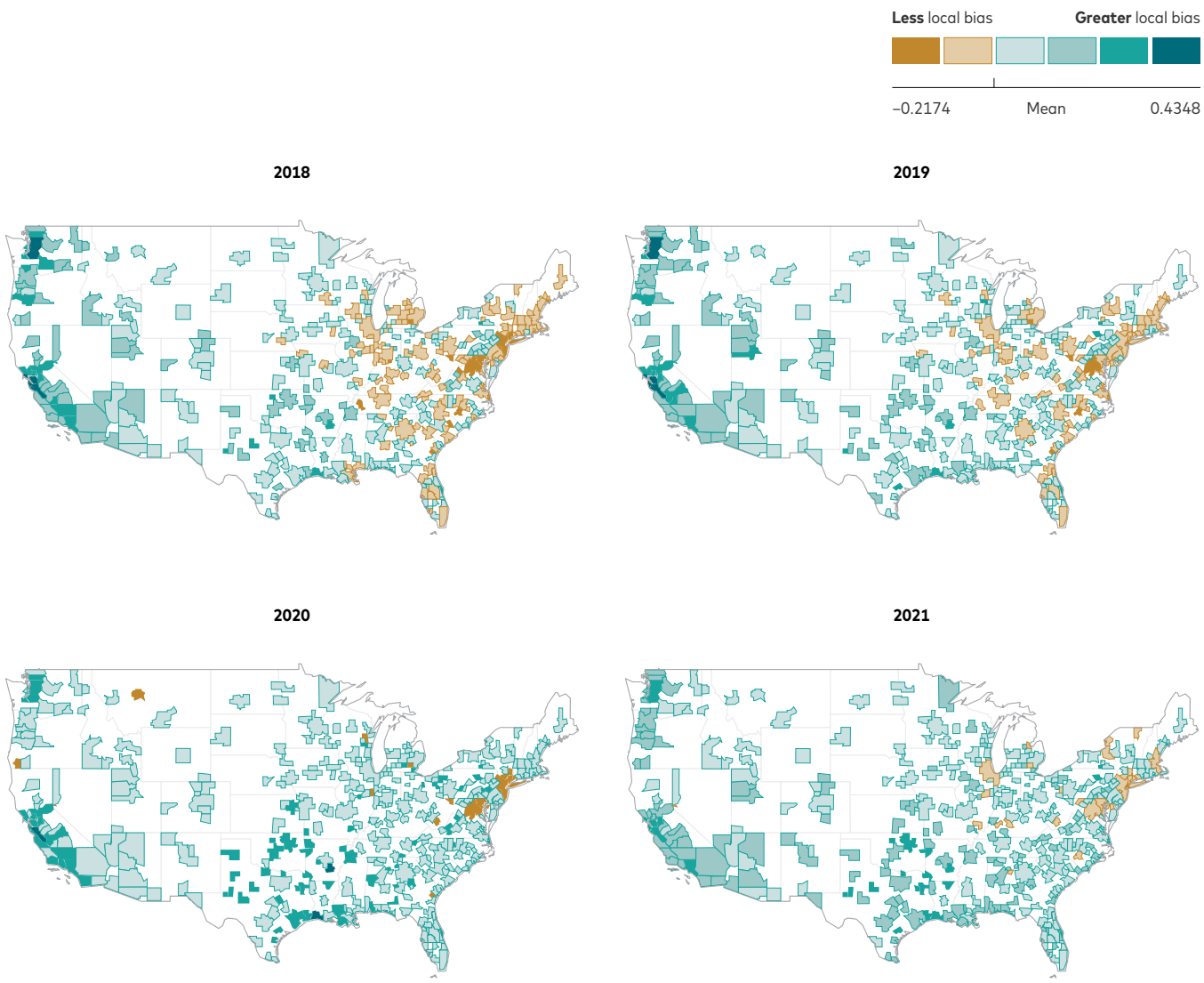
Sources: Vanguard, the NBER ZIP Code Distance Database, FactSet, and Morningstar.

6 The overall local bias metric is the equal-weighted average of all investors' local bias. The overall local bias metric is therefore not necessarily the same as the proportional difference between average investors' distance to portfolio and average investors' distance to benchmark, though it is substantially similar.

7 Brown et al. (2008) outlines the benefits of MSAs. For details, see https://www.bls.gov/sae/additional-resources/metropolitan-statistical-area-definitions.htm.

FIGURE 4.

Local bias has been consistently seen across time, though regional differences appear to have lessened



Notes: The maps illustrate the extent of local bias across the United States as of four year-end dates. For visual acuity, zip code values have been aggregated into MSAs, and Alaska, Hawaii, and Puerto Rico have been omitted. Turquoise hues indicate positive local bias; yellow hues indicate negative local bias.

Sources: Vanguard, the NBER ZIP Code Distance Database, U.S. Department of Housing and Urban Development MSA data, FactSet, and Morningstar.

Beyond establishing that our sample of investors exhibits local bias, we further explore what, if any, relationship this might have with portfolio characteristics. Namely, we are interested in portfolio concentration and stock-level characteristics. In both cases, we conduct multivariate regression to understand the relevant relationships.

With respect to concentration, we ask the following questions: To what extent is local bias associated with (1) the concentration of the individual stock portion of an investor's portfolio, and (2) the proportion of individual stocks in an investor's equity allocation? These questions attempt to address both risk specifically in the individual stock component of a portfolio and the magnitude of the risk to the broader portfolio.

To answer these questions, we focus on three variables of interest. *Individual stocks concentration* measures the amount of concentration in only the investor's individual stock portion of the portfolio. For this calculation, we consider only the same U.S.-based stocks included in the CRSP Total Market Index used for the local bias calculation. Our measure of individual stock concentration is based on the Herfindahl-Hirschman Index (HHI), a widely used measure of concentration in industries. We adopt HHI as a measure of stock concentration. *Individual stocks proportion of equity* captures the proportion of an investor's equity allocation that is held in individual stocks. *Concentration & proportion* is an interaction of the two variables. We include this interaction variable because it is reasonable to expect that there is some interdependence between these two variables when it comes to their associations with local bias. We regress local bias on the three variables of interest and add various control variables related to investor demographics, time, and location. **Figure 5** displays the results.

FIGURE 5.

Local bias is most strongly associated with individual stocks concentration

Variable	A	B	C	D
Individual stocks concentration	9.98****	8.75****	7.93****	7.90****
Individual stocks proportion of equity	–0.28	–1.91***	–2.26****	–2.15****
Concentration & proportion		2.73**	2.11*	1.88****
AUM (log)	0.25	0.27	–0.01	0.12
Equity allocation	–4.47***	–4.40***	–4.49***	–4.53****
Length of account ownership	0.14**	0.14**	0.21****	0.21****
Age	0.25****	0.25****	0.27****	0.25****
Year fixed effects	Yes	Yes	Yes	Yes
MSA fixed effects	No	No	Yes	No
Zip code fixed effects	No	No	No	Yes

******** indicates significance at the 0.1% level.

******* indicates significance at the 1% level.

****** indicates significance at the 5% level.

***** indicates significance at the 10% level.

Notes: The table provides regression coefficients from a regression of portfolio-level local bias (in percentage points) on several explanatory variables using year-end data from 2018, 2019, 2020, and 2021. The main explanatory variables of interest are individual stocks concentration and individual stocks proportion of equity. Individual stock concentrations input into the regression are first divided by 10,000 to create a value bound by 0 and 1. We also include several control variables and different combinations of fixed effects for robustness. Columns A, B, C, and D show the results of regression specifications differentiated by the inclusion of interaction of the main explanatory variables and different levels of location-based fixed effects. All specifications include year fixed effects.

Sources: Vanguard, the NBER ZIP Code Distance Database, FactSet, and Morningstar.

The results in Figure 5 provide reasonably clear answers to our questions. First, it does appear that local bias is strongly associated with more concentrated individual stock positions. This is indicated by *individual stocks concentration's* statistically significant and positive coefficient. However, the magnitude of the concentration's risk to the overall portfolio is likely limited. For example, on average the local bias of investors with above-average concentration is about 5% higher than that of investors with below-average concentration—a small number compared with the range of local bias. As it relates to our second question, the *individual stocks proportion of equity* coefficient is significant and negative. This suggests that as local bias increases, individual stocks as a proportion of overall equity decrease. However, this bias-decreasing association applies only to less-concentrated individual stock portfolios. For highly concentrated portfolios, there is little association between local bias and individual stocks proportion.

Assets under management (AUM) and the demographic variables age and length of account ownership are included as important control variables. Although age and length of account ownership are positively correlated with local bias, the inclusion of these three control variables provides an important takeaway: Even after accounting for investors' AUM, age, and length of account ownership, higher levels of local bias are associated with greater levels of portfolio concentration. To account for other potential unobserved heterogeneity at the local level, we include MSA fixed effects or zip code fixed effects in our regression analysis and show that our findings are robust.

To assess the potential risks in the individual stock portion of investor portfolios, we explore the correlations between local bias and various stock-level characteristics that have been commonly tested in prior local bias studies.

In particular, we test (the logarithm of) market capitalization, leverage, current ratio, market-to-book ratio, number of employees, and turnover.[8] Market capitalization is a measure of firm size; leverage—defined as total liabilities divided by total assets—and current ratio—defined as current assets divided by current liabilities—assess a firm's quality and financial health; market-to-book ratio proxies a firm's value/growth profile; and turnover—defined as trading volume divided by market capitalization—proxies a stock's liquidity. Coval and Moskowitz (1999) argue that "number of employees" can be viewed as a mechanism by which professional investment managers obtain information about a company. (Further exploration of this is beyond the scope of this research.) In addition, number of employees can be a non-market-cap measure of size. We regress a stock-specific local bias metric on these variables.[9] **Figure 6** displays the results.

FIGURE 6.

Smaller, more levered, less liquid, and value stocks are associated with more local bias

Variable	Coefficient
Market capitalization (log of)	–2.556****
Leverage	2.285****
Current ratio	–0.062****
Market-to-book ratio	–0.005****
Number of employees	–0.001****
Turnover	–3.617****

******** indicates significance at the 0.1% level.

Notes: The table provides regression coefficients from a regression of stock-level local bias (in percentage points) on several variables using year-end data from 2018, 2019, 2020, and 2021. It includes time effects. The adjusted R-square is 0.614.

Sources: Vanguard, the NBER ZIP Code Distance Database, FactSet, and Morningstar.

8 Kang and Stulz (1997), Coval and Moskowitz (1999), Zhu (2002), and Ivković and Weisbenner (2005) test subsets of the first five variables and, specifically, all test market capitalization, leverage, and market-to-book.

9 **Appendix 2** details the stock-specific local bias metric.

Consistent with the past literature, we find that smaller stocks and more levered stocks are associated with higher local bias. However, compared with investment managers studied by Coval and Moskowitz (1999), our coefficient on leverage is much smaller. This implies that information on a company's financial distress may not be as strong a driver for individual investors to hold local stocks. We also find that value firms (firms with lower market-to-book ratios) and firms with fewer employees exhibit higher local bias with high statistical significance, although the economic magnitude is small. Finally, less liquid stocks, measured by their average daily turnover, are associated with higher local bias.

We conduct several robustness checks based on more sample restrictions. We progressively restrict our sample by excluding investors not living in the continental U.S., investors who moved during the sample period, and investors who own advised accounts. We still find significant local bias in all the subsamples, and we obtain quantitatively and qualitatively similar regression results.

Implications and remedies

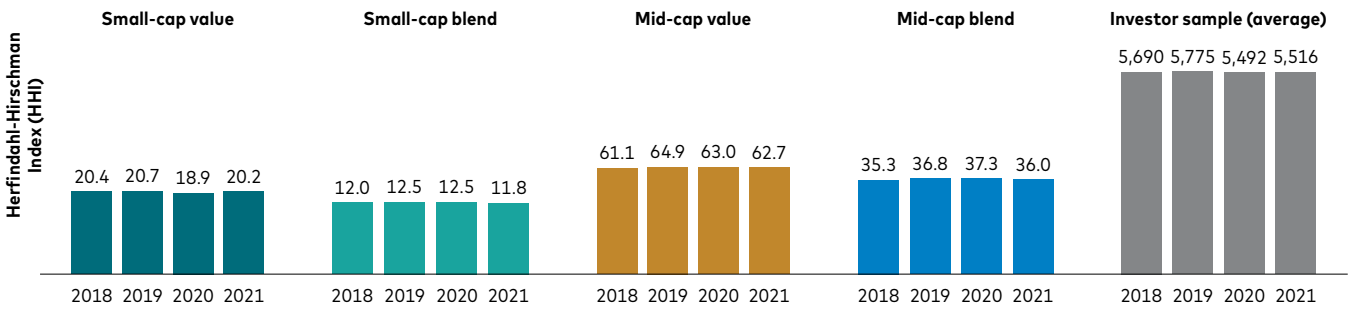
We have demonstrated that higher levels of local bias are correlated with higher degrees of concentration in individual stock portfolios and that those stocks have a smaller-cap size and value-style bias. For investors who are comfortable with those positions, perhaps no portfolio changes are necessary. However, for investors who are not necessarily comfortable, we offer one potential remedy.

One possible explanation for investors' comfort level is some degree of psychological utility from investing in local stocks. Perhaps investors feel better about investing locally and/or supporting companies where their family and friends might work. Whether or not this is an explicit choice, we do not know.

Investors could alleviate the concentrated nature of the individual stock portfolio but maintain a tilt toward smaller-cap and value by instead holding a diversified mutual fund or exchange-traded fund with those investment exposures. Exposure to a diversified portfolio of small-cap and/or mid-cap stocks combined with value- or blend-style could accomplish that goal. **Figure 7** shows that the concentration levels for four different size-and-style exposures are substantially less than the average concentration level in our sample's individual stock portfolios.

FIGURE 7.

Exposure to smaller-cap and value-style stocks with lower levels of concentration can be obtained with diversified funds



Notes: The chart shows concentration—as measured by HHI—for four style-box categories and our sample of individual investors. The style-box categories of small-cap value, small-cap blend, mid-cap value, and mid-cap blend are proxied by the CRSP U.S. Small Cap Value Index, the CRSP U.S. Small Cap Blend Index, the CRSP U.S. Mid Cap Value Index, and the CRSP U.S. Mid Cap Blend Index, respectively. The figure is shown in logarithmic scale for visual acuity. Data are as of December 31 for each year.

Sources: Vanguard and FactSet.

Conclusion

Using a sample of over 1.19 million Vanguard investors who hold individual U.S. stocks, we determine to what extent Vanguard investors exhibit local bias. We also analyze its association with investor portfolios and quantify the related investment exposures. We find that our sample of investors consistently exhibits local bias across geographic regions and time. Local bias is positively correlated with more concentrated individual stock positions, but such stock positions do not appear to also constitute a larger proportion of investors' overall equity allocations. With respect to stock-specific characteristics, local bias is associated with smaller, more levered, value-style, and less-liquid stocks. Investors who wish to alleviate the stock concentration associated with individual stock positions but perhaps maintain the smaller-cap and value-style tilts might consider diversified small-cap and mid-cap funds with varying amounts of value-style exposure.

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Appendix 1.

Local bias of the individual (LB)

We leverage the formula used by Coval and Moskowitz (1999). *LB* measures how much closer investor *i* is to the investor's portfolio than to the benchmark (as a fraction of the distance the investor is from the benchmark).

$$LB_i = \sum_{j=1}^{n} (m_{i,j} - h_{i,j})\ (d_{i,j}/d_i^M)$$

$m_{i,j}$ represents the market-capitalization weight of stock *j* in the benchmark index for which investor *i* is compared.

$m_{i,j}$ is the same across all investors *i*.

$h_{i,j}$ represents the weight that investor *i* places on stock *j* in the stock portfolio of investor *i*.

$d_{i,j}$ is the distance between investor *i* and the corporate headquarters of stock *j*.

d_i^M represents the average distance of investor *i* from all stocks *j* in the benchmark index, by weighting the distances between investor *i* and all *n* stocks in the benchmark by the appropriate benchmark weights:

$$d_i^M = \sum_{j=1}^{n} m_{i,j} d_{i,j}$$

A positive (negative) LB value suggests that an investor's stock portfolio is more (less) proximate than the benchmark index.

Appendix 2.

Local bias of the stock (LBy)

We leverage the formula used by Coval and Moskowitz (1999). *LBy*, denoted by $y_{i,p}$, captures the local bias of an investor (in percentage terms) in a particular stock holding.

$$y_{i,p} = (m_{i,p} - h_{i,p})(d_{i,p}/d_i^M)$$

$m_{i,p}$ represents the market-capitalization weight of stock *p* in the benchmark index for which investor *i* is compared, where *p* represents *only those stocks held in the investor's portfolio*.

$h_{i,p}$ represents the weight that investor *i* places on stock *p* in the stock portfolio of investor *i*.

$d_{i,p}$ is the distance between investor *i* and the corporate headquarters of stock *p*.

d_i^M represents the average distance of investor *i* from all stocks *j* in the benchmark index, by weighting the distances between investor *i* and all *n* stocks in the benchmark by the appropriate benchmark weights:

$$d_i^M = \sum_{j=1}^{n} m_{i,j} d_{i,j}$$

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