STYLE MIGRATION IN EUROPE

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November 25, 2015

Abstract

This paper complements the literature on style migration by examining value and size premiums throughout Europe. Information from more than 25 European markets indicates an average value premium of 9.58% per year. The primary determinants of the persistent value outperformance are: 1) value firms migrating to a neutral or growth portfolio, and 2) growth stocks migrating to neutral or value portfolios. The financial health metric F_SCORE helps uncover outperforming stocks ex ante, and provides preliminary evidence on the probability of migration, but only for small stocks.

Keywords: Migration; Value; Growth; F_SCORE

JEL classification: G11; G15

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Abstract

This paper complements the literature on style migration by examining value and size premiums throughout Europe. Information from more than 25 European markets indicates an average value premium of 9.58% per year. The primary determinants of the persistent value outperformance are: 1) value firms migrating to a neutral or growth portfolio, and 2) growth stocks migrating to neutral or value portfolios. The financial health metric F_SCORE helps uncover outperforming stocks ex ante, and provides preliminary evidence on the probability of migration, but only for small stocks.

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1. INTRODUCTION

Within an efficient market context, investors should not be able to consistently outperform the market using investment strategies based on style or market capitalization. They should also not be able to consistently find mispriced securities using fundamental analytical techniques. A plethora of research, however, details anomalous behavior in financial markets. Much of this research relates to investment style (value vs. growth) or firm size (small-cap or large-cap) effects. The consensus in the literature indicates that style and size are characteristics that may help generate above-market returns.

The focus of this paper is to evaluate the effects of style and size premia when firms migrate across various style–size classifications. Two questions are addressed. First, what are the impacts of migration on stock returns in Europe? Second, how might the incorporation of a fundamental financial health metric provide a better understanding of the migration issue? We address the first question by providing an out-of-sample test of Fama and French (2007a) "migration" using European data. We address the second question by applying the methodology of Piotroski (2000), namely, the F_SCORE metric, to our data.

A large European database incorporating variables associated with style, size, and financial health covering the period 1980–2011 yields the following results. First, migration plays a major role in driving both value and size effects in European stock markets. The value effect is found to be 9.58%, on average, and is caused mainly by value stocks migrating to a growth category. Stocks that do not migrate contribute very little to the value premium. Second, size effects exist only in the early years of the data. Over the entire period evaluated, the size effect is found to be an insignificant -0.23%.

Finally, we show that the Piotroski (2000) F_SCORE is able to indicate the increased returns of investment style decisions, but only for small stocks. Small-cap stocks with a very high F_SCORE are more likely to migrate favorably than stocks with a very low score.

After a review of the literature, a discussion of the data used and the incorporated portfolio formation specifics follows. Results are then presented, followed by concluding remarks.

2. LITERATURE REVIEW

The origins of differential investment strategy performance can be traced to Graham and Dodd (1934), who argue that value strategies outperform the market. One way of explaining the outperformance of value strategies is that such strategies are fundamentally riskier. The most notable proponents of this explanation are Fama and French (1992), who argue that investors who follow a value strategy take on more risk. The riskiness of value stocks can also be interpreted as increased risk of financial distress (Piotroski 2000). Fama and French (2005) find that low P/BV companies have a consistently lower return on equity than high P/BV companies. Further, Chen and Zhang (1998) and Fama and French (1992) find a clear relation between low P/BV, high amounts of debt, and other financial measures of risk.

The behavioral school of thought offers an alternative point of view on why the value effect exists. Lakonishok et al. (1994) argue that the risk-based explanation for the outperformance of value strategies lacks support; their explanation is behavioral. Investors simply make consistent mistakes in estimating stock prospects. Since rosy projections turn out to be too optimistic, glamour (or growth) stocks subsequently underperform. Past winners become losers, and non-glamour (or value) stocks become winners.

Fama and French (2007a) focus on migration in the US markets over the period 1927–2006. The value premium is due to value stocks migrating to neutral or growth portfolios. Also, growth stocks that earn low returns and migrate to neutral or value portfolios also contribute to the value premium. The final determinant of the value premium is that value stocks that do not migrate earn higher returns than growth stocks that do not migrate. Fama and French (2007a) also find that the size premium is almost entirely driven by small stocks migrating to a large-cap portfolio.

Fama and French (2007b) suggest that convergence plays an important role in the higher average returns of value stocks. Competition from other companies tends to erode the high profitability of growth companies. As a result, the P/BVs of growth portfolios fall in the years after portfolio formation (negative convergence). Conversely, the P/BVs of value companies rise as some value companies restructure, their profitability improves, and they are rewarded with lower discount rates (positive convergence).

Could we use accounting variables to forecast which value companies will converge? The idea of buying winning value stocks based on accounting fundamentals is not new. Papers such as Lev and Thiagarajan (1993) and Abarbanell and Bushee (1997) find that certain financial indicators are able to predict future changes in earnings. Piotroski (2000) takes a step further and combines these signals into a simple measure, the F_SCORE, to create portfolios. This author finds F_SCORE to be a useful indicator of future portfolio performance.

Fama and French (2006b) utilize fundamental analysis tools, including the Piotroski (2000) F_SCORE, in an effort to examine the relationship between P/BV, expected profitability, and expected investment with respect to future profitability. Even though Fama and French (2006b) confirm that the F_SCORE does predict future profitability, they disagree with the mispricing argument but conclude that the result is in line with valuation theory.

3. DATA AND PORTFOLIO FORMATION

The sample selection process follows Fama and French (2007a) and screens for publicly listed companies in Europe over the period 1980–2011. To be included in the sample, a company is required to have sufficient data on price-to-book, market capitalization, and stock returns. We require the following data: 1) book value of equity at the end of December, 2) market capitalization at the end of June, 3) monthly stock returns for the entire year. Note that company fiscal year must end in December. These combined requirements may produce a small survivorship bias, since we require a continuous series of data; but since the required horizon is for only one year, we believe any bias is small and does not affect the results.

Accounting data are collected from Worldscope using Thomson One Banker. The data for market capitalization and returns are from Datastream. To identify acquired companies, data from SDC Platinum are used. The merger and acquisition data include 35,255 observations over the period 1980–2011. Target companies are matched by their Datastream codes, Worldscope tickers, or SEDOL codes. The final tally of firm–year observations included in the sample is 52,154.

Shumway and Warther (1999) estimate that using a corrected return of -55% for missing performance-related delisting returns corrects the bias with CRSP's NASDAQ data due to missing returns for delisted stocks. CRSP and Datastream differ in the reporting data for delisted firms. CRSP sometimes misses the delisting data, whereas Datastream repeats the last valid data point. We employ this last valid data point.

Selecting 1980 as the starting year is due to limitations in Thomson ONE Banker—earlier data simply are not available. The scarcity of available data even in the 1980s is clearly evident in Figure 1. Although this does not cause problems in the aggregate sample of 52,154, analysis by country and region are somewhat limited, because the analysis requires creating six portfolios per year.[1] The choice of a December fiscal year-end was made to maximize the number of observations with fundamental data. More than 80% of firms have December fiscal year-ends.

Table 1 shows that the number of observations naturally varies between countries. As expected, the United Kingdom, France, and Germany are the countries with most observations. The price-to-book ratios are mostly gathered at the total sample median of 1.63, with Eastern European countries having lower valuations. This is most likely due to the fact that stock exchanges in Eastern Europe have a shorter history than their Western European counterparts. Variations in companies' market capitalizations can also be seen. Central and Western European companies tend to dominate the sample by both average and median market capitalization.

Following Fama and French (2007a), stocks are sorted into six categories by their size and price-to-book ratios. We divide stocks into two size categories, small-caps (S) and large-caps (L), by market capitalization. The cut-off point for S and L in year t is the median market capitalization for the benchmark index (MSCI) at t. According to P/BV, companies are sorted into three groups: the lowest 30% P/BV forms the value (V) group—that is, all companies in the bottom 30% of the MSCI P/BV group, the highest 30% forms the growth (G) group—that is, all companies in the top 30% of the MSCI P/BV group, and the middle 40% are neutral (N) stocks. This results in six different size–P/BV portfolios:

1. SV: Small-cap Value
2. SN: Small-cap Neutral

[1] The six portfolios are a combination of small- and large-cap, each combined with value, neutral, and growth style classifications.

3. SG: Small-cap Growth
4. LV: Large-cap Value
5. LN: Large-cap Neutral
6. LG: Large-cap Growth

Portfolios are formed at the end of June each year and rebalanced annually. The first portfolio begins in June 1980 and the last in June 2010. Thus, the last data point for the final portfolio is from June 2011.[2] Companies with negative book value are excluded from the portfolio formation. Total return data are obtained from Datastream. All portfolios are value-weighted and rebalanced at the end of each June. The benchmark index for the aggregate sample is MSCI Europe. Excess returns are calculated as a portfolio's return less the return of the benchmark index during the respective month.

Over time, style classifications can follow two general types of migration: 1) migration between the six size–P/BV portfolios and 2) migration out of the six portfolios. In the latter case, a stock ends up in one of the following portfolios:

1. "Good Delist"
2. "Bad Delist"
3. "Neg"
4. "NA"

A stock migrates to the "Good Delist" portfolio if it is acquired during year t. The "Bad Delist" portfolio consists of stocks that disappear for such reasons as bankruptcy, or not meeting listing requirements. The "Neg" portfolio consists of companies with negative book equity, and the "NA" portfolio includes stocks with missing data for book equity, or the delisting reason is not known.

The migration portfolios are combined into 24 summarized portfolios. Each size–P/BV portfolio is split into four broad movement categories:

1. Same: stocks that stay in the same portfolio when portfolios are rebalanced. This category also includes stocks in the "NA" portfolio.
2. dSize: small-cap stocks that move into large-cap portfolios, and vice versa.
3. Plus: stocks that move toward growth portfolios (from value or neutral) or are acquired by another company ("Good delist").

[2] The selection of June as the starting year follows Fama and French (2007a) to prevent look-ahead bias.

4. Minus: stocks that move toward value portfolios or are delisted due to a negative event ("Bad delist") or their book value goes negative ("Neg").

Subsequently, the average annual contributions to the size–P/BV portfolios by each migration type can be examined. Migration in the size spectrum contributes to the size premium. Also, migrating stocks with different P/BV characteristics contribute to the value premium. The premium contribution comes from two factors, namely, the frequency and the magnitude of returns for migrating stocks. The returns of each migration type are calculated relative to the market return.

Because migrating stocks can be traced at an individual level, this allows several ways to examine the characteristics that make them migrate. To study whether migration can be predicted, the method outlined in Piotroski (2000), namely, the F_SCORE, is applied.

To calculate F_SCORE, accounting data from the Worldscope database are used. The number of observations for small value stocks is 13,610, and 2,006 for large value stocks. The data set in this section is smaller than the original aggregated data set due to the increased requirements for calculating the F_SCORE.

The F-score is defined as the sum of the following binary signals:

$$F_{SCORE} = F_{ROA} + F_{\Delta ROA} + F_{CFO} + F_{ACCRUAL} + F_{\Delta MARGIN} + F_{\Delta TURN} + F_{\Delta LEVER} + F_{\Delta LIQUID} + EQ_{OFFER}$$

The components of the F_SCORE are described below. The variable is equal to 1 if the condition is filled, zero otherwise.

1) $\boldsymbol{F_{ROA}}$: the company's return on assets is positive in year t

2) $\boldsymbol{F_{\Delta ROA}}$: ROA in year t is larger than ROA in year t-1

3) $\boldsymbol{F_{CFO}}$: cash flow from operations is positive in year t

4) $\boldsymbol{F_{ACCRUAL}}$: cash flow from operations in year t is higher than net income before extraordinary items in year t (scaled by beginning-of-year total assets)

5) $\boldsymbol{F_{\Delta MARGIN}}$: gross margin ratio in year t is higher than gross margin ratio in year t-1

6) $\boldsymbol{F_{\Delta TURN}}$: asset turnover ratio in year t is higher than asset turnover ratio in year t-1

7) $\boldsymbol{F_{\Delta LEVER}}$: leverage ratio (long-term debt to average total assets) in year t is lower than leverage ratio in year t-1

8) $\boldsymbol{F_{\Delta LIQUID}}$: current ratio in year t is higher than current ratio in year t-1

9) $\boldsymbol{EQ_{OFFER}}$: the company did not issue equity during year t

The first four variables are associated with profitability. Since value firms typically have poor historical performance in generating earnings or cash flows (Fama and French 1995; Piotroski 2000), the first four variables are able to separate out companies that can generate profits. ROA and CFO are defined as net income before extraordinary items and cash flow from operations scaled by total assets at the beginning of the year. Therefore, if a company's ROA (CFO) is positive, the indicator variable F_{ROA} (F_{CFO}) is equal to 1, zero otherwise. In addition to current financial performance, the recent trend is also considered. $F_{\Delta ROA}$ is equal to 1 if a firm's current ROA is higher than in the previous year, zero otherwise. Finally, $F_{ACCRUAL}$ measures the relationship between earnings and cash flow levels to indicate possible earnings management by the company. Sloan (1996) shows that positive accrual adjustments (if profits are greater than cash flows from operations) are a bad signal for future firm performance. Piotroski (2000) adds that the incentives for earnings management are greater for value firms, to avoid possible covenant violations. The $F_{ACCRUAL}$ variable is defined as current year net income before extraordinary items less cash flow from operations, scaled by total assets at the beginning of the year. This variable is equal to 1 if CFO is larger than ROA, zero otherwise.

The next two signals, $F_{\Delta MARGIN}$ and $F_{\Delta TURN}$, are designed to measure the operating efficiency of the company. $F_{\Delta MARGIN}$ is defined as current year gross margin ratio less the gross margin ratio of the preceding year. This variable indicates a possible improvement in pricing power (or a reduction in costs). The variable is equal to 1 if the company was able to increase its gross margin ratio, zero otherwise. $F_{\Delta TURN}$ is defined as current year asset turnover ratio (total sales scaled by total assets at the beginning of the year) less the asset turnover ratio in the preceding year. This variable is equal to 1 if the company has managed to increase its asset turnover ratio, zero otherwise. The asset turnover ratio is a measure of how efficiently a firm manages its assets. A firm can increase its asset turnover ratio by generating more sales with the same amount of assets or employ fewer assets to generate the same amount of sales.

The last three signals, $F_{\Delta LEVER}$, $F_{\Delta LIQUID}$, EQ_{OFFER}, relate to leverage, liquidity, and source of funds, respectively. $F_{\Delta LEVER}$ measures changes in the company's long-term debt levels. If the company is able to reduce its long-term debt compared to the preceding year, this variable is equal to 1, zero otherwise. $F_{\Delta LIQUID}$ measures the change in the firm's current ratio (current assets divided by current liabilities) from the previous year. A company can better cover its short term liabilities when this ratio is high. This variable is equal to 1 if the current ratio has increased from the previous year, zero otherwise. The last variable, EQ_{OFFER}, indicates whether a company has issued equity in the year before portfolio formation. This variable is equal to 1 if a company did not need to issue shares, zero otherwise. According to Piotroski (2000), financially distressed firms that cannot generate adequate cash flows need external financing. The variables $F_{\Delta LEVER}$ and EQ_{OFFER} are able to indicate companies in distress.

4. RESULTS AND ANALYSIS

4.1. Value and size premiums

Table 2 depicts average returns for each of the six size–P/BV portfolios and the size and value premiums. The data indicate the presence of a significant value premium (HML) for European stocks over the 1980–2011 timeframe. The time-series average for the value premium is a statistically significant 9.58% average annual premium (0.80% per month). Fama and French (2012) also find a value premium (0.55% per month) in Europe. The higher value premium found is partly explained by the larger data set employed. Fama and French (2012) cover fewer countries (16 vs. 23) with a shorter time span (1990 to 2011). They also report a higher value premium for small stocks (0.69%) than large stocks (0.42%).

The development of size and value premiums over time is shown in Figure 2. Graphical presentation confirms the non-existence of any pattern in size premium. A value premium is evident, however. The value portfolio outperforms in most years and, in particular, in the peak year 2000, the outperformance is 64%.

The European style portfolio returns are mostly similar to those presented in Fama and French (2007a). Smaller firms do not outperform their large-cap counterparts. The size

premium (SMB) is -0.23% annually, but statistically insignificant for the aggregate European sample. The size premium is positive from 1980 to 1988, with average returns of 4.20%, but begins to decline after that period. From 1989 to 2011 the average annual size premium is -2.04%. Apparently, the size premium disappears from Europe after 1988.

Chen and Zhao (2009) argue that if an alternative definition for size premium is used, the premium is as robust as ever. These authors find the total size premium to be 0.24% per month from 1926 to 2006, 0.30% from 1926 to 1980, and 0.11% from 1981 to 2006, with US data. If, however, small growth firms are excluded from the sample, the size premium is 0.31%, 0.31%, and 0.30% for the periods 1926–2006, 1926–1980, and 1981–2006, respectively. Therefore, the disappearance of the size premium may be due to the disappointing performance of small growth firms.

The average annual returns for the SV, SN, SG, LV, LN, and LG portfolios are 20.2%, 13.7%, 7.0%, 17.3%, 13.0%, and 11.3%, respectively The small growth value portfolio has the lowest returns and highest volatility of all six portfolios. The average annual return of the small growth portfolio is 7.01%, while the volatility of annual returns is 24.3%. Following the Chen and Zhao (2009) argument, if small growth stocks are excluded from our sample, the annual size premium for 1980–2011 is 3.10%. The *t*-statistic is 2.02, which represents a statistical significance of 5% for a two-tailed test. But the size premium disappears in the latter period (1988–2011).

Table 3 presents how the size and value premiums behave in different European countries. Since the number of observations is low for especially small nations, countries are grouped into fairly similar regions. Countries with many observations are reported independently.

Fama and French (1998) also provide a country-level breakdown of the value effect in eight European nations from 1975 to 1995. They document an annual value premium ranging from -5.99% in Italy to 8.02% in Sweden. They also find a positive value premium in the United Kingdom, France, and Germany, with annual HML factors of 4.62%, 7.64%, and 2.75%, respectively. The data in the Fama and French (1998) study consist of 686 firms, on average. With a larger and more recent data set, we report positive value premium in all countries, including Italy (+4.9%). The only exception is the Benelux countries, where the premium is not statistically significant. Small growth companies have performed very well (+17.2%) in Benelux countries, which results in smaller value premium than in other geographical areas.

4.2. Migration

Table 4 displays the time-series average of migration frequencies. Stocks allocated to each size–P/BV portfolio are most likely to stay in the same portfolio when the portfolios are rebalanced at the end of June. The diagonal transitions illustrate this. Interestingly, small-cap stocks are less likely to stay in the same portfolio (67.8%, 59.8%, and 59.9%) than large-cap stocks (75.4%, 80.8%, and 84.0% for value, neutral, and growth styles, respectively). The second largest migration type tends to be within the same size classification. All stocks are more likely to migrate across style definitions rather than migrate across the size spectrum. For small-cap neutral stocks, migration to the value classification is more likely (13.8%) than migration to growth (9.8%). However, for large-cap neutral stocks, the situation is opposite: 9.7% migrate to growth, while 7.4% migrate to value.

Migration into large-cap territory is almost equally likely for small value stocks (13.8% in total) and small growth stocks (13.6% in total) when all three valuation categories are taken into account. This finding differs somewhat from that shown in Fama and French (2007a), who find that small growth stocks are more likely (11.7%) to migrate into the large-cap category than small value stocks (8.5%). Migration from large to small on the other hand is somewhat more likely for large-cap value stocks (1.9%) than large growth stocks (1.3%). Stocks that change size tend to stay in the same valuation category. For instance, small-cap value stocks are most likely to migrate to the large-cap value portfolio (8.0%) rather than the neutral (5.4%) or growth portfolio (0.4%). This phenomenon holds for all six categories.

Table 5 illustrates the excess returns of the six size–P/BV portfolios and excess return by migration type. Both small-cap and large-cap value stocks (7.8% and 4.9%) beat their growth counterparts (-5.4% and -1.1%). Small-cap value tends to outperform the benchmark (7.8% average annual excess return), but small-cap value stocks that stay in the same category underperform the benchmark (-2.6%). The outperformance of small-cap value therefore derives from stocks that migrate favorably in type or in the size spectrum. To illustrate, small-cap value stocks migrating to small-cap neutral and growth outperform by 37.1% and 74.0%, respectively.

Stocks tend to outperform by a substantial margin when they improve in type or size. Deterioration in type or size always leads to negative returns. The only exception to this is the SN category, which migrates to the large value (LV) portfolio. Negative returns are possible due to the fact that the cut-off level between large- and small-caps changes every year. Sharpe ratios tend to increase when a stock migrates upwards in either the size or value spectrums. Small-cap value stocks as a whole have a Sharpe ratio of 1.30 on aggregate, but their ratio improves considerably as they migrate favorably (Sharpe ratios are available upon request).

Table 6 presents results that connect migration frequency to excess returns. Although stocks tend to stay in the same group year over year, non-migrating stocks' returns tend to be negligible. Small-cap value stocks that stay in the same category contribute negatively (-1.6%) to the total portfolio (8.1%), whereas small growth stocks contribute positively (1.3% out of the total -5.3%). Further, LV stocks in the "Same" group contribute only 0.8% to the total portfolio return of 5.4%. The only positive contribution to the LG portfolio is solely from the non-migrating group.

Non-migrating value stocks tend to generate lower performance than non-migrating growth stocks (SG and LG). Although small value stocks as a whole perform best (8.1%), the typical small value stock does not migrate, which leads to an average underperformance of -2.4% for the SV group compared to the benchmark index. This indicates the significant role of migration, due to the fact that the majority of all stocks tend to stay in the same category.

Value stocks tend to improve in type (SV: 16.3%, LV: 21.3%) almost in equal proportions to growth stocks that deteriorate (SG: 24.6%, LG: 14.1%). Large value stocks are more likely to be upgraded (21.3%) than small value stocks (16.3%), which is a similar frequency as presented in Fama and French (2007a). Deterioration in type is more likely for small growth stocks (24.6%) than their large-cap counterparts (14.1%).

Small-cap neutral stocks are more likely to deteriorate (14.2%) than be upgraded (10.4%). Interestingly, the opposite is found for large-cap neutral stocks, with 7.5% migrating towards lower valuation and 10.3% migrating towards higher valuation. This finding is also similar to Fama and French (2007a). Another finding of interest is the difference in returns for neutral stocks in the "Minus" group. Small neutral stocks tend to generate worse returns (-33.6%) than large-cap neutral stocks (-18.2%).

The role of "Minus" and "Plus" transitions in regard to the value effect is very significant. Most of the outperformance of small value stocks comes from those stocks that migrate into a better category (5.8% out of 8.1% total portfolio). The same holds for large-caps (5.3% from a total portfolio of 5.4%). Growth stocks, on the other hand, that are in the "Minus" category generate a significant portion of their category's average (negative) excess returns. Small growth stocks contribute -9.5% to the total -5.3% SG portfolio. The same trend holds for large-cap growth stocks as well (-2.5% of the total -0.6%). The underperformance of growth stocks comes mostly from the heavy losses in the "Minus" group for both SG and LG.

As expected, migration across the size boundary contributes extensively to the excess returns of the small-cap portfolios (4.4%, 3.9%, and 3.6% for SV, SN, and SG, respectively). The likelihood of crossing the size boundary is almost equal for small value and growth stocks (13.7% versus 13.6%). The same does not apply for large-cap stocks. Migration from large to small-caps occurs at almost one-tenth the frequency. The negative contribution for large-caps ranges from -0.1% to -0.5%, which are significantly smaller figures compared to small-caps (3.6% to 4.4%). The reason for this is straightforward; it is due to the value-weighting of portfolios. Simply put, migration from small to large is most likely for firms close to the market capitalization boundary that have the greatest weights in their respective portfolios.

4.3. F_SCORE analysis

We then continue by incorporating fundamental variables from a "financial health" perspective (see Table 7). The F_SCORE directly separates financially weak firms (Low Score) from strong firms (High Score) when applied to small value stocks. The return difference between the highest and lowest F_SCORE groups is 24.1%. The return difference between financially strong firms and the total sample of small value stocks is 14.7%. For large-cap stocks, the return difference between financially strong and weak large companies (2.8%) is not statistically significant. This implies that financial health matters for small company migration, but not necessarily for large companies. This result is consistent with Piotroski (2000), who suggests, using US data, that the benefits of financial statement analysis are concentrated in small and medium-sized firms.

In sum, the results to this point are as follows. First, the returns to a small-cap value portfolio appear driven by stocks migrating to other categories, that is, stocks are rewarded with a

higher P/BV ratio, or they move across the size spectrum. Second, stocks that perform well can be separated from other stocks in the small-cap value universe using a fundamentals-based indicator. The natural question therefore is whether these findings are linked. To evaluate that question, we focus on small-cap value firms.

Stocks are divided into two groups, those that migrate favorably ("Good Migration") and the rest ("Other"). Good Migration stocks consists of SV stocks moving upward in the value spectrum (into SN or SG), or in the size spectrum (into any of LV, LN, or LG groups), or that are acquired by another company. Therefore, the Other category consists of small-cap value stocks that do not migrate, or stocks that are delisted for sub-par reasons, such as bankruptcy.

The bulk of outperformance of small-cap value stocks is driven by stocks that migrate in either the value or size spectrum. Table 8 illustrates how the probability of migration changes depending on the firm's F_SCORE at the portfolio formation period. Companies with very weak financial strength (F_SCORE of 0 or 1) tend not to migrate or are more likely to be delisted. The proportion of these stocks in the Good Migration category is 15.2%. The situation is the opposite with very strong companies (F_SCORE of 8 or 9). Their proportion in the "Good Migration" category is 30.1%, indicating that financial strength as measured by the F_SCORE may play a significant role in whether a stock migrates. The situation is not as clear in the middle range of the F_SCORE values, where the proportion of stocks migrating favorably hovers around 21% to 25%.

We also apply a logistic regression to the probability of migration for SV stocks. The variable Y represents whether a stock belongs to the Good Migration category at the end of June t+1 and X is the F_SCORE value at the end of June t. A value of Y = 1 indicates that a stock has migrated to the Good Migration category and a value of Y = 0 indicates that the stock belongs in the Other category. Good Migration is defined as the combination of SN, SG, LV, LN, LG or a stock that has been acquired by another company. The Other category includes the remaining destinations an SV stock can have: it can belong in the same SV category, its book value can go negative, or the company can be delisted for sub-par reasons. The results of a logistic regression for the probability of favorable migration show an odds ratio of 1.0847. This suggests that a one-point increase in the F_SCORE increases the stock's probability to migrate by 8.47%.

The results are intriguing, especially in relation to Chen and Zhao (2009). One of these authors' main findings is that positive earnings shocks drive favorable migration. Stocks that

beat analyst expectations are upgraded in valuation, which explains roughly a third of migration in their sample. Jiang and Koller (2007) also find that growth stocks tend to have higher returns on equity and invested capital. The aforementioned findings are interesting because a significant proportion of the F_SCORE's variables consider a company's profitability and its improvements in profit performance, but the evidence presented here is not enough to draw direct conclusions about migration.

A probable underlying reason for migration may be a simple "turnaround" story—a company's stock price increases because it is able to deliver better than expected results due to improving operational efficiency, and thus profitability (as measured by the F_SCORE). Investors might shun value stocks and remain pessimistic about the companies' probability of becoming more profitable, but the firms manage to surprise positively. Contrarily, without an improvement in a company's financials, the stock is not rewarded with an upgrade in valuation. According to European data, companies that have a poor financial performance measure tend to generate sub-par stock performance.

5. SUMMARY AND CONCLUSIONS

This paper examines the role of migration in value and size dimensions by complementing the existing literature with a European data set. The main objective of this paper is to provide an out-of-sample test of Fama and French (2007a). A European sample containing 52,154 firm–year observations from over 25 countries is utilized. The overall results suggest that migration plays a significant role in generating value and size effects. Further, this paper evaluates whether migration can be traced to the company level through aggregation of accounting data into a financial health measure, the F_SCORE, within a migration setting.

The data show a significant value premium in Europe, with a magnitude of 9.58% per annum. Further, the size effect is insignificant over the entire sample, but appears to be positive if the smallest growth stocks are omitted from the sample, as in Chen and Zhao (2009).

The value effect in Europe is mainly caused by: 1) value firms that migrate to a neutral or growth portfolio; and 2) growth stocks that migrate to neutral or value portfolios. These findings are consistent with Fama and French (2007a) and Chen and Zhao (2009). The main

difference between the findings is that value stocks in the US that do not migrate earn higher returns than growth stocks that do not migrate. The European data set examined here shows a different result: European growth stocks that do not migrate outperform value stocks that do not migrate.

Portfolio returns can be enhanced with the F_SCORE, but only for small stocks. Small-cap stocks with a very high score are more likely to migrate favorably than stocks with a very low score. Further, a logistic regression model is able to detect a relationship between the F_SCORE of a stock and its probability to migrate: an increase of 1 unit in the F_SCORE value for a stock increases the probability of favorable migration by 8.47%. Even though the model is significant, the results should be interpreted cautiously. Since the objective of the regression is only to examine whether a relationship exists between the F_SCORE and migration probability, the model is a crude measure and is not meant as a definitive answer to the causes of migration.

The value effect appears strong in Europe. Size factors are not as prominent, but combining size helps better understand migration. The financial health metric, F_SCORE, helps discover outperforming stocks ex ante, and provides preliminary evidence on the probability of migration. Our results are in line with Daniel et al. (1997), who suggest that portfolio manager benchmarking should be based on characteristic portfolios.

One of the most interesting aspects of the value vs. growth discussion is whether value stocks are inherently riskier than growth stocks or whether they are mispriced. The evidence generated in this paper cannot offer a solution to this debate, even though our results match the mispricing story better. The risk explanation is difficult to accept when stocks of firms with strong financial conditions (low risk) outperform stocks of firms in weak financial condition (high risk). However, there are no concrete theories to sufficiently explain why a subset of value stocks is able to outperform other value stocks.

When comparing the magnitude of the size and value effects found in this study, a problem could arise from selection of the metrics and the cut-off points used. Results might not be comparable with other studies, for instance, when the value effect is assessed with P/E rather than P/BV. Also, different results may arise depending on the definition of value and growth stocks. To illustrate, there is no standard definition for a value stock; it could just as well be defined as belonging to the bottom 10% or 30% of any valuation metric. Also, the value effect tends to be sensitive to the portfolio holding period.

Further, liquidity and trading volume are not taken into account when portfolio returns are calculated and interpreted. There is a realistic possibility that, in particular, small-cap portfolio returns are biased due to illiquidity and therefore are not achievable in real-world markets; also, this might impact the F_SCORE trading strategy with small-cap stocks.

This study contributes to the literature by providing further empirical evidence on the seemingly anomalous equity pricing effects, the value and size premiums. Although we are able to replicate the previous core paper (Fama and French, 2007a), the underlying mechanism behind the effects remains poorly understood. Further, even though behavioral finance has taken major steps in contributing to the field of asset pricing, the behaviorists lack a unifying theory to explain how a possible mispricing arises. Applying the concepts of behavioral finance to asset pricing is a valuable area for further research. However, the task of explaining asset pricing anomalies through investor behavior remains rather formidable.

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Table 1. Firm–Year Observations per Country

This table illustrates the market capitalizations and price-to-book ratios by the nation of each company. The country codes and book equity are obtained from Worldscope. Market capitalizations for each observation at June t are obtained from Datastream. P/BV is market capitalization at June t divided by book equity at December t-1. Forming portfolios at the end of June is due to allowing enough time to publish financial reports to mitigate look-ahead bias.

		Market Cap		P/BV	
Region / Country	n	Mean	Median	Mean	Median
North Europe / Scandinavia					
Denmark	1572	362	58	2.09	1.13
Finland	825	690	107	3.69	1.71
Norway	1694	683	74	2.42	1.48
Sweden	1554	499	34	3.76	2.22
Central / Western Europe					
Austria	1021	548	81	2.35	1.37
Belgium	1033	630	116	2.66	1.38
France	8612	1323	74	3.24	1.62
Germany	6938	1446	60	3.38	1.80
Ireland	763	1072	118	2.52	1.75
Luxembourg	321	1963	238	2.67	1.30
Netherlands	2061	2622	221	3.54	1.71
Switzerland	1311	1289	175	3.82	1.44
United Kingdom	13237	1363	67	4.39	1.80
Central / Western Europe (misc.)	232	617	79	3.57	1.52
Southern Europe					
Greece	2523	352	57	2.47	1.43
Italy	2261	1553	168	3.51	1.58
Spain	1898	2958	414	2.61	1.70
Portugal	597	731	86	2.03	1.18
Southern Europe (misc.)	413	654	190	2.82	1.60
Eastern Europe					
Bulgaria	303	29	2	2.35	0.76
Czech Republic	212	1209	50	1.08	0.71
Hungary	350	467	50	1.39	1.06
Poland	1598	423	60	2.58	1.47
Slovakia	51	83	4	0.64	0.43
Slovenia	111	204	27	0.99	0.83
Eastern Europe (misc.)	663	78	28	1.54	1.06
Total Sample	52,154	1257	79	3.32	1.63

Table 2. Descriptive Statistics of Average Annual Returns

This table presents the average annual returns (%) of all six size–P/BV portfolios and the size (SMB) and value (HML) premiums during the 1980–2011 period. The last three columns also depict the size effect excluding small growth stocks. Six value-weighted portfolios are formed at the end of each June t: SV, SN, SG, LV, LN and LG. Small-caps (S) are below the median market capitalization of MSCI Europe and large-caps (L) are above it at each June t. Stocks are further divided into three groups based on their P/BV: value (V) stocks are the bottom 30%, neutral (N) are the middle 40%, and growth (G) stocks are the top 30%. SMB is defined as the return difference between small-cap (SV, SN and SG) and large-cap stocks (LV, LN and LG), calculated from monthly return data. SMB excluding small growth stocks is defined as the return difference between small-cap (SV and SN) and large-cap stocks (LV, LN and LG). HML is defined as the return difference between value stocks (SV and LV) and growth stocks (SG and LG). P/BV is calculated by dividing market capitalization at the end of June t by book equity at the end of December t-1. Portfolios are rebalanced at the end of each June. Mean return differences are tested using the *t*-statistic by utilizing the two-tailed *t*-test. Symbols *, **, and *** indicate statistical significance levels of 10%, 5%, and 1%, respectively.

								SMB			SMB Excluding Small Growth (SG) Stocks		
	SV	SN	SG	LV	LN	LG	HML	Full Sample	1980–88	1988–2011	Full Sample	1980–88	1988–2011
Mean	20.20%	13.74%	7.01%	17.30%	13.01%	11.33%	9.58%	-0.23%	4.20%	-2.04%	3.10%	7.97%	1.10%
Standard Error	3.52%	3.19%	4.36%	3.26%	3.07%	3.28%	2.65%	1.44%	1.85%	1.76%	1.53%	2.17%	1.83%
t-Statistic	2.76***	0.56	-1.69*	1.58	0.26	-0.53	3.62***	-0.16	2.27**	-1.16	2.02**	3.67***	0.60
Median	21.51%	18.19%	13.03%	20.07%	15.97%	13.50%	8.15%	1.76%	5.94%	-4.75%	4.56%	9.65%	-0.25%
Maximum	63.45%	39.76%	40.08%	52.90%	42.85%	46.97%	64.16%	13.24%	11.35%	13.24%	19.36%	15.15%	19.36%
Minimum	-27.33%	-33.56%	-64.79%	-46.59%	-22.99%	-27.48%	-14.87%	-17.72%	-5.27%	-17.72%	-9.64%	-6.16%	-9.64%
Skewness	-0.36	-0.74	-1.37	-1.22	-0.32	-0.57	1.84	-0.09	-0.62	0.31	-0.04	-1.33	0.42
Kurtosis	0.19	0.15	2.07	4.05	-0.49	0.08	5.76	-0.91	-0.56	-0.68	-1.30	2.05	-0.97

Table 3. Size and Value Premiums by Region: 1980–2011

This table presents average annual returns (%) of the six size–P/BV portfolios and the size and value premiums by geographic region. Six value-weighted portfolios (SV, SN, SG, LV, LN and LG) are formed at the end of June t of each year. The portfolios are formed at the intersection of two size groups: small-cap (S) and large-cap (L). The cut-off value for small-caps and large-caps is the median market capitalization of the MSCI Europe. Companies are divided into three P/BV groups: value (V, bottom 30%), neutral (N, middle 40%), and growth (G, top 30%). Market capitalization at the end of June t is used to form the size groups and is obtained from Datastream. To form the P/BV groups, book equity at December t-1 is obtained from Worldscope and combined with the market capitalization data at June t. The HML factor is the return difference between value stocks (SV and LV) and growth stocks (SG and LG). The SMB factor is the return difference between small stocks (SV, SN, and SG) and large stocks (LV, LN, and LG). The Benelux category includes Belgium, Netherlands and Luxembourg. Central Europe consists of Austria, Czech Republic, Hungary, Poland, Slovakia, Slovenia, and Switzerland. Southern Europe comprises companies from Greece, Spain, and Portugal. Scandinavia includes companies from Denmark, Finland, Norway, and Sweden. Tests for statistical significance are performed for the HML and SMB factors by utilizing the two-tailed *t*-test. *, **, and *** indicate statistical significance levels of 10%, 5%, and 1%, respectively.

Country / Region	n	SV	SN	SG	LV	LN	LG	HML	SMB
United Kingdom	13237	19.4	17.2	10.9	18.7	13.5	13.0	7.1***	0.8
France	8612	27.8	17.2	12.3	20.7	15.5	10.3	12.9***	3.6
Germany	6938	16.6	8.6	1.7	17.1	10.5	10.9	10.5***	-3.9*
Italy	2261	18.8	5.1	10.6	5.3	16.6	8.7	4.9*	1.1
Benelux	3415	19.7	16.9	17.2	22.5	15.8	11.9	0.7	7.5***
Central Europe	4654	22.0	15.3	2.5	23.7	12.0	8.6	12.2***	-0.7
Southern Europe	5018	15.5	11.7	1.9	14.8	14.3	9.8	9.3**	-2.4
Scandinavia	5645	18.6	14.6	13.0	15.7	13.7	7.1	5.9*	1.1

Table 4. Average Transition Frequencies for Stocks Migrating within or Exiting from the Six Portfolios: 1980–2011

This table presents the average annual value-weighted transition proportions for migrating stocks within the six P/BV portfolios and the four leaving portfolios during the 1980–2011 period. Six value-weighted portfolios (SV, SN, SG, LV, LN, and LG) are formed at the end of June t of each year. The portfolios are formed at the intersection of two size groups: small-cap (S) and large-cap (L). The cut-off value for small-caps and large-caps is the median market capitalization of the MSCI Europe. Companies are divided into three P/BV groups: value (V, bottom 30%), neutral (N, middle 40%), and growth (G, top 30%). "Good Delist" companies are acquired by another company during the year. The "Bad Delist" portfolio consists of companies delisting due to sub-par reasons, such as bankruptcy or not meeting listing requirements. The "Neg" category includes companies with negative book value after a year of portfolio formation. Stocks that cannot be classified in any of the other categories due to unavailable data belong to the "NA" portfolio. Market capitalization at the end of June t is used to form the size groups and is obtained from Datastream. To form the P/BV groups, book equity at December t-1 is obtained from Worldscope and combined with the market capitalization data at June t. To identify the "Good Delist" companies, data from SDC Platinum are obtained. Bold data represent non-migrating frequency.

Average Transition Frequencies

	SV	SN	SG	LV	LN	LG	Good Delist	Bad Delist	Neg	NA
SV	**67.8**	14.9	0.9	8.0	5.4	0.4	0.5	0.1	0.6	1.4
SN	13.8	**59.8**	9.8	0.5	10.2	3.8	0.6	0.2	0.2	1.0
SG	2.1	21.6	**59.9**	0.0	0.8	12.8	1.0	0.4	0.5	0.9
LV	1.7	0.2	0.0	**75.4**	20.5	0.3	0.5	0.1	0.1	1.3
LN	0.3	0.5	0.0	7.4	**80.8**	9.7	0.7	0.0	0.1	0.5
LG	0.2	0.3	0.8	0.3	13.3	**84.0**	0.2	0.1	0.5	0.4

Table 5. Average Annual Excess Returns and *t*-Statistics for Migrating Stocks

Panel A of this table presents the average annual returns for migrating stocks above the benchmark index MSCI Europe over the period 1980–2011. The Total column contains all stocks for each particular style. The leftmost column reports the starting portfolio, whereas the rest of the columns depict the portfolio to which the stock migrates. For instance, small value stocks (SV) that migrate to large-cap value category (LV) return 16.9% more than the benchmark index on average. Average annual return of the benchmark index was 12.4% over the 1980–2011 period. Panel B represents the corresponding *t*-statistics for excess returns (compared to MSCI Europe) of the migration portfolios. Symbols *, **, and *** indicate statistical significance levels of 10%, 5%, and 1%, respectively.

Panel A.

Average Annual Excess Returns

	Total	SV	SN	SG	LV	LN	LG	Good Delist	Bad Delist	Neg	NA
SV	7.8	-2.6	37.1	74.0	16.9	46.8	164.1	36.2	-46.9	-39.3	17.7
SN	1.3	-33.8	0.1	32.7	-9.6	29.7	60.7	41.3	-57.1	-27.4	-16.9
SG	-5.4	-87.9	-32.9	0.8	5.0	4.9	35.1	11.8	-56.7	-37.5	-37.8
LV	4.9	-19.8	38.7	N/A	0.9	26.4	42.1	4.3	-60.0	-24.1	-10.7
LN	0.6	-53.2	-23.4	-12.1	-18.3	-0.1	27.6	20.0	-38.6	-19.4	4.2
LG	-1.1	-87.2	-49.1	-19.3	-63.5	-18.2	2.4	7.1	-80.7	-50.2	-3.1

Panel B.

t-Statistics

	Total	SV	SN	SG	LV	LN	LG
SV	2.95***	-0.96	11.00***	5.57***	4.03***	7.33***	5.01***
SN	0.54	-10.34***	0.04	8.54***	-0.74	4.99***	9.69***
SG	-2.04**	-11.32***	-9.74***	0.29	-2.16**	0.58	8.17***
LV	1.82*	-3.16***	1.57	N/A	0.3	7.60***	2.12**
LN	0.27	-9.44***	-5.32***	-1.01	-4.80***	-0.05	8.59***
LG	-0.53	-4.49***	-8.39***	-2.54**	-3.34***	-6.01***	1.11

Table 6. Average Annual Excess Returns, Average Transition Vectors, and Average Contributions to Average Excess Returns: 1980–2011

This table presents average excess returns, average transition vectors, and average contributions to excess return for each size–P/BV portfolio. Average excess return is defined as the average of annual value-weighted returns in excess of the market return for the year after portfolio formation for all stocks in a size–P/BV portfolio (Total), or for the Minus, Same, Plus, or dSize groups of the portfolio. The Minus group consists of stocks that are downgraded in valuation or delisted due to sub-par reasons. The Same group includes stocks that do not migrate or for which data is not available for the next year. Stocks that are upgraded in valuation or acquired by another company are included in the Plus portfolio. Small (large) stocks that move into the large-cap (small-cap) category are included in the dSize group. The year t transition vector for a portfolio is the fraction of the aggregate market capitalization of the portfolio when formed at the end of June of year t that is in the Minus, Same, Plus, or dSize group at the end of June t+1. The average transition vector is the average of the annual vectors. The Minus, Same, Plus, or dSize group's contribution to a portfolio's average return for year t is the fraction of the year t market capitalization that migrates to the group in t+1 times the value-weighted average excess return for the group from t to t+1. Average contribution to excess return is the average of the annual contributions. The average annual value-weighted market return is 12.4% for June 1980 to June 2011.

	Average Transition Vector					Average Excess Return				Average Contribution to Excess Return			
	Total	Minus	Same	Plus	dSize	Minus	Same	Plus	dSize	Minus	Same	Plus	dSize
SV	8.1	0.7	69.2	16.3	13.7	-51.7	-2.4	36.8	34.3	-0.5	-1.6	5.8	4.4
SN	1.8	14.2	60.8	10.4	14.5	-33.6	-0.7	28.8	37.1	-5.0	-0.4	3.3	3.9
SG	-5.3	24.6	60.8	1.0	13.6	-35.5	0.6	3.8	31.8	-9.5	1.3	-0.7	3.6
LV	5.4	0.2	76.7	21.3	1.8	-31.7	1.1	25.8	-14.4	-0.3	0.8	5.3	-0.5
LN	1.0	7.5	81.3	10.3	0.8	-18.2	0.0	27.1	-36.8	-1.3	0.1	2.4	-0.2
LG	-0.6	14.1	84.4	0.2	1.3	-19.1	2.4	13.3	-37.3	-2.5	2.0	0.0	-0.1

Table 7. Descriptive Statistics for Small-Cap and Large-Cap Value Stocks Based on Fundamental Signals

This table presents average annual returns, number of observations, Sharpe ratios, and tests of statistical significance for small value stocks and large value stocks. The Low Score portfolio consists of stocks with an F_SCORE of 0 or 1 and High Score portfolio of stocks with an F_SCORE of 8 or 9. All portfolios are value-weighted. The Sharpe column indicates the median annual Sharpe ratios for the portfolios from 1981–2011. Mean return differences are tested with the *t*-statistic. Symbols * and ** denote statistical significance of 5% and 1%, respectively, using a two-tailed *t*-test. The median F_SCORE value for both small and large value stocks is 5.

Small Value	Return	n	Sharpe	Large Value	Return	n	Sharpe
All Firms	20.2%	13610	1.32	All Firms	17.3%	2006	0.98
0	7.9%	672	0.64	0	44.6%	13	0.36
1	9.1%	695	0.06	1	14.4%	38	0.56
2	7.4%	1018	0.06	2	7.9%	129	0.05
3	14.4%	1745	0.71	3	16.6%	330	0.59
4	15.7%	2227	0.84	4	15.5%	438	0.49
5	18.9%	2492	0.69	5	18.9%	460	0.58
6	25.2%	2248	1.40	6	20.8%	325	0.60
7	29.2%	1530	1.80	7	25.8%	176	0.98
8	34.6%	784	1.29	8	23.6%	76	0.96
9	30.8%	199	1.26	9	32.0%	21	0.88
Low Score	10.8%	1367	0.02	Low Score	20.6%	51	0.51
High Score	34.9%	983	1.40	High Score	23.3%	97	0.54
High – Low	24.1%			High – Low	2.8%		
t-Statistic	4.04**			*t*-Statistic	0.29		
High – All	14.7%			High – All	6.00%		
t-Statistic	4.11**			*t*-Statistic	1.79*		

Table 8. Statistics for Migrating and Non-Migrating Small-Cap Value Stocks

The “Good Migration” category consists of stocks that move from the small-cap value (SV) category to either small-cap neutral (SN), small-cap growth (SG), large-cap value (LV), large-cap neutral (LN), large-cap growth (LG), or stocks that are acquired by another company during the year. The remainder of the stocks (“Other”) are stocks that stay put in the SV category or are either delisted due to sub-par reasons or have negative book equity the next year. The total number of observations (12,614) is slightly smaller than in Table 7 (13,610), since a few companies’ “Migration” data were not available for year t+1.

	Number of Observations			
F_SCORE	"Good Migration"	%	"Other"	Total
0–1	175	15.2%	980	1155
2–3	577	22.3%	2013	2590
4–5	939	21.2%	3492	4431
6–7	854	24.1%	2695	3549
8–9	268	30.1%	621	889
Total	2813	22.3%	9801	12614

Figure 1. Firm–Year Observations by Calendar Year

This figure reports the annual number of firm–year observations that form the six value-weighted size–P/BV portfolios across the period 1980–2011. Companies are included in the sample if adequate data for price-to-book, market capitalization, and stock returns are available in the Thomson Financial and Datastream databases. The total number of firm–year observations in the sample is 52,154.

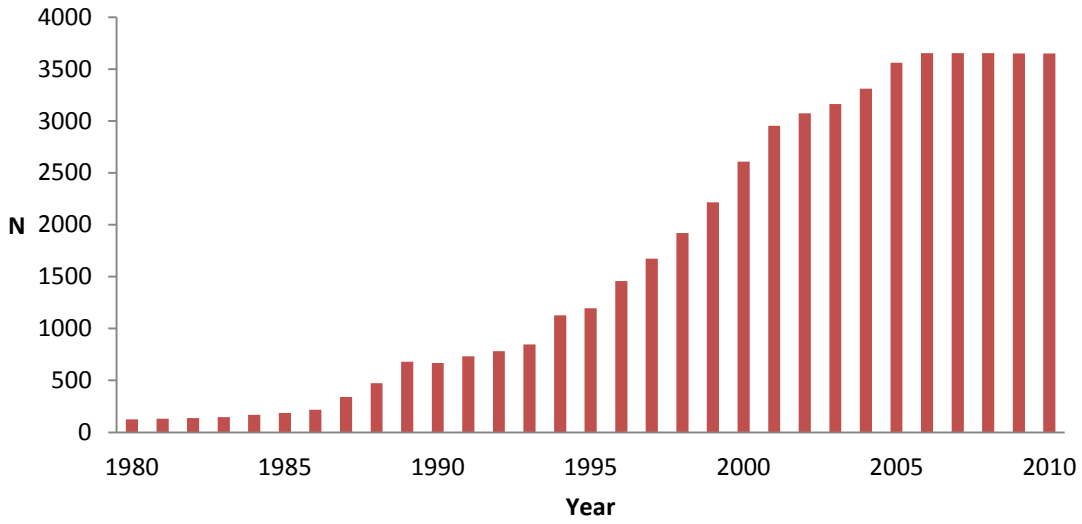

Figure 2. Annual Size and Value Premiums, 1980–2011

HML is defined as the difference between the average monthly returns of value stocks less the average monthly returns of growth stocks. Value stocks are the SV and LV portfolios and growth stocks are the SG and LG portfolios. SMB is defined as the difference between the average monthly returns of small-cap stocks and large-cap stocks over the entire sample period of 1980–2011.