

Explaining the Recent Failure of Value Investing

Baruch Lev¹
Anup Srivastava²

¹New York University, Stern School of Business, blev@stern.nyu.edu

²University of Calgary, Haskayne School of Business, anup.srivastava@ucalgary.ca

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ABSTRACT

The long-standing and highly popular strategy of investing in low-valued stocks and selling short high-valued equities is widely believed to have lost its edge in the past 12–14 years. The reasons for this putative failure of value investing elude investors and academics, so assessing the likelihood of a return of value investing to its glory days is challenging. We show that value investing has generally been unprofitable for almost 30 years, barring a brief resurrection following the dotcom bust. We identify two major reasons for the failure of value investing: (1) accounting deficiencies causing systematic misidentification of value, particularly of glamour (growth) stocks, and (2) fundamental economic developments that significantly slowed the reshuffling of value and glamour stocks (mean reversion), which drove the erstwhile gains from the value strategy.

Keywords: Value investing, Growth investing, Hedged portfolio, Intangibles, R&D, Market-to-book ratio, Credit crisis

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Explaining the Recent Failure of Value Investing

Value investing is about finding diamonds in the rough by going long on low-valued (“value”) stocks and shorting highly valued (“glamour”) equities, thereby capturing companies whose stock prices are temporarily undervalued or overvalued by investors, relative to fundamentals. The price reversals of these misvalued stocks drive the gains from value investing. The value investment strategy yielded excess (abnormal) returns for decades, leading to the proliferation of value funds and strategies offered to investors. Around 2007, the strategy appeared to have lost its magic. A google search of “death of value investing” and related morbid terms yields hundreds of articles in, for example, *Forbes*, *Barrons*, the *Wall Street Journal*, *Seeking Alpha*, *Bloomberg*, and *Financial Times*. *The Economist* (October 27, 2018, p. 71), under the title “The agony of the value investor,” quoted a prominent value fund manager informing investors: “Our results have been far worse than we could have imagined.” Another manager said: “The market is telling us we are wrong, wrong, wrong about almost everything.” And, yet, all those self-flagellations by value managers and the value obituaries by media pundits do not address the main questions concerning investors.

- Why did value investing, which yielded steady excess returns for decades, abruptly lose its edge around 2007?
- Is the failure of the value strategy a recent phenomenon or a long-term fall from grace?

We answer both questions by showing, based on extensive data analysis, that flaws in the accounting for intangibles, combined with fundamental economic shifts, have undermined the value strategy.

We first describe what is generally referred to as value strategy.

1 The Value Strategy in Brief

Value strategy is based on the premise that among low-valuation (out-of-favor) stocks are many undervalued ones, relative to their fundamentals. Once investors realize the undervaluation, the share prices of the undervalued stocks rise and revert to intrinsic value. Accordingly, investing in low-valuation stocks (value stocks) should yield above market returns. A similar argument can be made about high-valuation stocks, which likely include overvalued equities, bound to fall in price over time. Shorting the highly valued equities (growth or glamour stocks) should also yield excess returns. Thus, a combined strategy of long on value and short on glamour (value strategy) should provide turbo excess returns.

Academic research consistently documented excess returns to the value strategy, until the past 12–14 years. Lakonishok, Shleifer, and Vishny (1994), for example, reported that investing every year (on June 30) in the 30% of stocks with the lowest market-to-book (M/B) ratio (value stocks) and selling short the 30% of stocks with the highest market-to-book ratio (glamour stocks)—yielded over the period 1968–1989 a mean annual return of 6.3% and a whopping 34.4% for a rolling three-year holding period. A similar value strategy, also based on the market-to-book ratio, is the high minus low (HML) methodology introduced by Fama and French (1992, 1993). They differ slightly from Lakonishok *et al.* (1994) in that the long-short portfolios were determined after first dividing the sample firms into large and small by median market capitalization (thereby adjusting for firm size) and then investing in the 30% lowest value stocks and shorting the 30% highest valued stocks, of both large and small firms. The Fama-French HML strategy averaged almost 5% annually during the 1930–1989 period. The papers (1992, 1993), not unexpectedly, drew considerable attention, getting almost 50,000 academic citations by August 2021, one of the highest citation counts in the finance literature. The HML classification also became a standard

control factor (arguably, for risk) in studies examining abnormal stock returns. Based on the superior performance of the value strategy, value funds offered to investors proliferated.

While value investing is premised on identifying stocks whose prices understate their intrinsic value and those that overstate it, no universally accepted way exists of implementing the value strategy, leading to multiple value measures used in practice and academic research.¹ For example, in addition to the book-to-market (B/M) ratio, Lakonishok *et al.* (1994) examined ratios of cash flow and earnings to market value. Piotroski (2000) and Mohanram (2005) advance value strategies that add “quality” parameters to the book-to-price (B/P) ratio. We cannot examine all the value indicators used by researchers and investors. To keep our analysis focused and readily interpretable, we primarily identify value and glamour stocks by the market-to-book ratio, the most frequently used indicator by researchers (Lakonishok *et al.*, 1994; Fama and French, 1992, 1993; Kok, Ribando, and Sloan 2018; Ball, Gerakos, Linnainmaa and Nikolaev, 2019) and by investment institutions [Russell Value Stocks, Standard & Poor’s (S&P), and MSCI Value indexes].² For robustness check, we also examine another popular value indicator, the price-to-earnings (P/E) ratio.

We follow Fama and French (1993) in computing the value strategy returns because their methodology adjusts for firm size and has been subjected to most academic rigor, as is evident from their high citation count.³ In this strategy, book value is considered a benchmark for intrinsic

¹ MSCI comments: “Value investing is premised on identifying stocks whose prices seem to understate their intrinsic value. While many institutional investors may agree with that premise, implementation of value-index strategies differs widely.” See <https://www.msci.com/documents/1296102/1339060/Factor+Factsheets+Value.pdf>.

² In addition, S&P and MSCI use sales-to-price ratio and enterprise value-to-cash flow ratio (EV/CFO), respectively. See <https://us.spindices.com/documents/methodologies/methodology-sp-us-style.pdf> and <http://www.ftse.com/products/downloads/Russell-US-indexes.pdf>.

³ We follow Fama and French (1993) to classify firms into the value and glamour categories. Stock returns and accounting data are obtained from the Center for Research in Security Prices (CRSP) and Compustat, respectively. All firms traded on NYSE, Amex, and Nasdaq are initially included. Delisted stock returns are taken from CRSP. Book value for computing the book-to-market ratio is taken from $t - 1$ financials statement for June to December fiscal year end and $t - 2$ for January to May firms. Negative book value firms are excluded. The numerator, the market

value. Stocks with market values far exceeding book values are considered overpriced, and those with market values much lower than their book values are considered underpriced.

2 The Recent Failure of the Value Strategy

Examining the 10-year growth of a dollar invested in the Fama-French value strategy at the beginning of each decade, from the 1970s to the present, is instructive. This is a notional, hedged investment because equal values of low market-to-book stocks and high market-to-book stocks are bought and sold. To calculate the returns, one dollar long position and one dollar short position are taken at the start of the month, in high and low portfolios (by B/M), respectively, that were formed on the preceding June 30 (see footnote 3). This gives what Ken French reports as the HML factor for a month. The annual return is calculated by compounding monthly returns on the long and short portfolios for a calendar year and then taking their difference. Ken French reports this as the annual HML.⁴ We then compound those annual returns with each passing year over the decade, beginning January 1 of the first year of the decade. The accumulated value gives a rough idea about how well the HML strategy worked in each decade. Figure 1 presents each decade's cumulative return from this annually updated long-short value strategy. Thus, for example, the HML strategy beginning from January 1, 1970 yielded by the end of the decade \$2.02 (102%

value of equity, is obtained for the end of year $t - 1$. Portfolios are formed in June 30 of year t . All firms are divided into six equal groups [two groups by market value and three groups by market-to-book (highest 30%, middle 40%, and lowest 30%)]. Portfolios with the highest (lowest) 30% market-to-book are called glamour (value). Monthly returns are for each portfolio from July 1 of year t to June 30 of year $t + 1$, value weighted, based on market value as of June 30 of year t . HML returns are computed as one-half the returns from going long on large and small value portfolios and one-half the returns from shorting large and small glamour portfolios. We use SAS code obtained from Wharton Research Data Services (WRDS) to identify stocks by HML classification (<https://wrds-www.wharton.upenn.edu/pages/support/applications/risk-factors-and-industry-benchmarks/fama-french-factors/>).

The Fama-French HML strategy is originally based on the book-to-market ratio. We use the inverse term market-to-book ratio due to its greater familiarity. Because our sample is restricted to positive book value firms, the ranking of stocks is not affected using either metric.

⁴ Stocks for inclusion in long and short portfolios for January through June are identified in June of the previous year; for July through December, in June of the same year (Fama and French, 1992, 1993).

return). The HML strategy beginning on January 1, 1980 yielded by decade-end \$1.75 (75% return). These were attractive returns.

[Insert Figure 1 near here]

This seems to have been the swan song of value investing. From 1989 on, the strategy faltered, mainly because of the tech bubble of the 1990s, which elevated the valuations of glamour companies until the end of the decade, thereby rendering the short part of the strategy a losing proposition. Note that tech firms typically have a low B/M ratio, thus they enter the short portfolio in HML strategy. The HML strategy from the beginning of the 1990s would lose 10% by the end of the decade. Also shown in Figure 1, the first few years of the 2000s saw a brief resurgence of the value strategy, driven primarily by the success of shorting glamour stocks, due to the burst of the tech bubble. Prices of erstwhile glamour (growth) companies plummeted (Nasdaq fell in 2000 by 55%), and 17% of the small glamour companies failed altogether and were delisted. Shorting all those losers substantially boosted the long-short value strategy, leading to good performance until 2006. The flight from the collapsing tech to the more stable value stocks in those years further boosted the value strategy.

The good performance of the value strategy in the early 2000s apparently looms large in the minds of relatively young investors who started investing in the 21st century and find difficult to understand the “demise of value” since 2007. However, as Figure 1 makes clear, the value strategy had already lost much of its potency in the late 1980s and yielded negative returns in the 1990s, barring a brief resurgence in 2000–2006. This then leads to our rephrased question: What caused value investing to lose its consistent edge by the late 1980s?

Returns from the HML strategy are value weighted. A closer look reveals that HML returns come mainly from hedged portfolios in the small stock category. We calculate the average of

annual returns for the four time periods over which the HML strategy has performed differently, separately for small and large stocks (see footnote 4). Figure 2 shows that while in general the value strategy does better with small stocks than large stocks, it has not performed even for small stocks since the late 1980s (except for the brief resurrection period of 2000–2006).

[Insert Figure 2 near here]

We also examine industry-adjusted portfolios. Asness, Porter, and Stevens (2000) find much stronger value effects within industries than across industries. Stated differently, over- and undervalued firms could be better identified by considering within-industry distributions of B/M ratio. Accordingly, we identify cutoffs for high and low B/M by industry (Fama and French 12 industries) instead of on a cross-sectional basis. We then conduct two tests. First, we calculate the annual HML returns using revised cutoffs. Figure 3 presents those results. The industry adjustment improves overall returns, consistent with Asness *et al.* (2000). The declining trend of value returns remains largely unchanged. The average for 2007–2018 is just 0.65% and is statistically not different from zero.

[Insert Figure 3 near here]

Second, we estimate HML returns by industry. Figure 4 presents those results. Our main conclusions hold for most industries. That is, unlike the 1970–1988 period, the return to the HML strategy is lower practically in every industry in the last 30 years, barring the temporary resurrection during 2000–2006. During the 1970–1988 period, return to the HML strategy for all industries shows positive annual returns, on average, with 10 out of 12 showing greater than 4% return. During the 2007–2018 period, however, return to the HML strategy for only two industries shows greater than 4% returns.

[Insert Figure 4 near here]

We investigate two potential reasons for the failure of value investing: (1) accounting deficiencies causing systematic misidentification of value, particularly of glamour (growth) stocks, and (2) fundamental economic developments that significantly slowed the reshuffling of value and glamour stocks (mean reversion), which drove the erstwhile gains from the value strategy.

3 Accounting Deficiencies Adversely Affected Value Investing

HML and most value strategies consider book value as a yardstick of intrinsic value. Book value (equity), the denominator of the market-to-book ratio, is however increasingly measured incorrectly compared with a firm's current economic value.

Book value is an outcome of multiple accounting conventions, such as historical cost accounting, depreciation policy, matching, acquisition accounting, impairments, lower of cost or market, fair value accounting, and conservatism. In other words, balance sheet asset values are based on a hodgepodge set of accounting principles. Book values thus are incomparable across firms from different industries and with different growth strategies and at different stages of their life cycles. For example, for the same value of assets, a firm that borrows and buys assets has a different book value than a firm that leases them. A firm that grows organically has a different book value than a firm that grows by acquisitions, even if they both spend the same amount on intangible assets. This is because intangibles are expensed by the former and capitalized by the latter.⁵ Similarly, a firm that builds intangible assets has a different book value than a firm that builds tangible assets, for the same value of investments. Tangible assets are included in the book value, and intangible assets are not.

⁵ For example, Facebook reported the value of users acquired from its WhatsApp acquisition at \$2 billion. However, it does not report as assets the value of its own users that are far more numerous and profitable.

The differential accounting for inhouse intangible investments versus tangible investments creates the greatest distortion in the book values compared with what was considered the book value at the time of Ben Graham. Ben Graham considered M/B ratio as a measure of overvaluation in his books on value investing written in the 1940s. Up to the late 1980s, corporate investments were primarily in tangible (physical) assets (property, plant, equipment, structures, airplanes, etc.), which are capitalized (considered assets) by accounting rules and, therefore, fully included (net of depreciation) in companies' book values (equity). This inclusion of most corporate investments in book values was reflected, among other things, by the median market-to-book ratio of public companies, which hovered around 1.0 until the mid-1980s. Accordingly, market values, being lower or higher than the book values, could be considered under- or overvaluation of stocks. Graham considered stocks with M/B greater than 1.5 as expensive.

Since Graham's time, a far-reaching transformation of corporate business models took place. Investment in tangible resources increasingly gave way to intangible assets (Corrado and Hulten, 2010). Currently in the U.S., the intangible investment rate of the corporate sector is roughly twice that of the tangible investment rate, and the gap keeps growing.⁶ In absolute terms, U.S. annual intangible investment surpassed \$2 trillion in 2017.⁷

Over 80% of firms listed today went public after 1990, and their business models are based on intangible investments. Given the vast and increasing size of corporate intangible investments, the misspecification of book values and earnings is substantial and growing. This misspecification can be judged by the median market-to-book ratio of approximately 3.0 in 2018.⁸

⁶ Enache and Srivastava (2018) report a similar pattern from analyzing company-level data.

⁷ Intangible investments in other countries lag considerably behind the U.S. China comes second at about \$700 billion annually; Northern European countries, at \$100 billion–\$200 billion each. Most other countries have negligible investment in intangibles.

⁸ The wholesale expensing of intangibles also renders many firms ineligible for inclusion in our value strategy because of their negative book values.

As a result, compared with Graham's time, the extent to which book value can be considered a benchmark to determine overvalued or undervalued stocks has substantially declined. Consider AirBnB, which continues to incur losses. It has almost no assets on its books, other than cash, despite a market value exceeding \$100 billion. On December 31, 2020, its M/B exceeded 30:1. Such a phenomenon has become more and more important since the end of 1980s, because each new cohort of listed firms uses more intangibles-intensive models than its predecessor (Srivastava, 2014). The growing industries are pharmaceuticals, software, computers, electronics, cloud services, and communication. Asset-intensive, manufacturing industries are in decline. Book value's ability to represent a public firm's intrinsic value keeps decreasing with growing prominence if intangibles-intensive industries are gaining prominence.

In sum, an increasing source of book value mismeasurement is the immediate expensing in income statements of all investments in internally generated, value-creating, intangibles, such as research and development (R&D), information technology (IT), brand development, and human resources. This book value mismeasurement, we reason, is a major contributor to the failure of value investing that started in the late 1980s (see Figure 1).

Based on book-to-market ratio, a firm investing heavily in R&D, IT, brands, or business processes (e.g., customer recommendation algorithms) would appear to be an overvalued company, due to its understated denominator. In reality, its valuation may not be excessively high if its book value were properly measured. The same argument applies to overvaluation judged based on price-to-earnings ratio. Reported earnings of companies with increasing investments in intangibles are understated, due to the immediate expensing of intangibles, leading to overstated P/E ratios. Some observers may contend that value strategies rely on cash flows such as EBITDA (earnings before interest, taxes, depreciation, and amortization) to overcome the accounting

deficiency. However, cash flows, too, are calculated after the deduction of intangibles and, therefore, do not solve the accounting deficiency.

4 Reversing the Expensing of Intangibles

We run an experiment to investigate whether the accounting mismeasurement of book value could affect returns from the value strategy by recomputing companies' book values after capitalizing the expensed intangible investments. The essence of our capitalization procedure is that, for every public company and year, we capitalize (consider as an asset) its annual R&D expense and amortize the cumulative R&D capital (the sum of the capitalized past annual R&D expenses), according to industry-specific R&D amortization rates reported in Li and Hal (2018). The annual amortization of the R&D capital thus replaces the expensing of current R&D outlays in firms' income statements, and, importantly, the unamortized R&D capital (an asset) is added to book value.

We also capitalize a part of sales, general, and administrative (SG&A) expenses, following Enache and Srivastava (2018), because many non-R&D intangible investments, such as in brands, IT, business processes, and human resources, are included in SG&A expenses in the income statement. R&D is first deducted from SG&A to avoid double-counting of R&D. Advertising expenses are deducted because benefits from advertising are short-lived (Lev and Sougiannis, 1996). The remaining amount is called MainSG&A. However, MainSG&A also includes regular expenses, such as sales commissions and administrative salaries. Following Enache and Srivastava (2018), we separate expenses from intangible investments in MainSG&A by running for every industry and year a cross-sectional regression of MainSG&A expenses on current revenues (scaled by total assets) and two dummy variables representing losing firms and sales-decreasing companies. The portion unexplained by current revenues in this regression equation, that is, the

intercept, represents the industry average of intangibles included in SG&A, for that firm and year. We match a firm to its industry progressively by four-digit, three-digit, two-digit, and one-digit Standard Industrial Classification code, depending on data availability, to estimate the regressions.⁹ We thus maintain a rolling stock of the capitalized intangibles in SG&A expenses and amortize the capitalized amount over three years.

Using this methodology, we adjust the book values of all firms by adding to the reported [Generally Accepted Accounting Principles (GAAP)] values both the unamortized R&D and MainSG&A capitals. Because acquired intangibles and goodwill are already included in the book value, we do nothing with them. We then recompute companies' market-to-book ratios, using the adjusted book values.¹⁰ Additional firms get included in the feasible set of value and glamour stocks as their book values turn positive by the capitalization. Firms' market-to-book ranks change significantly after capitalization, causing substantial reassignments of firms to value and glamour portfolios.

Finally, we recalculate the returns to the adjusted value strategy. The impact of our book value intangibles adjustment is dramatic. The recalculation of book values significantly changes

⁹ The empirical procedure requires at least 15 firm-year observations by industry.

¹⁰ At the time of our writing of this paper, two other papers emerged with a similar idea. Park (2022) capitalizes R&D and SG&A to calculate intangible-adjusted book-to-market ratio (iB/M). Eisfeldt Kim, and Papanikolaou (2020) also capitalize R&D and SG&A to calculate book values and offer a new HML factor called HML^{INT}. The principal difference between those papers and ours is in the method of estimating the investment portion of SG&A to be capitalized. We rely on Enache and Srivastava (2018) to calculate the industry-specific investment portion of SG&A. Park (2022) and Eisfeldt *et al.* (2020) assume those portions to be 30% and 100% of SG&As, respectively. Enache and Srivastava (2018) explain why 100% of SG&As cannot be investments (for example, salesperson commissions, delivery costs, and warehouse rents are not intangible investments, because they are operating expenses) and why this percentage cannot be uniform across industries (for example, a restaurant is unlikely to spend the same percentage of SG&A outlays on intangible investments as a steel or a pharmaceutical firm). Enache and Srivastava (2018) show that the portion of SG&A unmatched with the current revenues, that is, the portion that does not produce immediate benefits, has the characteristics of investments and that it differs across industries. This is based on the idea that firms on average invest rationally. Yet, no capitalization method, including that from Enache and Srivastava (2018), is perfect because a) value of intangibles is neither defined nor verifiable; b) any capitalization method includes outlays that ex post turn out to be wasteful, even if initially well intended; and c) some intangible investments can have lottery-type payoffs because of scalability, such as initial investment in Google's search engine.

the composition of the top and bottom 30% of companies ranked by market-to-book. For example, in 2017, for the top 30% (glamour) companies, 455 firms change classification after capitalization (255 enter and 200 leave, of an initial total of 921), and 524 companies (271 enter and 253 leave, of an initial total of 929) change classification in the bottom (value) 30% category. Thus, roughly 40%–60% of value and glamour stocks change classification due to our intangibles book value adjustments in recent years. These major changes have a significant effect on the returns from the value strategy.

Figure 5 depicts the effect of our book value adjustments on the returns of the long-short value strategy. The red (left) bars in each year are the returns from the original, unadjusted market-to-book classification, and the blue (right) bars represent the returns from the adjusted methodology. While our book value adjustment did not change much of the strategy’s performance in the 1970s, when intangible investments were low, it began to yield improved returns in the 1980s, when intangibles gained prominence. All in all, in 34 out of the 49 years examined, 1970–2018, the returns from the adjusted value strategy were higher than those of the conventional strategy (based on GAAP-reported book values) and, in most years, the adjusted returns were substantially higher.

[Insert Figure 5 near here]

Thus, for example, in the 1980s, while a dollar invested on January 1, 1980 in the conventional strategy grew to \$1.75 by decade-end, a dollar invested by the adjusted strategy grew to almost \$2.86, a 68% difference. Strikingly, in the 1990s, when the conventional value investment under-performed the market, the adjusted methodology doubled the original investment at decade-end. The differences in investment gains continued to be substantial in the early 2000s. Even in the recent period, 2010–2018, when the conventional value strategy lost its

edge and yielded negative returns, the adjusted strategy generated reasonably positive gains. Thus, the adjustment of book values for the glaring accounting deficiencies of intangibles expensing could have a dramatic effect on the long-short value strategy throughout the past four decades.

The effect of our intangibles book value adjustments is, as expected, more pronounced for glamour than for value stocks, because most glamour (having high M/B ratios) companies are intangible-intensive. Among glamour stocks, our adjustments had a larger effect on small than on large companies, because small, high-growth glamour firms tend to invest heavily in intangibles, causing their reported book values to be highly misspecified. Our adjustments thus improve significantly the identification of overvalued (relative to fundamentals) glamour stocks. The intangibles adjustments were less consequential for value stocks, many of which do not invest much in intangibles. The additional gains from our book value adjustments in the long-only, pure value strategy (no shorting) were modest in the 1990s, very large during 2000–2009, and essentially vanished thereafter.¹¹

So, while the conventional (GAAP) mismeasurement of book value explains a great deal of the failure of value investing, it does not completely resolve the issue as far as the past 10–12 years are concerned. Even with our book value adjustments, the long-short, and more so the long-only, strategies under-performed the market significantly since 2007.

The value effect has generally been stronger in small stocks, but it has largely disappeared since the 2007–2009 financial crisis, as shown in Figure 2. We examine if our capitalization method works differently for large and small stocks. Figure 6 shows two trends. First, the improvement in returns with the HML strategy because of intangible capitalization is larger for small than large stocks. This difference occurs, arguably, because small firms being in growth

¹¹ Because the long-only, pure value strategy is not a hedged investment, we consider the investment returns net of the market return in each year.

stages spend more on intangibles as a percentage of total outlays than do large firms (Enache and Srivastava, 2018). Second, almost no improvement in HML returns is evident for large firms, post-financial crisis. In sum, our suggested method continues to work for small stocks, but it does not work for large stocks. Hence, irrespective of methods, value strategy now fails for large stocks.

[Insert Figure 6 near here]

5 From Market-to-Book to Price-to-Earnings

We replicated the tests conducted so far with the market-to-book ratio using another popular valuation metric: the price-to-earnings ratio. Figure 7 shows the year-by-year gains from investing in the 30% lowest P/E stocks (after adjusting for firm size) and shorting the highest P/E stocks at the beginning of each decade. The picture emerging from using the P/E metric resembles closely that of the market-to-book ratio in Figure 1, except that, with the P/E ratio, the 1990s were also profitable. Figure 7 also juxtaposes the P/E annual returns over the M/B returns and shows a high correlation (89%) between the two, with a higher volatility to the P/E returns.

[Insert Figure 7 near here]

We also adjusted the earnings of the price-to-earnings ratio for the intangibles' capitalization by adding back the annual R&D expense and the part of SG&A related to intangibles and subtracting the annual amortization of the R&D and SG&A capitals. As expected, the effect of intangibles' capitalization on earnings was substantially lower than that on book values (Section 4), but it nevertheless improved the overall returns from the P/E strategy, relative to the returns from unadjusted PE ratio (Figure 8).

[Insert Figure 8 near here]

In any case, whether guided by the M/B ratio or the P/E ratio, the recent 10–12 years returns from value investing were unusually low, leading us to continue the quest for the reasons for the recent failure of value investing.

6 The Value Strategy and Mean Reversion

From a statistical point of view, the gains from value investing derive from the mean reversion of the highest (glamour) and lowest (value) ranked stocks. When ranked by the market-to-book ratio (or by alternative rankings, such as price-to-earnings), some of the highly ranked stocks drop in value over time. Being ranked at the top, they can only remain at the top or drop down due to deteriorating operations (a sales decline) or other revisions in investor valuations. This mean reversion from the top generates the gains from shorting glamour stocks. Similarly, some of the lowest ranked (value) stocks experience price increases, due to improved operations or other factors, and escape the value class, thereby generating the gains from investing in value (out-of-favor) stocks.

The mean reversion of value and glamour stocks is not unique to capital markets. In fact, mean reversion is ubiquitous to many phenomena in life, yet it is often misunderstood or overlooked. Whenever subjects are ranked by a score, such as people ordered from highest to lowest levels of blood cholesterol or investment funds ranked from top to bottom on performance, some of the observations at the top and bottom ranks revert to the mean observation over time.¹²

The reason for mean reversion is that the specific ranking of a subject, say, a football team, at a particular time is due to systematic (fundamental) factors, such as players' talent and size of the fan base, as well as to random (transitory) factors, such as injuries. Over time, the transitory factors average out, and the subjects ranked at the top and bottom revert to the mean. Similarly,

¹² On mean reversion in the investment context, see Mauboussin (2012).

value and glamour stocks are ranked at the bottom and top according to systematic factors, such as a strong patent portfolio or a weak product mix, as well as random (transitory) factors, such as a contract cancellation or a Securities and Exchange Commission inquiry. The random (transitory) factors average out over time, leading to mean reversion of both value and glamour stocks. The extent and speed of mean reversion is determined by the relative size of the random to fundamental factors. The larger the relative size of random to fundamental factors, the stronger and quicker the mean reversion.¹³

Several explanations have been offered in prior literature for the consistent gains from value investing until the late 1980s. For example, Lakonishok *et al.*(1994) argue that value investing is driven by investors' extrapolation bias, that is, misinterpreting recent, temporary good or bad sales or earnings streak as a long-term trend. They essentially argue that investors exaggerate the effect of the random element in a stock's ranking (e.g., perceiving a temporary sales increase as a long-term one). A reversal of past sales and earnings trends, which investors misinterpreted as a sign of a permanent trend, leads to gains from value investing. Another interpretation is offered by Daniel and Titman (2006). They argue that high M/B stocks, that is, low B/M, result from investor's overreaction to intangible information such as growth options (consistent with the term "glamor" that we use). In this case, the returns from the value strategy occur when investors correct their expectations of intangible information.

In either case, returns with the value strategy are related to investors' correcting their extrapolations of past accounting performance measures (such as sales growth) or their assessment of intangible signals. Accordingly, an understanding of the failure of value investing

¹³ Michael Jordan was ranked for many years at the top of professional basketball players, with a record 50 appearances on the cover of *Sports Illustrated*. This absence of mean reversion was due to the fact that the random element in Jordan's performance was negligible relative to his fundamental, exceptional talent.

in the past 12 years should start with exploring changes in the extent and speed of those corrections, which we refer to as mean reversion.

We focus in the subsequent analyses on the large value and glamour stocks, because our intangibles adjustment strategy continues to work for small stocks. In any case, large stocks have a dominant effect on the returns of the total sample (large and small stocks) because the returns from the value strategy presented in this paper are value weighted by capitalization.

7 The Surprising Slowdown of Stocks' Mean Reversion

We measure stocks' mean reversion in three ways: rank correlation, length of stay in the value or glamour categories, and large stock price upticks and downticks.

We first examine the inter-year correlation of rank order of B/M ratio. This ratio can change because of alterations in rank of book or price. In general, book values do not shift much year to year because they are derived from historical cost accounting and because firms generally maintain stable payout policies. Even with earnings-related news, changes in book values are smaller than the changes in market values. Change in book value occurs because of a change in just one earning, but market value changes based on shifts in the expectation of a stream of future earnings. In addition, market values are based on forward-looking information and can move dramatically from year to year without any change in current earnings or payout policy. Therefore, any year-to-year shift in a firm's B/M rank is more likely due to change in market value than to change in book value. For the same reason, increasing correlation in a firm's B/M rank is more likely because of decreasing rate of change in the rank of a firm's market value than of book value.

We measure rank correlation as the correlation of a stock's market-to-book rank (relative to all stocks) at the end of a given year with its rank in the previous year. Increased rank correlation would imply lower reshuffling of stocks. Figure 9 shows the grouped annual rank correlations of

large value and glamour stocks, during 1989–2018. The rank correlations of both value and glamour stocks increased substantially during 2007–2018 and are now the highest since the 1970s. For both groups, the rank correlations increased from the late 1980s, with glamour stocks jumping from 45%–47% to 60% in 2007–2018. This substantial increase in rank correlation reflects a significant slowdown of the mean reversion of both value and glamour stocks during 2007–2018, arguably decreasing the gains from value investing.

[Insert Figure 9 near here]

Our second mean reversion measure is the length of stay of a particular stock in the value or glamour portfolios. The longer the stay, the lower the mean reversion. Figure 10 shows substantial increases in the average length of stay. Value stocks increased, on average, from 2.5 years during 1989–2006 to 3.3 years in 2007–2018 (a 32% increase), and for glamour stocks the increase was from 3.5 to 4.5 years (a 28% increase). These increases of length of stay in each category corroborate the substantial slowdown of stocks' mean reversion in recent years.

[Insert Figure 10 near here]

Our third measure of mean reversion is the one most directly related to the gains from value investing. It reflects the frequency of large (10% or more) stock price upticks for value stocks and downticks for glamour stocks. These upticks and downticks, arguably driven by the mean reversion of value and glamour stocks, generate the gains from the long-short value investing strategy. Figure 11 presents the periodic annual percentages of 10% or more upticks (for value) and downticks (for glamour stocks).¹⁴ In both cases, the price change frequency during 2007–2018 was substantially lower than in previous periods. The 10% or more upticks for value stocks decreased from 22% annually during 2000–2006 to just 10% in 2007–2018 (a 55% decrease), and

¹⁴ La Porta, Lakonishok, Shleifer, and Vishny (1997) show that a large percentage of these upticks and downticks occur on earnings announcement dates.

the downticks frequency for glamour stocks decreased from 18% annually in 2000–2006 to 10% in 2007–2018. These substantial decreases in upticks and downticks in the recent period are not the result of a general decrease in stock volatility. For example, the percentage downticks of 10% or more of value stocks, in fact, increased during 2007–2018 (not presented in the figure).

[Insert Figure 11 near here]

Thus, all our measures indicate a substantial slowdown of the mean reversion of both value and glamour stock in the past 12 years, accounting for much of the decline in the profitability of value investing. But this is a statistical explanation, raising the question: Which economic developments caused the mean reversion slowdown? Understanding these developments would allow us to address the essential issue of whether the recent demise of value investing is a transitory or a long-term phenomenon.

8 What Caused the Slowdown of Stocks' Mean Reversion?

That the recent failure of value investing started in 2007, the first year of the financial crisis, is not coincidental. The 2007–2009 crisis and the subsequent deep recession had a devastating and prolonged effect on the performance of several industries, particularly in the financial sector, as well as firms relying on consumers' demand, driving those industries and firms to the ranks of value (low valuation) firms and keeping them there. The two major adverse effects of the financial crisis were the sudden contraction of bank lending and the sharp fall in consumer demand. Hogan (2019, pp. 1–2; our emphasis) wrote: “One mystery of the slow recovery [post-recession] is why lending failed to respond to expansionary monetary policy. Bank lending declined dramatically during the crisis, and despite the period of very low interest rates since, lending has failed to recover.... Instead, banks appear to have *permanently decreased lending* relative to their other

activities.... Thus, bank loans have been persistently low since the financial crisis despite high demand for loans during this period.”

The prolonged decline of bank lending had a direct, adverse effect on the performance of banks, most relying on lending as a major source of profits and growth, and an indirect effect on low-valuation firms, which rely on bank lending to finance investment in innovation and growth (R&D, IT, acquisitions), being unable to issue stock due to their low valuation. Those value firms were cut off from much needed equity and bank financing sources to improve operations and escape the low-valuation trap. Many of those firms were also hit by the second major effect of the financial crisis: the prolonged decline in consumer demand.

Former Federal Reserve System chairman Ben Bernanke, in a detailed survey of the crisis-related economic research (2018), concluded (pp. 58–59; our emphasis): “A substantial body of evidence now suggests that such [credit] factors are important for the behavior of households, firms, and financial intermediaries.... More specifically, the empirical portion of this paper has shown that the financial panic of 2007–2008, including the runs on wholesale funding and the retreat from securitized credit, *was highly disruptive to the real economy* and was probably the main reason that the recession was so unusually deep.... In particular, it seems plausible that the weakening of household balance sheets ... was a significant headwind to recovery.” Similarly, Mian, KRao, Amir Sufi (2013) reported that the collapse in house prices during the Great Recession (December 2007–June 2009) caused a sharp drop in consumer demand by households. Authers and Leatherby (2019) showed that household debt had not recovered even after a full decade, leading to painful consequences, such as the demand decrease and income-inequality increase. The only increase occurred in student debt.

The combination of the prolonged contraction of bank lending and the falling of consumer demand, post-recession, drove industries and individual firms to the ranks of value (low valuation) companies and largely kept them there for the past 10–12 years. Not surprisingly, therefore, the five leading industries of value firms during the past decade were banking, retail, insurance, wholesale, and utilities, accounting for roughly 50%–60% of large value companies.

This arguably was a cause of the significant slowdown in mean reversion during the 12-year period 2007–2018 and the consequent failure of value investing. Value firms, since the financial crisis, experienced exceptional operational difficulties. Their profitability plummeted relative to previous periods (and relative to glamour companies), as is shown by Figure 12, reporting for value and glamour firms their median return on equity (ROE) and return on net operating assets (RNOA), both fundamental measures of enterprise profitability. The profitability trends of value and glamour firms could not have been more different. Whereas glamour firms experienced in 2007–2018 their highest profitability since 1970, value firms sustained their worst profitability. Other profitability indicators were consistent. For example, the percentage of firms reporting annual losses was highest for value firms during 2007–2018 (and lowest for glamour companies, not presented in graphs). Thus, by practically any measure of operating performance, the profitability of value firms deteriorated sharply since the financial crisis and remained at a historically low level up to the present.

[Insert Figure 12 near here]

This poor profitability precluded most value firms from improving their performance by investing in innovation and growth (R&D, IT, brands, acquisitions). Such crucial investments require massive funding (the average large glamour company now invests close to \$1 billion a year in R&D), which most value firms could not afford. R&D investments, for example, require ample

internal funds generation because external funds for R&D, especially debt, are difficult to come by due to R&D's uncertain outcomes, severe asymmetric information problems, and lack of collateral value (Hall, 2002). Figure 13 shows that the internal funds of value firms (earnings minus dividends) were, on average, negative during 2007–2018 and a historical low. Without internal funds, and with very limited access to the stock and debt markets, most value firms were unable in recent years to pick themselves up and rise in performance and value.¹⁵ Investment in this group of poor performers, trapped in low valuation, was therefore a losing proposition during 2007–2018.

[Insert Figure 13 near here]

9 Glamour Firms' Different Experience

The economic experience, post-crisis, was very different for glamour companies. The three leading industries of these companies were business services (primarily software), pharmaceuticals (including biotech), and electronics. The business models of firms in these industries are largely based on scalable intangible assets (compare the revenue generation potential of patents or software with that of a rental property or a retail store), strongly protected by patents and brands. First-mover advantages, network externalities, and platforms and ecosystems built around entrenched customer relationships further enhanced the performance of many glamour firms, as evidenced in Figure 12. Glamour firms, flush with cash and with easy access to capital markets, due to their attractive business models, have no problems raising funds to maintain a high investment level in tangible and intangible assets.

Glamour companies are highly rewarded by investors, as made clear by Figure 14, showing the dramatic increase of investors' valuation of intangible assets and the large valuation gap

¹⁵ During 2007–2018, less than 1% of value firms issued stock annually.

between intangible and tangible valuations.¹⁶ Many of the large glamour companies also enjoy strong entry barriers to their proprietary business models, keeping them at the top for long periods of time, as evidenced by the increasing rank correlation (Figure 9) and their longer stay in the high valuation portfolio (Figure 10).

[Insert Figure 14 near here]

The high displacement rate of glamour firms up to the financial crisis (generally known as creative destruction), which drove the past gains from shorting glamour stocks, gave way to increased stability of glamour companies. Consider the leaders of the software, pharmaceutical, telecommunications, electronics, Internet service provider, and media industries. These companies have been at the top of their industries for decades. Creative destruction and industry disruption seem to have had little effect on Microsoft, Pfizer, Apple, Amazon, and the like. Shorting these companies was a futile exercise. Thus, the increased stability at both the top and bottom of stock valuation ranks, due to different economic and technological reasons, robbed value investing of its previous gains.

The serious financial constraints on value firms (bottom 30%) and, to a somewhat lesser extent, on the middle 40% of firms prevented these companies from spending large amounts of money on R&D, brand development, and technology, which are required to unseat the top, glamour firms from their coveted position. Thus, the considerable reshuffling of glamour

¹⁶ We estimated investors' valuation of the intangibles that are not shown as assets on the balance sheet (internally generated R&D, IT, brands, business processes, etc.) and term them unrecognized intangibles. *UnrecogIntan* is the amount of the estimated unamortized stock of R&D and SG&A (see Section 3). We ran the following regression by year to estimate investors' valuation of property, plant, and equipment (*PPE*) and *UnrecogIntan*:

$$\begin{aligned} \text{SharePrice}_{i,t} = & \beta_{1,i} + \beta_{2,i} \times \frac{\text{Cash}_{i,t}}{\text{CommonShares}_{i,t}} + \beta_{2,i} \times \frac{\text{AccountsReceivable}_{i,t}}{\text{CommonShares}_{i,t}} + \beta_{3,i} \times \frac{\text{Inventory}_{i,t}}{\text{CommonShares}_{i,t}} \\ & + \beta_{4,i} \times \frac{\text{PPE}_{i,t}}{\text{CommonShares}_{i,t}} + \beta_{5,i} \times \frac{\text{RecogIntang}_{i,t}}{\text{CommonShares}_{i,t}} + \beta_{6,i} \times \frac{\text{UnrecogIntan}_{i,t}}{\text{CommonShares}_{i,t}} + \beta_{7,i} \times \frac{\text{Liabilities}_{i,t}}{\text{CommonShares}_{i,t}} \\ & + \beta_{8,i} \times \text{NYSE_Index}_{i,t} + \varepsilon_{i,t}. \end{aligned}$$

The coefficients β_4 and β_6 are investors' estimated valuation of tangible and intangible assets, as shown in Figure 15.

companies pre-financial crisis, driving the gains from shorting these firms, dwindled significantly in recent years.

This then explains the failure of value investing since 2007. A striking bifurcation developed between value and glamour firms. Most value companies now operate in regulated industries (banks, insurance, and utilities) or in low-valuation, tangible asset-rich sectors (retailers, transportation). Escaping this low-valuation group requires massive investments in intangibles and acquisitions and often a radical restructuring of business models, which most value firms cannot afford. Finding diamonds in the rough of this group is increasingly challenging. Glamour firms, in contrast, operate intangibles-based business models that enable longevity and high profitability. Shorting these enterprises is a losing proposition.

10 Escaping the Value Predicament

For investors intent on discovering value, out-of-favor companies, identifying the attributes of value companies that rose in valuation in recent years and escaped the value trap would be instructive. We do so by distinguishing between firms in the large value category, from 2008 to 2017, that remained in that category (trapped) and those that moved up to the medium (40%) and high (30%) market-to-book ratio categories, while retaining large size. We performed this separation by a statistical Logit regression that focused on numerous company and performance attributes and highlighted the attributes that significantly (in a statistical sense) distinguished between the trapped (value) and escaped companies.¹⁷ Estimates from this Logit regression are presented in Table 1. Variables with significance level lower than 0.05 (5%) are generally regarded as statistically significant.

[Insert Table 1 near here]

¹⁷ All continuous variables were winsorized at 1% and 99% by year to remove the effect of outliers.

Numerous attributes were found to significantly distinguish between the breakouts and those that stayed behind.

- Intangible investment (R&D, IT, brands, etc.) relative to total assets: Escapees had a substantially higher intangible investment rate than firms that stayed behind.
- Net capital investments (capex) relative to total assets: Escapees had a substantially higher capital investment (net of depreciation) than those staying behind.
- Steady sales growth: Essentially, it indicates a successful business model.
- Debt raised to total assets: Escapees raised substantially more debt than others, apparently to finance their investments.
- Size (total assets): The negative coefficient of (log) assets indicates, surprisingly, that larger firms had a lower likelihood of escaping the value category.
- Loss: Firms reporting losses were, unsurprisingly, less likely to escape.
- Recapitalization: Firms that could reduce their equity base by share repurchases had a higher likelihood of escaping value.

Some attributes failed to distinguish those companies that escaped from those that stayed behind. Corporate acquisitions, presumably made to break out from the low market-to-book class, appear largely ineffective, either due to overpayment for target or strategic misfit, or both. An industry change also appears to be ineffective. Overall, internal investments in traditional intangibles, such as R&D, brands, information technology, and tangible investments, as well as the lesser visible investments in organization capital, or management, were the main drivers of growth in market value. Recent economic research shows that differences in managerial practices account for a large share of variation in firms' performance.¹⁸ Unique business processes

¹⁸ See Van Reenen (2018).

(recommendation algorithms, artificial intelligence), employee incentive devices, and managerial control and monitoring systems are major drivers of breaking out of the low-capitalization crowd. A working business model (sales growth) was a key to success, and the ability to raise debt to finance investments was helpful. So, value firms are not entirely doomed to stay in the trap. Innovation and reinvestments are key to rising in value.

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Table 1: Success Factors for Value Companies

Variable	Coefficient	Standard Error	Significance
Intangibles to Assets	1.664	0.45	<0.01
Capex (Net of Depreciation) to Assets	4.686	1.64	<0.01
Percent Contribution to Sales from			
Acquisitions	0.082	0.74	0.91
Last Three Year's Sales Growth	1.694	0.37	<0.01
Industry Change	-0.044	1.31	0.97
Debt to Assets	1.199	0.34	<0.01
Free Cash Flows to Assets	2.110	1.02	0.04
Share Repurchase to Assets	6.182	2.12	<0.01
Dividend Payments to Assets	7.352	3.32	0.03
Cash to Assets	-0.067	0.62	0.91
Age since Listing	-0.001	0.00	0.86
Return on Equity	0.004	0.02	0.83
Loss	-0.485	0.14	<0.01
Log of Assets	-0.193	0.05	<0.01
Year and industry fixed effects	Yes		
Number of observations	2,338		
Number of observations with value = 1	730		
Likelihood ratio	423 significant at <0.0001		

Description: This table presents the results of logistic regression to distinguish characteristics of large value companies that remained in the value category (that is, the bottom 30% by market-to-book ratio) from those that rose to higher market-to-book ratio categories. See footnote 3 for description of value versus glamour category and small versus large firms. Data period is from 2008 to 2017.

Interpretation: Intangible investments and net capital investments are positively associated with the likelihood of escaping from the value category.

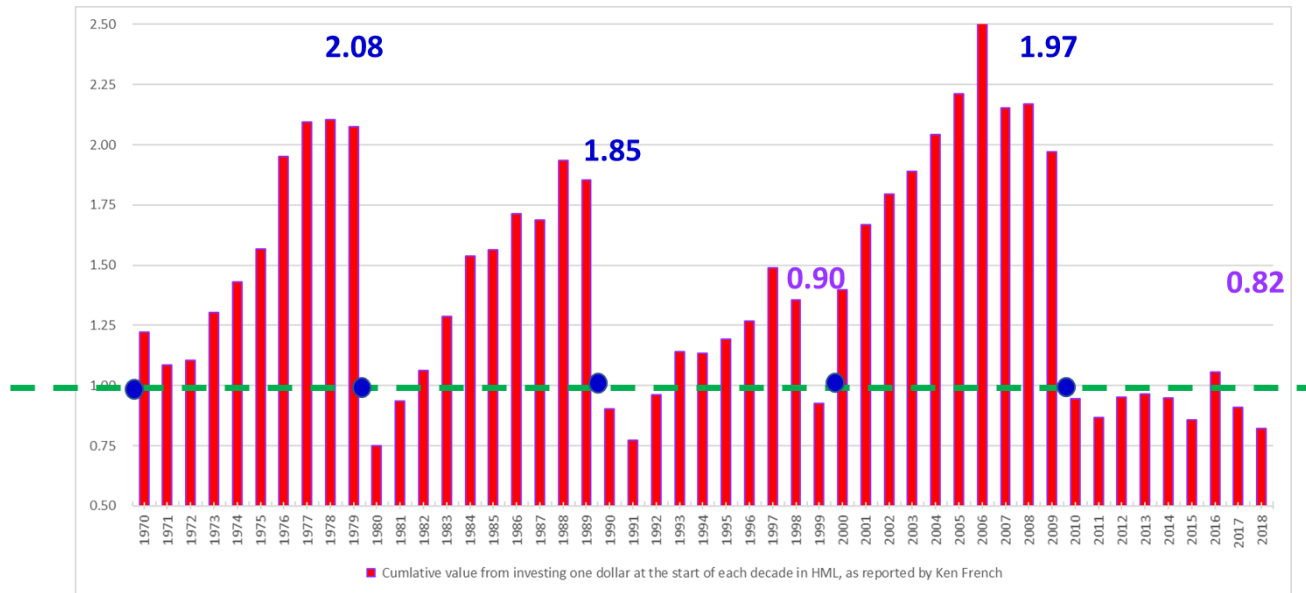


Figure 1: HML Returns for Each Decade

Description: At the start of the month, one dollar long and one dollar short positions are taken in high and low portfolios (by book-to-market ratio), respectively (see footnote 3). Ken French reports net returns from this hedged strategy as the high minus low (HML) factor for the month. The annualized return is calculated by first compounding monthly returns from long and short strategies for a calendar year and then taking their difference, giving what French reports as the annual HML. We then compound those annual returns with each passing year during the decade. For example, returns of 10%, 11%, and 15% in the first three years of a decade accumulate to $\$1 \times (1 + 10\%) \times (1 + 11\%) \times (1 + 15\%)$. Blue dots represent the start of each decade. HML yielded \$2.08 during the 1970s, \$1.85 during the 1980s, \$0.90 during the 1990s, \$1.97 during the 2000s, and \$0.82 from January 1, 2010 to December 31, 2018.

Interpretation: The accumulated value gives a rough idea about how well the HML strategy worked in each decade. The strategy failed during the decades of 1990s and, again, in the decade beginning 2010.

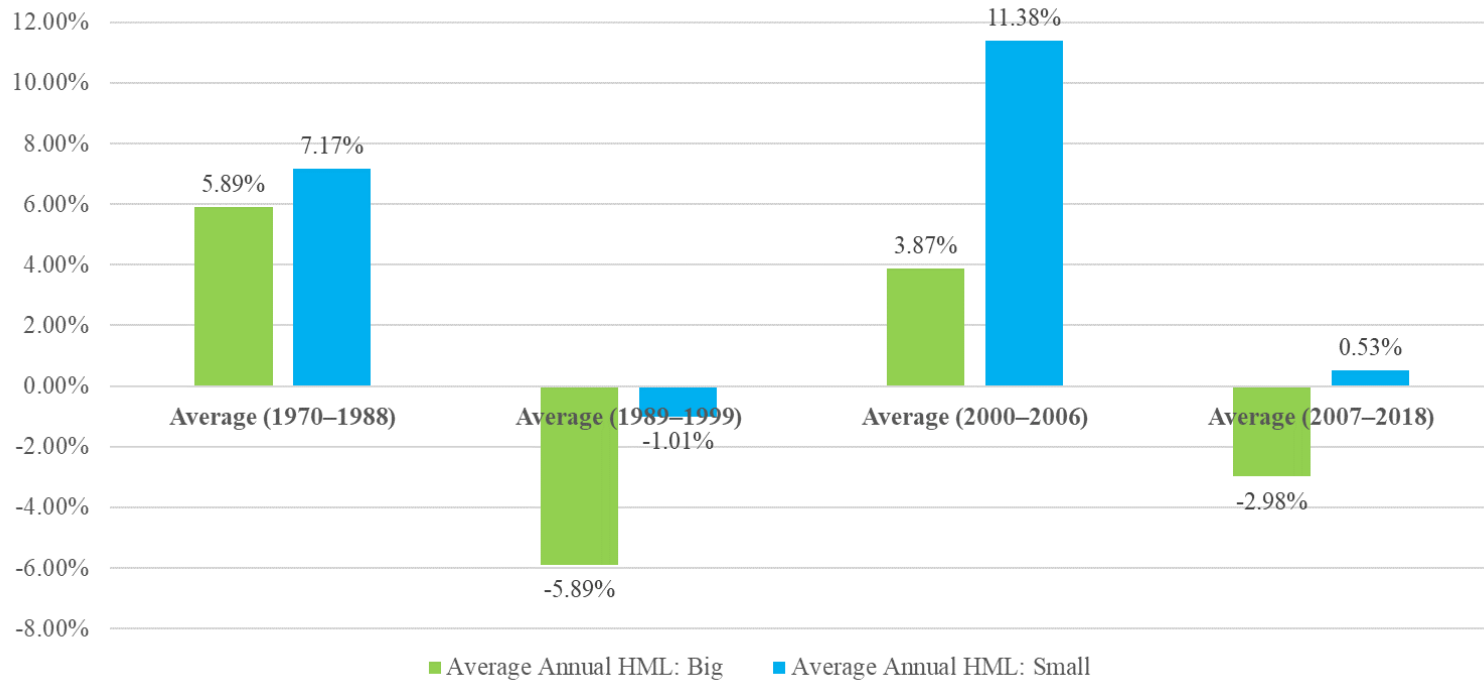


Figure 2: HML Returns for Small and Big Stocks

Description: This figure presents the average annual high minus low (HML) returns for the big and small stocks for the four periods examined in this study. See Figure 1 and footnote 3 for the calculation of HML returns and the definition of small and big stocks.

Interpretation: This figure shows that HML returns for big stocks have been negative on average since 1989, except for a brief period of 2000 to 2006.

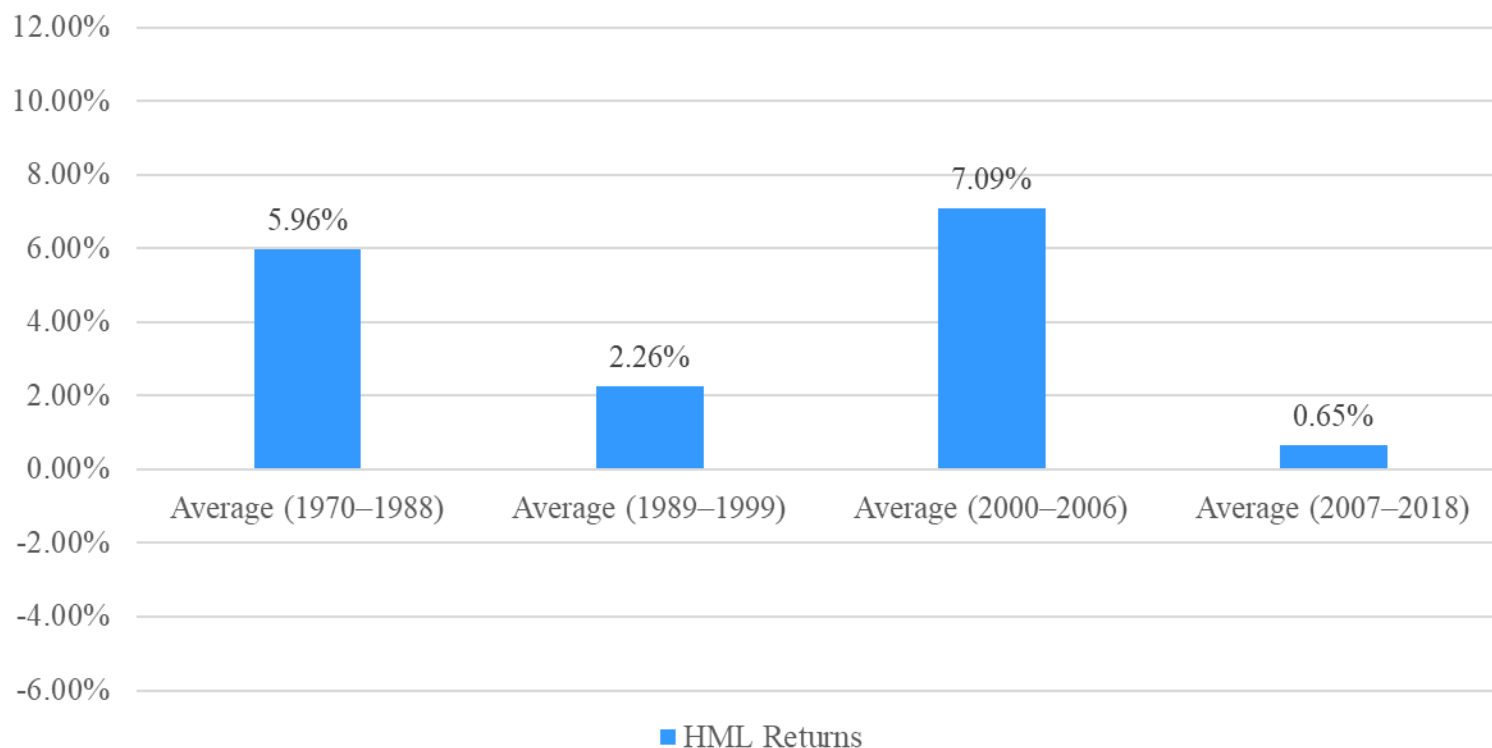


Figure 3: HML Returns with Industry-Adjusted Book-to-Market Ratios

Description: In this figure, we identify cutoffs for high and low book-to-market ratios by industry (Fama and French 12 industries), instead of on a cross-sectional basis. Accordingly, we identify value and glamour stocks. We then calculate the average annual high minus low (HML) returns using revised long and short portfolios and present their averages for the four time periods examined in this study. See footnote 3 for the calculation of HML returns.

Interpretation: This figure shows that returns from even the industry-adjusted HML strategy have declined since 2007.

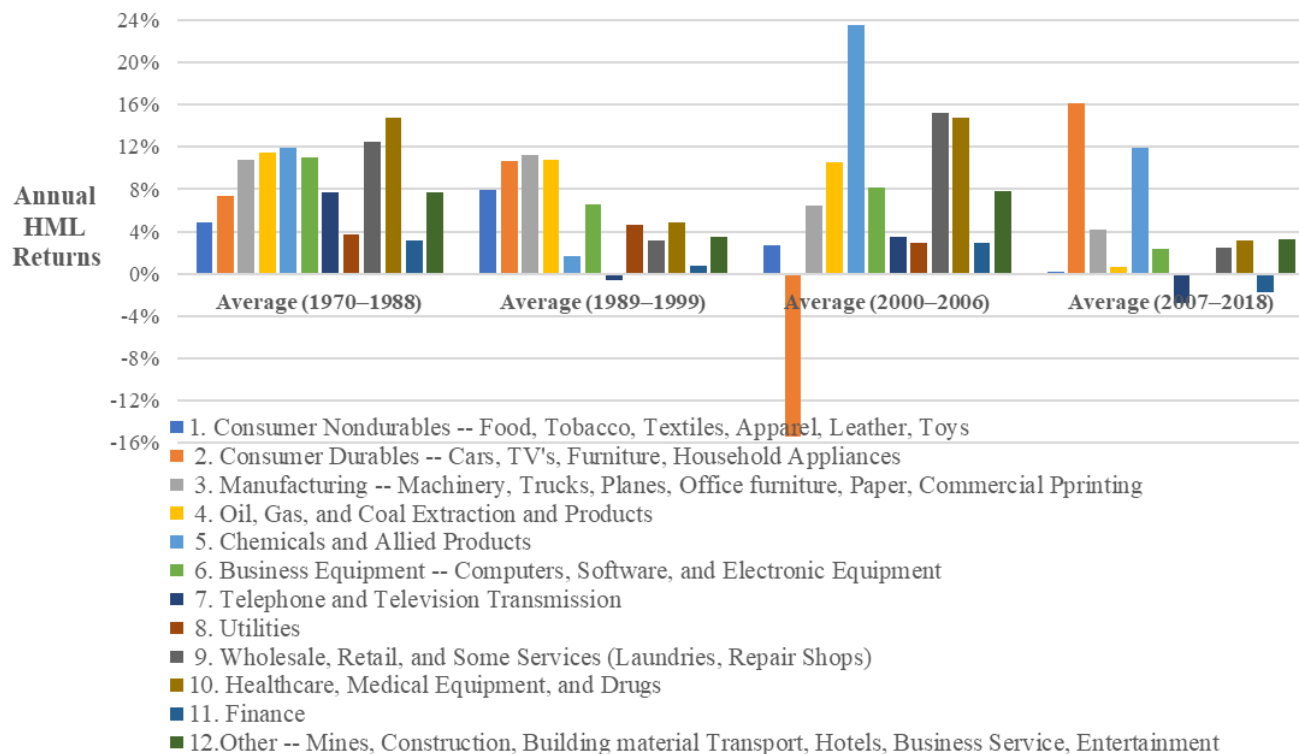


Figure 4: HML Returns by Industry with Industry-Adjusted Book-to-Market Ratios

Description: This figure presents annual average returns by portfolios formed within each industry, for the four periods examined in this study. See Figure 3 for the calculation of high minus low (HML) returns using industry-adjusted book-to-market ratios.

Interpretation: This figure shows that returns from even the industry-adjusted HML strategy have declined since 2007 for most industries.

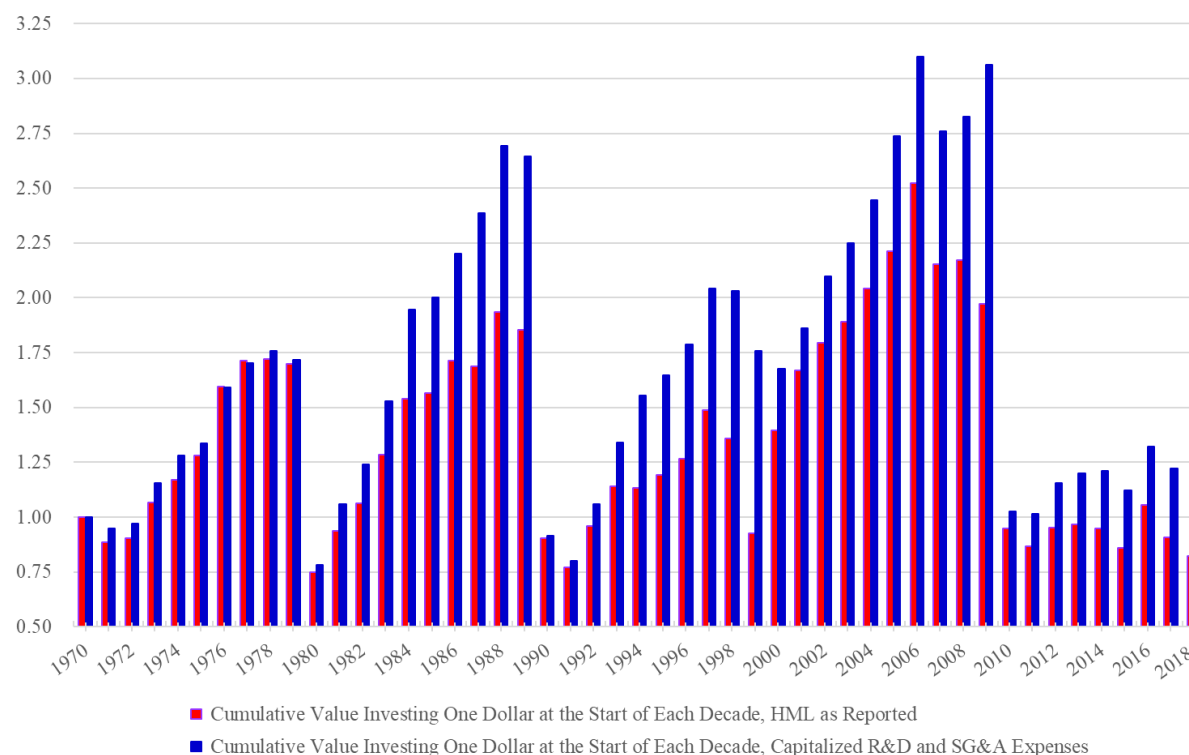


Figure 5: Adjusted HML after Capitalization of Intangibles

Description: Section 4 explains calculating book values after capitalizing intangibles and calculating high minus low (HML) returns with revised portfolios. This figure depicts the effect of those adjustments on HML returns. The red (left) bars in each year are the returns from the original, unadjusted market-to-book classification, and the blue (right) bars represent the returns from the adjusted methodology. Data for unadjusted returns are obtained from Ken French’s website. See Figure 1 for calculating returns by decade. R&D = research and development; SG&A = sales, general, and administrative.

Interpretation: This figure shows that the HML strategy, by capitalizing intangibles, yields better returns than without capitalization. The improvement because of capitalization has declined in decade of the 2010s.

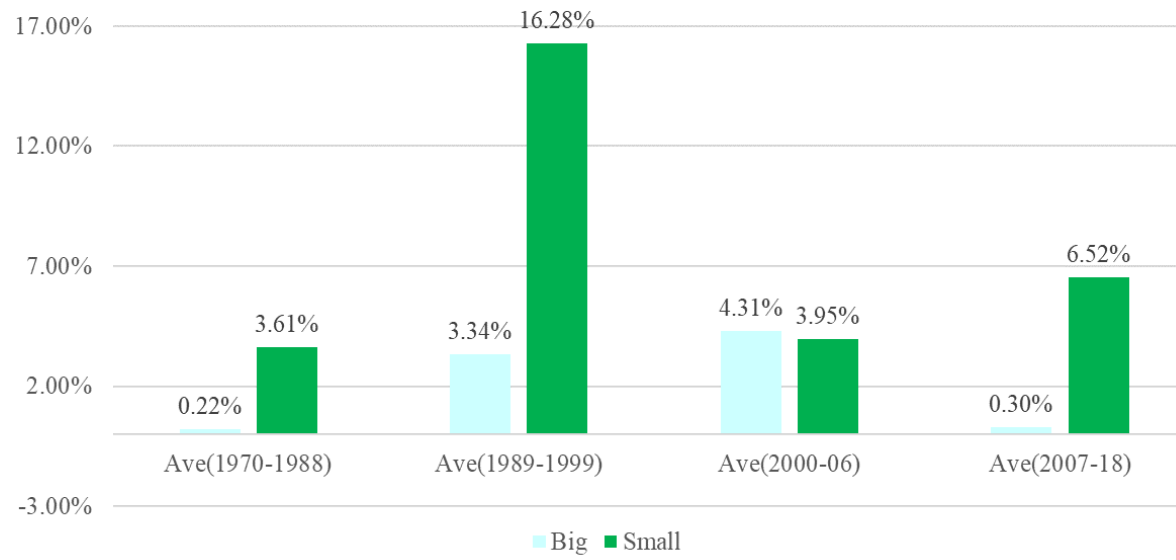


Figure 6: Adjusted HML after Capitalization of Intangibles for Small and Big Stocks

Description: Figure 5 shows how to recalculate high minus low (HML) returns after capitalization of intangibles. This figure presents the effect of those adjustments for big and small stocks for the four time periods examined in this study.

Interpretation: This figure shows that better improvement for smaller stocks, arguably because young and small firms spend a higher percentage of outlays on intangibles than do large firms.

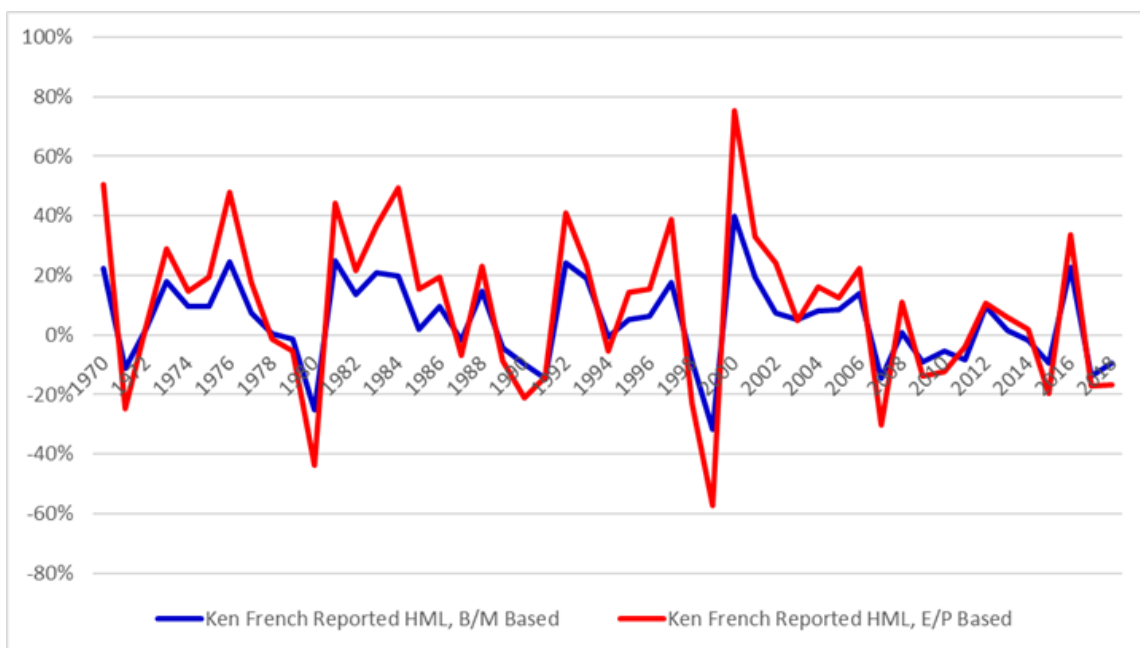


Figure 7: Correlation between HML Returns Based on B/M and E/P Ratios

Description: Figure 1 depicts HML returns based on portfolios formed by book-to-market (B/M) ratio. This figure presents HML returns based on portfolios formed on earnings-to-price (E/P) ratio. Data for both returns are obtained from Ken French’s website.

Interpretation: The figure shows high correlation between HML returns based on B/M and E/P ratios.

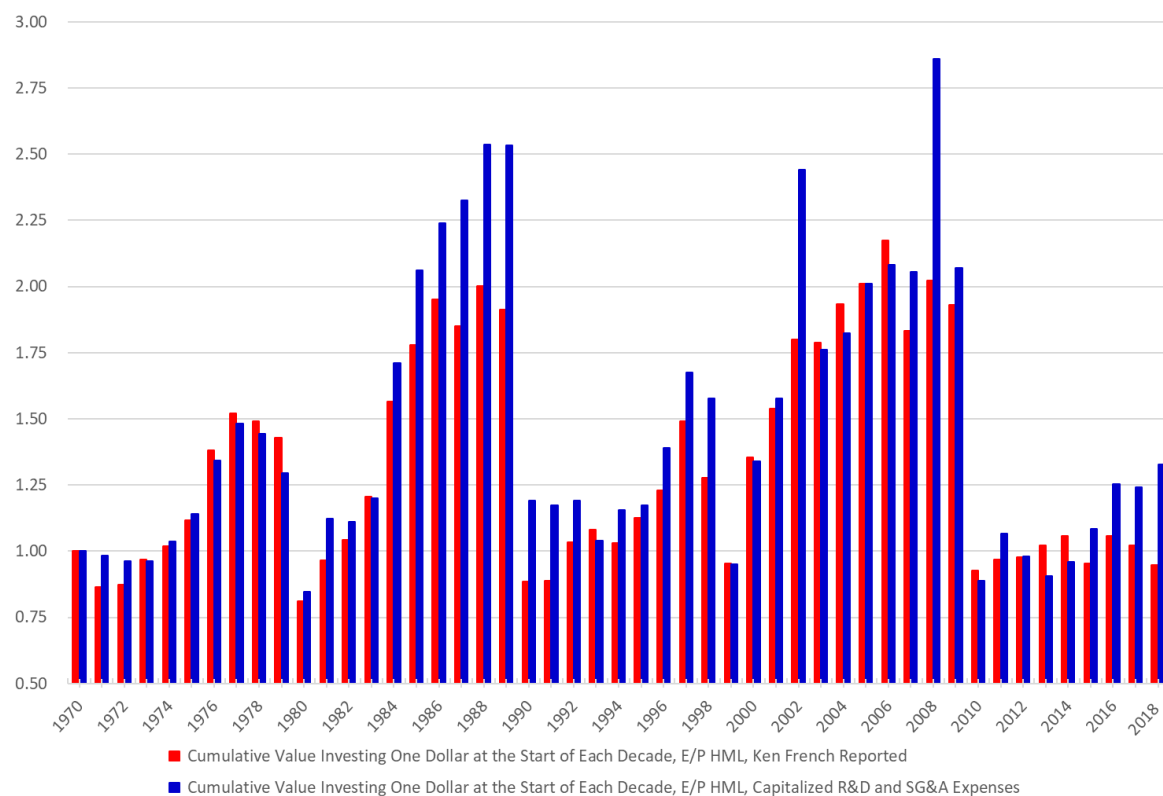


Figure 8: Adjusted E/P HML after Capitalization of Intangibles

Description: Figure 7 reports on calculating adjusted high minus low (HML) after capitalization of intangibles. Figure 5 presents HML returns based on book-to-market (B/M) ratio. In this figure, we do similar adjustments for HML returns based on earnings-to-price (E/P) ratio. R&D = research and development; SG&A = sales, general, and administrative.

Interpretation: This figure shows the improvements in adjusted HML returns, based on E/P ratio, because of capitalization of intangibles. It also shows that the improvement in HML strategy based on E/P ratio has declined in the decade of the 2010s.

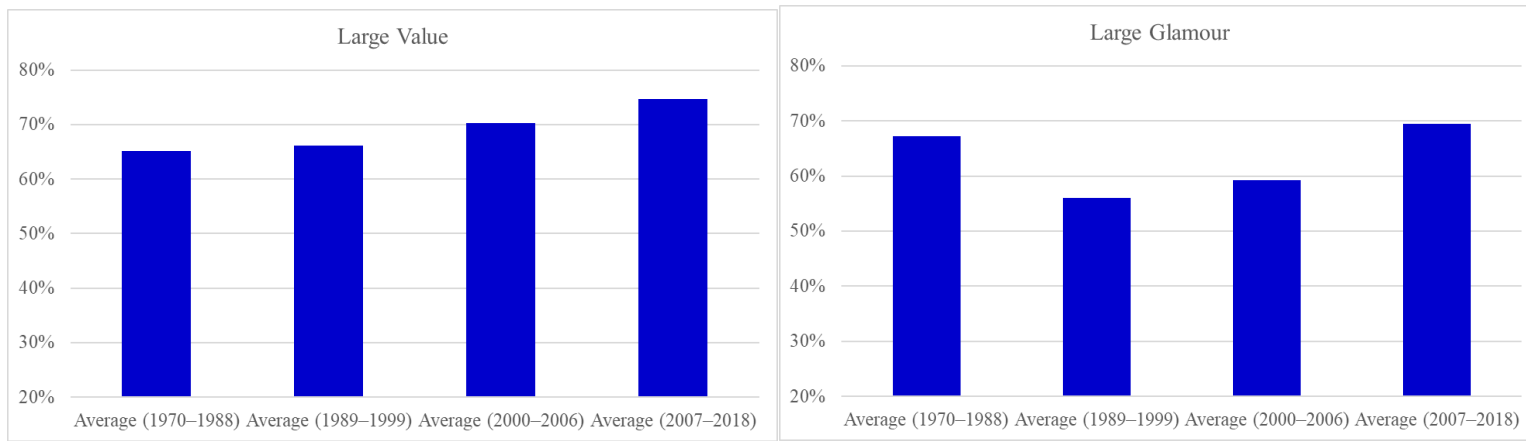


Figure 9: Rank Correlations of B/M Ratios for Large Value and Glamour Stocks

Description: Book-to-market (B/M) ranks are calculated for each stock each year. Correlations between this year's and last year's ranks are calculated separately for large value and glamour stocks. See footnote 3 for definitions of large value and glamour stocks. This figure presents the average annual correlations for the four time periods examined in this study. High correlation decreases the profitability of the high minus low (HML) strategy, because it implies lower mean reversion.

Interpretation: This figure shows that mean reversion has slowed since 2007.

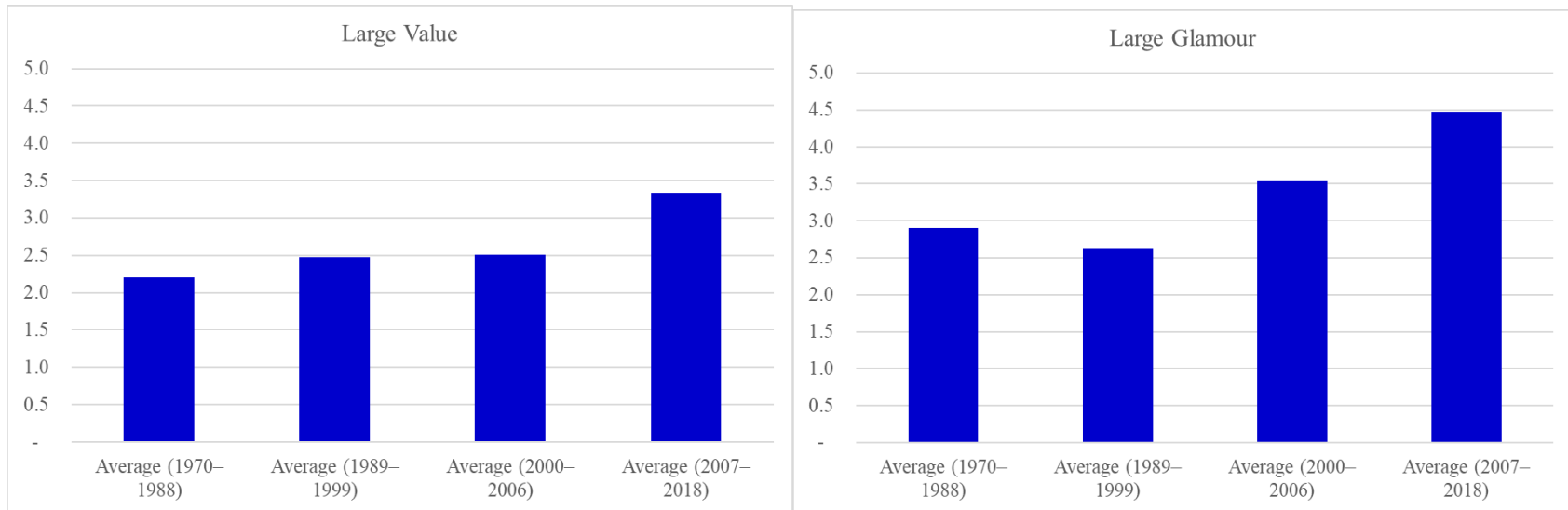


Figure 10: Length of Stay in Large Value and Glamour Portfolios

Description: This figure presents the average stay of a large firm in the value and glamour portfolios for the four time periods examined in this study. Longer stay indicates lower mean reversion and decreases the likelihood of earning returns from the high minus low (HML) strategy. See footnote 3 for definitions of large value and glamour stocks.

Interpretation: This figure shows that mean reversion has slowed since 2007.

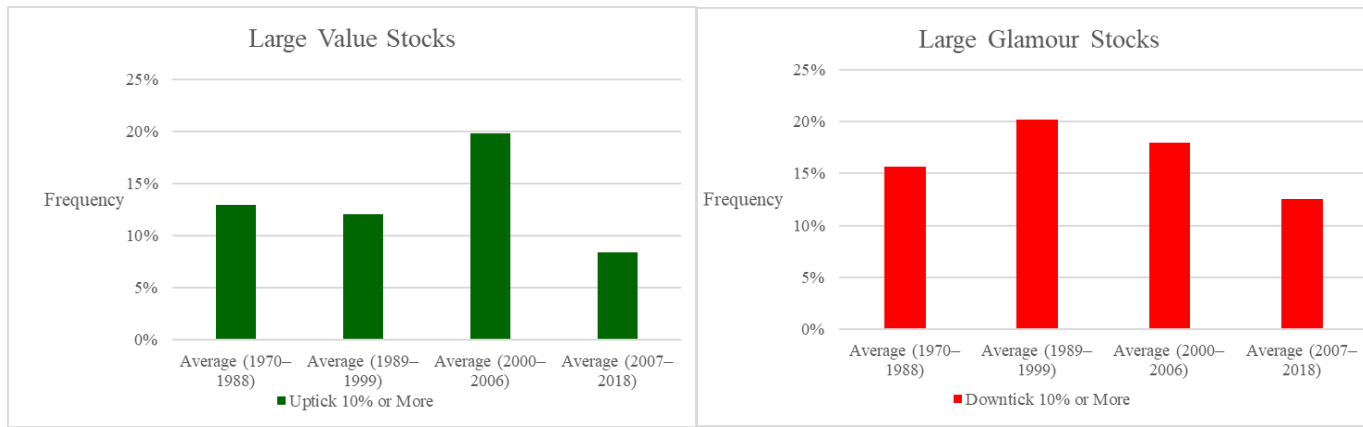


Figure 11: Large Upticks (for Value) and Large Downticks (for Glamour Stocks)

Description: This figure presents the periodic annual percentages of 10% or more upticks (for value) and downticks (for glamour stocks) for the four time periods examined in this study. Upticks (for value) and downticks (for glamour stocks) indicate mean reversion and improve the likelihood of earning returns from the high minus low (HML) strategy. See footnote 3 for definitions of large value and glamour stocks.

Interpretation: This figure shows that mean reversion has slowed since 2007.

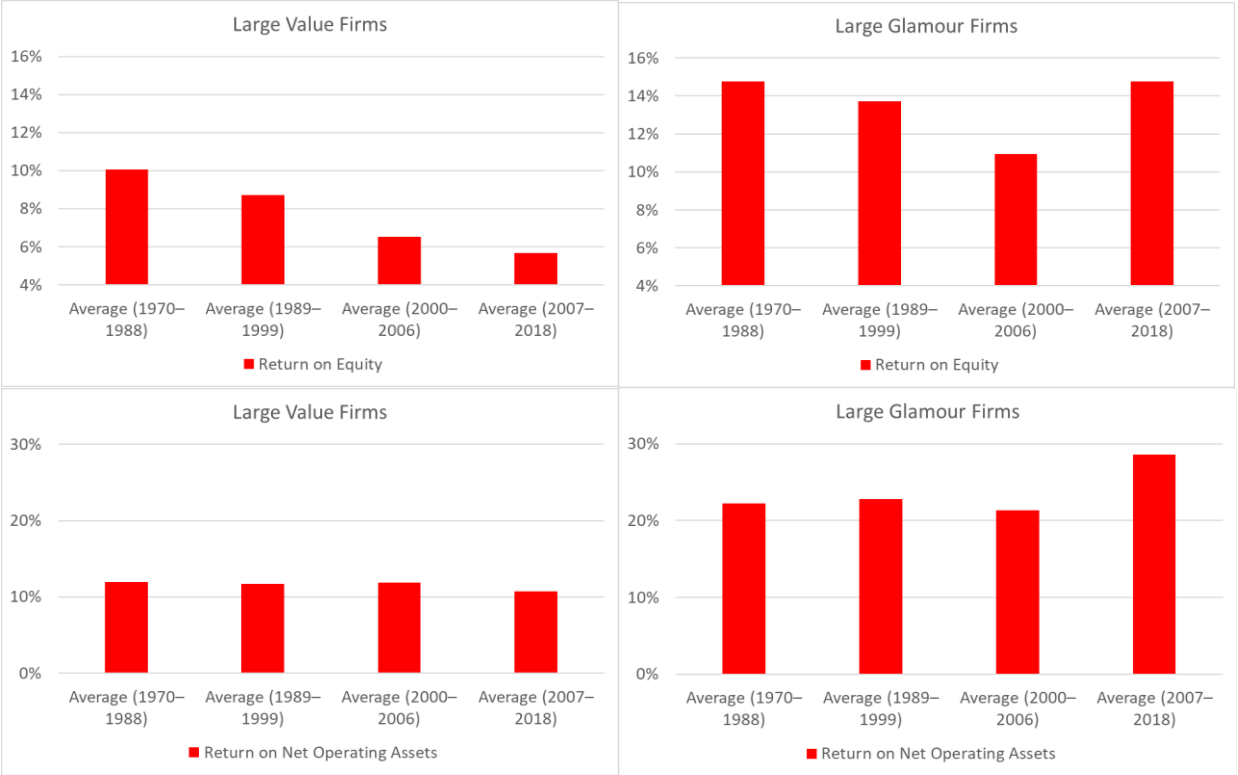


Figure 12: Financial Performance of Large Value and Glamour Firms

Description: This figure presents the median return on equity (ROE) and the return on net operating assets (RNOA), both fundamental measures of enterprise, for large value and glamour stocks for the four time periods examined in this study. See footnote 3 for definitions of large value and glamour stocks.

Interpretation: This figure shows that the financial performance of large value firms has deteriorated and that of the large glamour firms has improved since 2007.

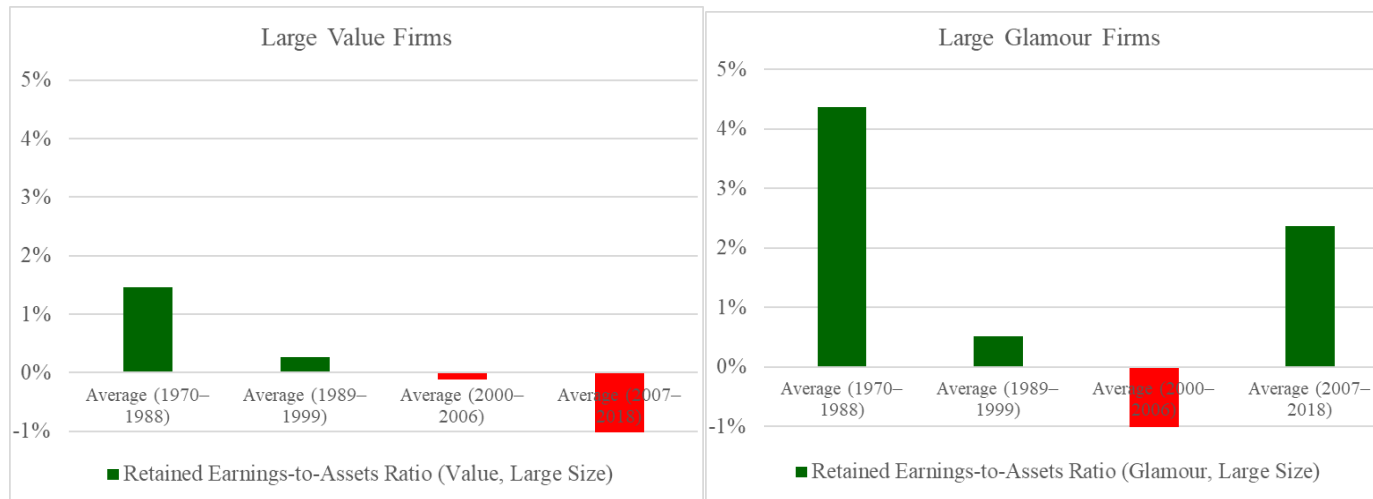


Figure 13: Retained Earnings of Large Value and Glamour Firms

Description: This figure presents the ratio of retained earnings (earnings minus dividends) to assets for large value and glamour stocks for the four time periods examined in this study. See footnote 3 for definitions of large value and glamour stocks.

Interpretation: This figure shows that retained earnings of large value firms has deteriorated and that of the large glamour firms has improved since 2007.

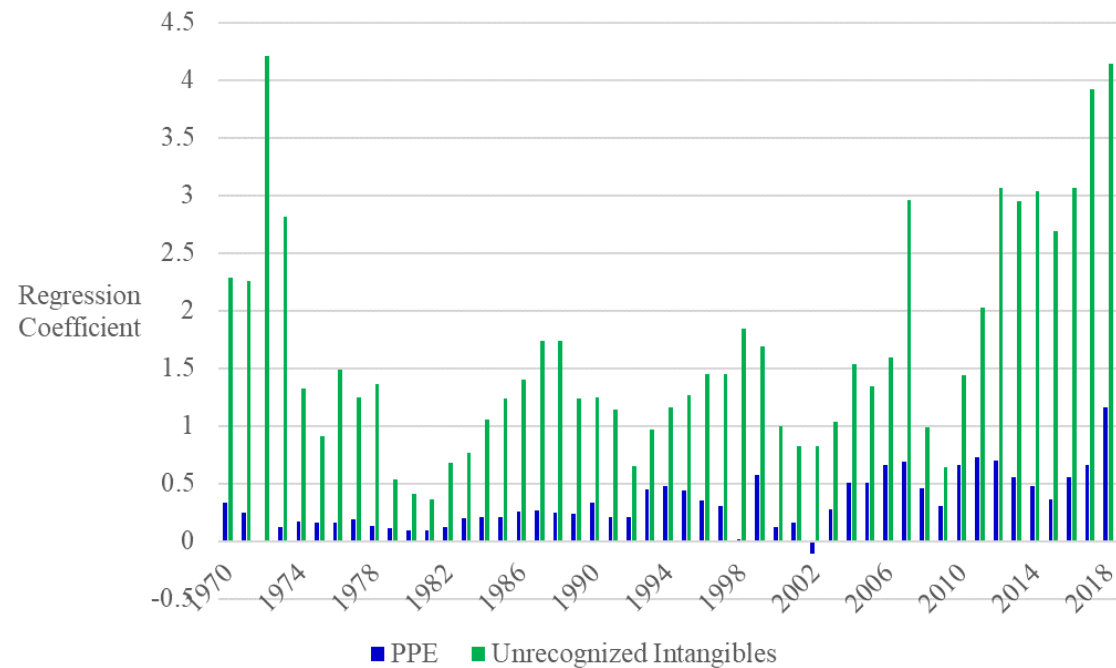


Figure 14: Investors' Valuation of Tangible and Unreported Intangible Assets

Description: See footnote 15 for estimating the regression coefficients on intangibles and property, plant, and equipment (PPE) in the valuation equation, which are indicative of investors' valuation of those assets. This figure depicts the investors' estimated valuation of tangible and intangible assets, by year. PPE = property, plant, and equipment.

Interpretation: This figure shows that, at least since 2007, valuation attached to intangible assets is much higher than the valuation attached to tangible assets.