Value Investing and Dynamic Capabilities

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Submitted: December 14, 2018 / Accepted: April 29, 2019

Abstract

This paper argues for and supports an alternative explanation for sustained above normal returns earned by value investors. We posit that by using ratios that incorporate particularities of the US accounting system, value investors are, perhaps unknowingly, capturing the value-creating investments in what the field of strategic management categorizes as a dynamic capability. Using the analytical methods of finance research, we analyze 44-years of US accounting data, by using low price-to-book and other ratios, value investors create metrics that capture firms' dynamic capability spending. The resulting abnormal returns are consistent with hypotheses grounded in strategic management.

Keywords: Value investing, dynamic capabilities, financial ratios, abnormal returns.

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การลงทุนเน้นคุณค่าและความสามารถเชิงพลวัต

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บทคัดย่อ

งานวิจัยนี้อภิปรายและสนับสนุนการอธิบายอีกแง่มุมหนึ่งของอัตราผลตอบแทนที่มากกว่าปกติแบบยั่งยืนโดยการลงทุนแบบนักลงทุนเน้นคุณค่า นักลงทุนเน้นคุณค่าอาจจะสามารถลงทุนได้ประสบความสำเร็จโดยการใช้อัตราส่วนทางการเงิน ซึ่งงานวิจัยนี้มุ่งเน้นการใช้อัตราส่วนทางการเงินและมาตรฐานการบัญชีจากสหรัฐอเมริกา และมีการอธิบายโดยใช้หนึ่งในแนวคิดกลยุทธ์การบริหารซึ่งก็คือ ความสามารถเชิงพลวัต งานวิจัยนี้ใช้การวิเคราะห์เชิงปริมาณทางการเงินโดยใช้ข้อมูลทั้งหมด 44 ปีจากข้อมูลบัญชีในสหรัฐอเมริกา เน้นที่อัตราส่วนราคาต่อมูลค่าทางบัญชีต่อหุ้นที่ต่ำ และอัตราส่วนทางการเงินอื่นๆ ซึ่งนักลงทุนเน้นคุณค่าสามารถหาวิธีที่จะลงทุนในบริษัทที่มีความสามารถเชิงพลวัตได้ อัตราผลตอบแทนซึ่งเป็นอัตราผลตอบแทนที่มากกว่าปกตินั้นตรงกับสมมติฐานของทฤษฎีในทางกลยุทธ์การบริหาร

คำสำคัญ: การลงทุนเน้นคุณค่า ความสามารถเชิงพลวัต อัตราส่วนทางการเงิน ผลตอบแทนที่มากกว่าปกติ

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Introduction

For the past three decades, investors in portfolios of "value stocks" have outperformed the US stock market as a whole. This conclusion is supported empirically by a long series of large-sample studies in the finance literature by Fama and French (1992, 1993, 1995, 1996, 1998, 2006, 2012, 2015), by studies of individual value investors (Graham and Dodd, 1934; Graham, 2003). The portfolios of well-known value investors, such as Warren Buffett, Charlie Munger, Walter Schloss, and Seth Klarman, regularly outperform the average market returns (Klarman, 1991; Buffett, 1984). Not surprisingly, the explorations proffered in the field of finance reflect the much larger debate in that discipline as to the efficiency of the capital markets as a whole (Charron, 2017).

There is room for other disciplines in these discussions, and they may well add significant new perspectives. In particular, research anchored in the accounting systems' role in the financial research would seems critical given the role of accounting data in the investment decisions of value investors, and meaningful scholarship has followed, e.g., Lee (2001), Novak (2008).

In this paper we build on the accounting-focused research on value investing, but we do so by adding in the perspectives of the field of strategic management which provides explanations as to why firms sustain the abnormal returns over time that the accounting system captures. With an understanding of how US accounting data is used by value investors, we present an alternative explanation for these returns that is consistent with strategic management's causal models of sustained abnormal performance.

More specifically, we argue here that by primarily using particular US accounting ratios to identify firms in which to invest, value investors are, perhaps unknowingly, filtering their search for value stocks on a firm's active investment in what the field of strategic management labels "dynamic capabilities" (Eisenhardt and Martin, 2000). By focusing on dynamic capability spending, we can see how the treatment of spending in the US accounting system creates an effective filter in the resulting ratios that value investors use. Specifically, this filter separates out for closer examination those firms that strategic management suggests should, on average, have better long-term performance (Teece, 2007), and that the finance research shows, in fact, do (Fama and French, 1995, 2006).

Our argument is that the inefficiency through which value investors are able to earn abnormal returns rises from the market's apparent difficulty in identifying and pricing the future returns of firms that are making dynamic capability investments. In contract, by using the dynamic capability concept from strategic management (Teece, 2007), and how it is captured in the US accounting system, we provide an explanation for value investors' apparent ability to identify and earn sustainable economic returns on equity investments in what should be a near frictionless market.

We will first briefly set out the dynamic capability arguments, which are grounded in a primary theoretical anchor in strategic management the resource-based view of the firm (Barney, 1991, 1997).

We then show out how accounting for dynamic capability expenditures figure into common accounting ratios. We then argue that when value investors incorporate these ratios into their initial filters they are, in fact, in part filtering firms on their amount of dynamic capability investment. We then set out predictions about how performance variations should be patterned based on the assumption that dynamic capability investment both enhances long-term firm performance and lowers short-term performance ratios. To test the resulting hypotheses we use accounting data from the population of publicly traded firms in the US markets as listed in S&P International's Compustat® and the Center for Research on Security Prices' CRSP® tapes from 1970 to 2014. Then, to compare alternative weak-efficiency explanations for our results, we apply the Fama-French 3 factor model, which controls for market, size and value factors to the results to test robustness.

We conclude the paper with a discussion of the results and suggest that the dynamic capability capture argument provides a more robust explanation for the persistent above-normal returns argument for value investors than the explanations provided by the finance literature as well as the important limitations to this research and their implications for future research opportunities.

Dynamic Capabilities in Strategic Management

The field of strategic management has been concerned with the persistence of abnormal profits in firms for almost forty years. The dominant perspective in that field for explaining persistent abnormal profitability is the resource-based view of the firm (RBV) (Barney, 1991, 1997). The RBV argues that firms consist of a meaningful number of heterogonous resources and capabilities, including managerial skills, that enable otherwise similar firms competing in the same market to produce outputs with differing degrees of efficiency and effectiveness (Peteraf, 1993). Importantly, these differences among rival firms do not quickly disappear in open markets as classic micro-economics would suggest (Bain, 1959). Instead, they are hard to imitate (Barney, 1997), enabling firms, such as Southwest Airlines and Wal*Mart Stores, to post decades of above-average returns in industries notorious for their fierce competitiveness.

Though they do not quickly disappear, these hard-to-imitate capabilities do, over time, erode for a range of reasons (Eisenhardt, and Martin, 2000). It is, therefore, incumbent on firms to continually invest in improving their existing hard-to-imitate capabilities and in developing new ones. Through dynamic capability investments, a firm's distinctiveness can be maintained in spite of the imitation efforts of rivals (Teece, et al., 1997; Wernerfelt, 1984; Prahalad and Hamel, 1990).

Important in the above is the fact that the dynamic capability investments made to maintain and develop hard-to-imitate capabilities are seldom felt in the competitive marketplace immediately. Even in fast-to-market industries, there is a lag between initial resource allocations for activities such as R&D and brand building and the returns those investments earn in the marketplace.

Generally, there is nothing in the finance literature that links value-investing to the just-described concepts of dynamic capabilities. For investors, finding potentially undervalued equities is not hard when using some well-known indicators such as a low Price-to-Book (P/B)[1] ratio. It is the *ex-ante* identification of those firms with low P/B ratio firms that are protected by what Warrant Buffet refers as a "moat" to which that is harder to do. We argue here that an outcome of the way in which the US system accounts for dynamic capability investments is a lower P/B ratio, and that the P/B ration is driven lower, in part, by these investments in the hard-to-imitate capabilities that, in fact, build and sustain Buffet's competitive "moat" over time. As a result, the US accounting system makes the P/B ratios used by value investors good initial indicators of dynamic capability investments a future, higher performance.

We know that there is a strong link between certain accounting measures and the construction of value investing portfolios. Piotroski (2000) constructed an F-score using various accounting measures and found that it produced higher returns when used in a value portfolio. Similarly, Novy-Marx (2013) used gross profitability variables to increase performance of the value portfolio. But while theoretical discussions of capital market efficiency inform these authors' explanations for the value investors' returns, their theory of market inefficiency does not seem to drive the decisions of investors in value portfolios. Accounting measures do. And there is nothing in the capital market efficiency arguments that explains why particular accounting measures contain the critical information for value investors' initial filtering of targets. In contrast, the dynamic capabilities argument presented here does explain why these accounting measures are good filters.

To understand how dynamic capabilities arguments explain why accounting measures are good filters for value investors, we must first look at the ratios that make up part of the value investors' analysis and see how their relative values align with the RBV's explanation of dynamic capability investment and sustained advantage. We can then follow the lead of Novy-Marx (2013) and build portfolios of US equities based on this explanation to see how the patterns of returns across a range of different ratio values align with the hypothesized expectations. Finally, we can see if these patterns can be distinguished from those that explain market inefficiency by using Fama and French's (2012) three-factor model.

[1] The Price-to-Book ratio is calculated from accounting statements by dividing the firm's per-share stock price by its per-share book value.

Accounting for Expenditures: Capturing Current Capability and Dynamic Capability Spending

Value Investing and the Efficient Market for Equities

Value investors tend to look at firms that have a low price to book ratio (P/B) or similar measure as a starting point in their analysis. This behavior is inconsistent with the efficient market hypothesis that argues that, at least in US equity markets, the market clearing price is an accurate reflection of the expected future returns for an equity as adjusted for risk (Sharpe, 1964). Under the efficient market hypothesis, if the P/B ratio is relatively low, then the market's expected return is higher for the higher level of risk taken.

Value investors assume that a significant number of low P/B firms are, in fact, underpriced. Importantly, value investors believe that the sub-set of low P/B firms that will outperform the market can be systematically be identified *ex ante*, in part, by using accounting data. The stocks identified as being of potential interest are flagged for more fundamental analysis. The anticipation is that the resulting portfolios will have returns skewed above normal.

As noted, these ratio-driven steps are not the end of the value investor's system; value investors continue with fundamental analysis of firms that are filtered in this way prior to investing. But even without this last step, if the accounting-based filters are sorting equities such that they capture under-recognized investments in dynamic capabilities, then there should be links between the components of these accounting-based filters, the traits of successful dynamic capability management, and long-term abnormal market returns.

Measuring Dynamic Capability Spending

Measuring how managers allocate a firm's investable resources between current competitive markets and future competitive markets with is difficult. Reported spending for public companies often aggregates expenditures broadly. However, by looking at how performance measures are calculated from the accounting data, we can see how and why a course-grained measure, such as gross profit used by Novy-Marx (2013), may help isolate dynamic capability investment.

What follows is by no means a detailed enquiry into financial or managerial accounting. But it is sufficient to show how dynamic capability spending is isolated at one point in the deconstruction of a firm's profit in the US accounting system.

First, the US accounting system requires that a firm's expenditures within a given time period be treated differently based on whether or not the expenditures are directly linked to the goods or services sold in that period. Direct expenses are captured by the Costs of Goods Sold (COGS). COGS, when presented as a percentage of sales and subtracted from 100%, gives the firm's gross profit margin.

Cash that is not taken by COGS may be free to contribute to the indirect costs the firm also incurs.[2]

Indirect costs capture most other expenses incurred in the reporting period. They are often collectively reported as "sales, general and administrative" (SG&A) expenses or "overhead" We will use the latter designation in this paper. For internal control, the firm allocates overhead expenses across units of goods and services, both sold and inventoried, according to firm policies and accounting principles. In reporting income from sales, these overhead expenses are subtracted from the gross margin. The result is the firm's operating margin. Operating margins are closely watched by investors. Cash that is free after subtracting overhead expenses can cover interest and taxes.[3]

A simple representation of three measures of profit using US accounting data is thus:

Revenue minus direct costs = Gross Profits

Gross profits minus overhead costs = Operating Profits

Operating profits minus interest, depreciation, and other expenses = Net Profit

An oddity of the US system, versus the system used on Europe and other markets, rests in how some overhead expenditures are accounted for. In the US system, expenditures such as R&D and many brand-building expenditures have to be fully accounted as expenses in the current period. Current year expensing is required even though the benefits of the expenditure may accrue over many future years. Thus, the cost of developing future competitive advantages through R&D or brand building cannot be aligned with the revenues they may produce in future years. This contrasts with how capital investments are accounted for with approved depreciation methods.

While this may be a debatable accounting practice, fully costing these expenditures in the year made turns out to be highly convenient for isolating the impact on spending on dynamic capabilities among the three measures of profit above. The US requirement forces these expenditures for future competitive advantage to be a) recognized in the year of the expenditure and b) placed in the overhead category. Thus, while the managerial intention is to invest in future years' performance, many items in which they invest are fully expensed in the year spent not in the years in which they impact revenues.

This is where the information difference between the two ratios align with dynamic capability investment. All else being equal, these higher levels of spending on future competitive advantage will result in lower current operating profits when accounting ratios are calculated, but not lower gross profits. To the extent that almost all dynamic capability expenditures are treated this way, management decisions to invest in dynamic capabilities will both drive down the P/B ratio by inflating overhead and expand

[2] In accrual accounting systems investors have to be careful, as accrued direct costs do not equate identically with cash flows. Thus, gross margins are only a proxy for a firm's ability to pay its bills.

[3] That leaves only investments in long term assets, such as property, plant and equipment. These are depreciated under the accrual system and only a portion of their costs are allocated to current expense. These depreciation expenses are posted against a firm's revenues, but are not reflective of the current period's cash flow.

the gap between gross income and operating income when the ratios are compared.

By contrast, direct costs of current sales (COGS) will have no impact on this gap. And long-term investments that are capitalized and depreciated, such as a new plant and equipment, are unlikely to facilitate capabilities that are distinctive and hard to imitate, a key requirement in the RBV for retaining sustainable heterogeneous resources in a firm (Barney, 1997).

Clearly many other items are collected in a firm's overhead expenses that are not associated with dynamic capabilities. Corporate office expenses, for example, make up a large portion of overhead costs in many firms. Similarly, there may be resource allocations that impact both contemporary and future performance. Costs associated with the human resource function fall into this category. Thus, we are clearly not saying that overhead expenditures are a precise reflection of investment in dynamic capabilities, but rather that investments in dynamic capabilities are included in overhead expenditures.

There will also be industry effects reflected in the gap between gross profits and operating profits when using this measure. Pharmaceutical firms, for example, will have much higher R&D expenditures as a percentage of sales than retail grocery stores. Thus, while the difference between gross and operating profits is definitely a course-grained measure, across the population of publicly traded firms it should be positively and significantly correlated with levels of dynamic capability spending.

Alternative Profit Measures, Dynamic Capabilities and Expectations of Future Performance

Relationship Among the Alternative Measures

Although they are both continuous measures, for illustration purposes the expected the performance interactions of the two profit metrics used in value-investing decisions, Gross Profit and Operating Profit, are set out in the 2x2 grid in Figure 1. Because operating profit is dependent on gross profit and both have the same denominator, it is not possible to have a low gross profit ratio and a high operating profit ratio. However, for the other three combinations of Gross Profit and Operating Profit in Figure 1, we can look at alternative explanations for each pairing and at the anticipated market reactions to these different pairings in financial statements.

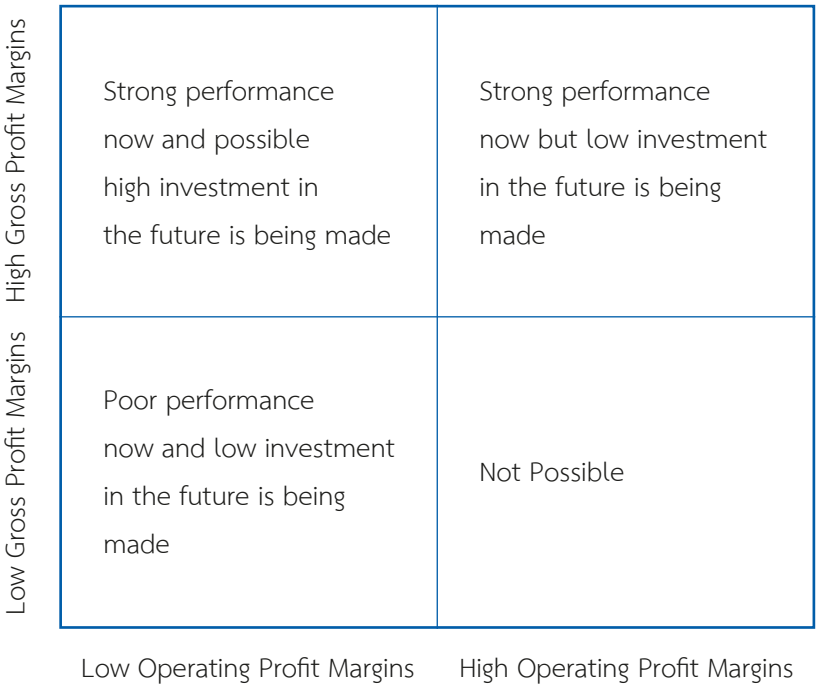

Figure 1 Accounting Matrix of Gross Profit Margins and Operating Profit Margins

Note: This figure explains the possible relationship between accounting profit measures, firm spending, and anticipated performance outcomes. The factors on the vertical axis are gross profit margins. The factors on the horizontal axis are operating profit margins.

First, firms with both low gross margins (G/A ratio) and low operating margins (O/A ratio) are most likely in one of two possible situations, but they face only one likely market outcome. Either the firm is in a difficult contemporary position that requires all resources to be directed to current competitive battles, or it is in a mature and slowly-changing market that requires little future investment. Either way, the firm is not a promising investment target for the future above-average returns that value investors seek. Because these are both transparent and/or slow-changing competitive situations, it is most likely that the equity markets are rather efficient and that the firm's risk-adjusted, discounted future returns are accurately captured in their equity price. Thus, in both situations, these firms are not desirable targets for value investors[4]

[4] It is possible, of course, that a firm in a vigorously competitive contemporary market may win a dominant position as rivalry plays out. However, its whole focus on winning that contemporary advantage deprives it of capabilities for future markets that may emerge. This was one of Christenson's (1993, 1994) key points about resource allocation decisions.

Second are firms with ratios showing both high gross margins (G/A ratio) and high operating margins (O/A ratio). Here too, there are two scenarios that would likely produce most of these outcomes. In one scenario, these firms could just be exceptionally strong in their market. Thus, their gross margins may be so large that even with high current dynamic capability expenditures on R&D and similar future-oriented investments, they still can maintain high operating margins. These traits would be seen among the high-visibility firms in the global economy, such as Apple in most recent years.

But a second scenario includes firms that are doing well today, but have management that is not investing significantly for future, competitive landscapes. The result, all else being equal, is smaller overhead costs than rivals. This raises the operating income ratio higher so that it mirrors high levels in the gross income ratio. Although this mix magnifies short-term operating profit, it is a myopic strategy that is not attractive to value investors.

Third are firms with high gross returns on assets (G/A), but low operating returns on assets (O/A). Again, there are two explanations for this outcome, but here the alternatives reflect alternatively poor and good management. Poor management produces the firm with bloated overhead levels that weakens, not strengthens, its long-term competitiveness, such as oversized corporate offices or inefficient operating procedures. Public firms exhibiting this type of performance are ready targets for takeovers and reengineering. On closer analysis by value investors, these firms would not show a competition-deflecting "moat" emerging.

In contrast, the second scenario is the RBV's view of good management. Here the firm's management is willing to experience short-term reductions in operating profits (lower O/A) so they can invest in long-term dynamic capabilities. It is this group of firms that we suspect value investors are looking for and are capturing when they initially sort firms' accounting data for high G/A ratios with low P/B ratios. Their subsequent fundamental analysis would align the larger gap between G/A and O/A with building and sustaining Warren Buffet's "moat" While by no means a perfect sorting mechanism, these ratios place firms with strong dynamic capabilities disproportionately into this third group for further analysis.

Usage of the Performance Measures in an Inefficient Market

The above assumes a decision process by investors is occurring here wherein the information from three different ratios are used. In an efficient equity market, the three ratios should relate to each other over time in a frictionless way, as set out on the left-hand side of Table One. Instead, we argue that the market is not frictionless and that most investors are mis-interpreting the low operating profits of firm (O/A ratio) where dynamic capability investing is the driver of the ratio's unfavorable level. The performance outcomes that drive the ratios and the behavior of the market operate over time in the way set out on the right-hand side of Table One.

Table 1 Alternative Views of Market Recognition of Firms' Dynamic Capability Spending

Efficient Market Sequence	Proposed Value Investing Sequence
1. Firm invests in dynamic capabilities. (e.g. R&D, brand building)	1. Firm invests in dynamic capabilities. (e.g. R&D, brand building)
2. Dynamic capability investments are internally expensed as overhead.	2. Dynamic capability investments are internally expensed as overhead.
3. Firm reports good gross profit margins but weaker operating profit margins.	3. Firm reports good gross profit margins but weaker operating profit margins.
4. Market accurately recognizes future value of the dynamic capability investments captured by the lower operating profit and both market price and the firm's P/B ratio reflects the same.	4. Market inaccurately recognizes future value of the dynamic capability investments captured by the lower operating profit and a lower price brings a lower P/B ratio.
5. No investment opportunities exist for any investors that are not available to all.	5. Value investors look for the combination of a large gap between gross and operating profit margins among firms with low P/B ratios for further fundamental analysis.
6. The expected net present value of all future returns to dynamic capability investments are captured by the equities market price.	6. Public disclosure of historically successful value investors' investment is not sufficiently copied by other investors to bid away future excess returns.
	7. Insufficient buying of historically successful value investors' choices enables above average returns to continue.

Specific hypotheses can now be presented for the relationships set out in Figure One and the sequences set out in Table One above.

H1a : The cumulative average returns will be higher on portfolios of US-traded equities with low price-to-book ratios than on portfolios of US-traded equities with a high price-to-book ratio.

H1b : The average monthly returns will be higher on portfolios of US-traded equities with low price-to-book ratios than on portfolios of US-traded equities with a high price-to-book ratio.

and

H2a : The cumulative average returns will be higher on portfolios of US-traded equities with a low gross-returns-to-assets ratio than on portfolios of US-traded equities with a high gross-returns-to-assets ratio.

H2b : The average monthly returns will be higher on portfolios of US-traded equities with a low gross-returns-to-assets ratio than on portfolios of US-traded equities with a high gross-returns-to-assets ratio.

These hypnotized results would be consistent with but not distinctive from what has been seen in prior value investing research. If the dynamic capability investment argument advanced here is correct, then consistent with the scenarios presented in Figure One, among firms with a low P/B ratio, those with a larger difference, or gap, between their G/A and O/A ratios will have higher returns than those with a smaller difference between their G/A and O/A ratios. So, with respect to these relationships among the same two performance metrics we posit that:

H3a : Among US-traded equities with similar price-to-book ratios, the cumulative average returns on portfolios with firms with a larger difference between their gross-returns-to-assets ratio and their operating-returns-to-assets ratio will outperform portfolios with firms with a smaller difference between their gross-returns-to-assets ratio and their operating-returns-to-assets ratio.

H3b : Among US-traded equities with similar price-to-book ratios, the average monthly returns on portfolios with firms with a larger difference between their gross-returns-to-assets ratio and their operating-returns-to-assets ratio will outperform portfolios with firms with a smaller difference between their gross-returns-to-assets ratio and their operating-returns-to-assets ratio.

The argument could be made that any significant results that are produced when testing the above hypotheses are due to the firm's small size and/or the firm's lower valuation levels. In this view, there is no significantly distinctive information about dynamic capability investments by management in the ratios used by value investors. Rather, the market is less efficient in pricing firms with low book value and small size than with other firms. In this view the value investors are simply picking up on price discounts due to size and value that are applied in addition to the variables in the Capital Asset Pricing Model (CAPM) (Sharpe, 1964).

If this explanation is correct, then once the size and value mispricing is controlled for, the significance of any results in the above hypotheses should disappear. Fama and French did this with their three-factor model (Fama and French, 1993). If the three-factor model adjustment explains the general CAPM underpricing, then the argument that dynamic capabilities, as described in strategic management, are behind the differences between G/A and O/A captured by hypotheses 3a and 3b will no longer be supported. To address this alternative argument, we need to control for any discount in price that comes from small firm size or value. To better estimate price in these situations, Fama and French (1993) have added variables to the CAPM equation as set out as follows;

$$R_p(t) - R_f(t) = \alpha + \beta_M\{R_M(t) - R_f(t)\} + \beta_{SMB}R_{SMB}(t) + \beta_{HML}R_{HML}(t) + \epsilon(t)$$

where $R_p(t)$ is the portfolio return at time t, $R_f(t)$ is the risk-free return at time t, $R_M(t)$ is the market return at time t, $R_{SMB}(t)$ is the size factor from the Fama-French 3 factor model at time t, $R_{HML}(t)$ is the value factor from the Fama-French 3 factor model at time t.

The test looks at whether alphas in the three-factor model remain significantly different from zero. If the alphas are significantly different from zero, then these adjustments do not account for the underpricing that results in significant returns to value investors.

The dynamic capability argument would suggest that even if the equity market is inefficient and the three-factor model captures significant mispricing, there will still remain a large number of low P/B firms that are suppressing operating profits through long-term investments in dynamic capabilities. Thus, even after size and value are controlled for, the equities are still mispriced to the low side. In this argument, the market is mispricing these equities due to its failure to recognize management's dynamic capability investments as the drivers of the low operating profits. Fama and French's size and value additions to CAPM may be significant, but significant mispricing will still remain and explanations for the second-level relationships in hypotheses 2a and 2b remain unaddressed.

H4 : When applying the Fama-French three-factor model (Fama and French, 1993) to the portfolios of US-traded equities, the firms with portfolios consisting of firms with a larger difference between their gross-returns-to-assets ratio and their operating-returns-to-assets ratio will retain a significant Alpha term.

Capturing Dynamic Capability Investments

The Data and Variable Calculations

The relationship that we want to understand through the accounting ratios is whether value investors' logic is, in fact, focusing on the gap created by overhead expenses, which includes all a firm's dynamic capability spending. To do this we first looked at the returns earned over time to portfolios drawn up with the population of all investable publicly-traded US equities between 1970 and 2014. The accounting data is from Compustat® and the return and stock price data is from CRSP®.[5]

[5] Note that non-publicly traded firms are not relevant here as value investors cannot acquire shares in these firms. Similarly, thinly traded firms such as those captured by "pink sheet" trading are too lightly traded to be relevant to either value investors or the institutional investors that are discussed later in this paper.

To create the database from which the portfolios would be constructed, we merged the monthly returns from the CRSP® data with the yearly accounting data from Compustat® to produce a database with 2.4 million rows of data. Prior year data are used, assuming investors use this latest information before making decisions to invest.

For the gross margin variable, we follow Novy-Marx (2013) and calculate gross profit divided by total assets (G/A). The operating margin variable is calculated by dividing operating profit by total assets (O/A), following Fama and French (2015). Neither Novy-Marx (2013, 2015) nor Fama and French (2015) include these sustainability variables in their research. However, we thought they were necessary in our study to explore the value of these variables in identifying of dynamic capabilities, which are supposed to support sustainable above-average returns over time. We refer to these G/A and O/A.

Initial Filtering – Low P/B Ratios and Gross Returns

Portfolios were constructed using methods standard in the financial literature (e.g., Fama and French (2012, 2015); Novy-Marx, 2013). In our initial pass, we divided the equities into quartiles based on their P/B ratio. Then, within each P/B quartile, we created quartiles based on one of the three gross margin ratios. The result was a 4X4 matrix of portfolio developed in Table 2.

Table 2 Portfolios Constructed from PB and G/A

	LOW G/A	CAGR		HIGH G/A
LOW PB	15.18%	14.09%	20.83%	17.23%
	12.22%	12.58%	14.82%	18.33%
HIGH PB	10.78%	10.71%	11.72%	14.32%
	5.05%	6.00%	8.96%	11.21%
		Minimum		
	-22.49%	-26.76%	-25.97%	-26.69%
	-23.83%	-23.46%	-31.10%	-29.84%
	-29.18%	-30.41%	-30.61%	-29.95%
	-33.52%	-31.28%	-33.33%	-31.35%
		Maximum		
	35.94%	32.53%	35.32%	32.09%
	16.76%	26.14%	30.28%	30.04%
	22.29%	22.81%	20.98%	29.00%
	31.84%	20.91%	23.79%	25.60%

Table 2 Portfolios Constructed from PB and G/A (Continued)

Standard Deviation			
5.73%	6.40%	6.52%	6.76%
4.43%	5.38%	6.00%	6.16%
5.46%	5.69%	5.93%	6.12%
7.79%	6.74%	6.74%	6.56%
Value at Risk 5%			
-7.31%	-8.13%	-7.84%	-8.39%
-6.23%	-6.94%	-8.16%	-7.64%
-7.60%	-7.77%	-7.93%	-7.77%
-11.59%	-9.78%	-9.61%	-9.45%
Monthly Average Return			
1.42%	1.45%	1.84%	1.64%
1.11%	1.18%	1.36%	1.67%
1.02%	1.06%	1.15%	1.36%
0.74%	0.75%	0.99%	1.18%

Note: This table represents various information from 16 portfolios constructed by the PB and the gross profit-to-assets (G/A) ratio. The top row represents the 1st quartile of the PB (lowest PB). The bottom row represents the 4th quartile of the PB (highest PB). The first column represents the 1st quartile of the G/A (lowest G/A). The fourth column represents the 4th quartile of G/A (highest G/A). The table gives compound annual growth rate (CAGR), minimum of returns, maximum of returns, standard deviation of returns, value at risk of 5% of returns, and the average of returns. The monthly stock returns are calculated from 1950-2014. The fundamental data is from Compustat. The price data is from CRSP. Each portfolio rebalances itself every year at the end of June.

For each matrix, the P/B ratio quartiles are reported across each row and the return ratio quartiles in each column. Portfolio rebalances occurred at the middle of each year (June). Again, we assume that the investor uses information from previous calendar years to make decisions. Each company will release information from the previous calendar year in different months, but this is usually not more than 4 months after the beginning of the calendar year. Therefore, we expect June to be a proper month for investors to absorb all information.[6] Such rebalancing in the middle of the year is typical in financial literature (e.g., Fama and French (2012, 2015); Novy-Marx (2013)). For comparison of returns, in each cell we assume an equal investment in each stock in each of the sixteen portfolios.

[6] The authors also tried using January and March as the rebalancing months. The results are similar to the reported portfolios using June as a re-balancing portfolio.

For G/A, we obtained monthly returns for each of the ratios' sixteen portfolios. The numbers reported in the top matrix are the Cumulative Average Growth Rates (CAGR) for each portfolio containing equities with the P/B ratio and return ratio combination for the table's time period. For each portfolio, we also report the minimum of returns, maximum of returns, standard deviation of returns, value at risk, and the average of returns per month.

A specific example may illustrate the results more clearly. In Table 2, 15.18% is the one-year CAGR for the portfolio made up of the lowest quartile P/B ratio stocks with the lowest quartile G/A. 17.23% is the one-year CAGR for portfolios made up of the lowest quartile P/B ratio stocks and the highest quartile G/A. 5.05% is the one-year CAGR for portfolios made up of the highest quartile P/B stocks and the lowest quartile G/A, etc. The other measures in each matrix in each table capture the same pattern of relationships.

Collectively, the value-investing premium across the population of US equities over a 44-year period. Across the measures the CAGR (top matrix) and average returns (bottom matrix) are generally higher for the top row and lower for the lowest row. Overall, the columns on the right generally have higher CAGR and average return than the columns on the left. These results are similar to Novy-Marx (2013). Therefore, the P/B ratio can point to a value premium. The risk measures of standard deviation and value at risk are quite similar throughout the matrix.

Based on these results, we posit that hypotheses 1a, 1b, 2a, and 2b are largely supported.

Secondary Filtering – The Gap Between Gross Returns and Operating Returns

The results set out in Tables 2 are consistent with the argument that value investors are capturing dynamic capabilities in their investment filters, but it is not a complete argument. In addition to being high on G/A, value investing and the assumptions captured in Figure 1 require us to also look at O/A ratios. In Figure 1, a firm increasing its dynamic capability investments is pushing its position further into the upper-left hand corner of the matrix. If our strategic management-based arguments are correct, then we will see the size of the gap between G/A and O/A increase as O/A falls due to greater dynamic capability investments. The impact on the portfolios constructed within each G/A quartile should be a corresponding rise in CAGR as O/A falls.

For this analysis, we started with the equities in each P/B quartile in Table 2. For those equities in the lowest P/B quartile we then created a new set of 2x4 matrixes, distributing stocks equally according to their quartiles on the viable G/A and O/A combinations.[7] The results in Tables 3 are set out in the same pattern as before.

[7] Portfolios of equities with low G/A ratios are not relevant here as they could not have high O/A ratios.

Table 3 Portfolios Constructed using G/A and O/A for firms from the 1st (lowest P/B) quartile of Table 2

	1st Q of O/A (lowest)	CAGR		4th Q of O/A (highest)
3rd Q of G/A	24.64%	20.21%	17.45%	17.60%
4th Q of G/A (highest)	25.10%	16.06%	16.45%	13.93%
		Minimum		
	-31.09%	-28.43%	-27.33%	-28.34%
	-27.62%	-28.93%	-30.88%	-26.96%
		Maximum		
	42.83%	50.89%	38.72%	41.42%
	35.36%	36.48%	43.25%	29.28%
		Standard Deviation		
	8.44%	6.80%	6.59%	6.88%
	8.94%	7.01%	6.71%	7.24%
		Value at Risk 5%		
	-9.73%	-8.12%	-8.17%	-8.84%
	-10.94%	-8.69%	-8.06%	-9.32%
		Monthly Average Return		
	2.17%	1.75%	1.57%	1.59%
	2.24%	1.50%	1.49%	1.36%

Note: This table represents various information from the portfolio constructed by the gross profit-to-assets (G/A) and the operating profit-to-assets (O/A). These stocks are members of the 1st quartile of PB ratio. There are 8 portfolios due to the fact that we pick on 3rd and 4th quartile of G/A. We do not pick 1st and 2nd quartile due to the fact that it does not make sense to have a stock with low G/A and high O/A. Therefore, we only focus on the 3rd and 4th quartile of G/A. The table gives compound annual growth rate (CAGR), minimum of returns, maximum of returns, standard deviation of returns, value at risk of 5% of returns, and the average of returns. These returns are monthly stock returns from 1950-2014. The fundamental data is from Compustat. The price data is from CRSP. Each portfolio rebalances itself every year at the end of June.

Again, an example may help clarify. Table 3 represents equities in the lowest quartile of P/B ratios use in constructing the grids in Table 2 (i.e., the top line in each 4x4 grid of table 2 capturing is the lowest P/B quartile). From these equities, the 2x4 matrices were created on each of the same six variables. The portfolios of firms in the lowest P/B quartiles with the highest gross margins and the

lowest operating margins had a CAGR of 25.10% and an average monthly return of 2.24%.

In hypothesis 3 we predicted that the firms with the largest gap between gross margins and operating margins would show the highest returns. The overall patterns of CAGR and Monthly Average Returns reported here are consistent with respect to changes in G/A and O/A. There the performance measures reverse for the two measures of G/A in the 1st and 2nd quartiles of O/A for both CAGR and Average Monthly Returns. Although not hypothesized in our original design, it should be noted that in all cases the standard deviations of the returns were highest for these portfolios, which is consistent with risk-adjusted pricing of the equities by the market.

Although still consistent with the value investor's approach, this pattern of highest returns for low P/B equities in general, and in particular those with the largest gap between gross margins and operating margins, suggests that the higher the P/B ratio becomes, the less dramatic the returns. This also suggests that the market does, in fact, price in future growth for some firms better than others. Important here is that, even as the P/B ratio climbs, the greater the gap becomes for the portfolio between the two performance ratios, G/A and O/A, the greater the CAGR and average monthly returns, with the one exception just noted.

Based on these results, hypotheses 3a and 3b are supported.

The results of the above analysis of the population of publicly traded equities in the US markets over a 44-year period strongly support the argument that value investors in finance have, in fact, been successfully using a course-grained measure of a firm's investment in dynamic capabilities with their metrics. Although for value investors, subsequent fundamental analysis is needed to sort through the firms flagged in this way, the returns calculated here demonstrated for one, five, and ten-year periods are all consistent.

Tests of Firm Size and Value Impacting Equity Market Efficiency

Hypothesis 4 argues that the abnormal returns captured by the results of the previous hypotheses can be separated from those due to other drivers of mispricing in the equity markets. From the upper left-hand corner of Figure 1, hypothesis 4 suggests that market mispricing due to small size and low value may well be real. However, if our arguments are correct, then those firms with significant dynamic capability investments will retain significant additional abnormal returns. Table 4 gives the results from the addition of the size and value factors to CAPM as per the Fama-French three-factor model (FF3). Table 4 presents the alpha coefficients of factors according to the FF3. This is done by regressing the excess return of each portfolio on the three factors of the FF3. In Table 4 we report the t-statistics for each coefficient in square brackets. As the tables show, the alphas of High G/A and Low O/A are significant and positive. This result supports hypothesis 4, that controlling for size and value pricing inefficiencies in the capital markets predicted as an explanation by FF3 cannot fully explain the returns of firms with

dynamic capabilities with low valuations. The FF3 controls are not insignificant. According to the t-statistics, the size factor can partially explain the returns in the low O/A and third quartile of G/A. However, the value factor does not seem to be able to explain the returns of the portfolio because the coefficients from HML factor are not significant except the highest quartile of O/A and G/A.

Table 4 Fama-French 3 Factor Model of Portfolios Constructed using G/A and O/A

	Low OA			High OA
		α		
Third GA	**0.012**	**0.009**	**0.009**	**0.009**
	[3.029]	[3.004]	[3.718]	[3.425]
High GA	**0.017**	**0.013**	**0.011**	**0.012**
	[4.060]	[3.556]	[4.342]	[4.225]
		β_M		
	0.274	**0.069**	**0.102**	**0.009**
	[3.124]	[1.034]	[1.887]	[0.156]
	0.047	**0.158**	**-0.104**	**-0.132**
	[0.524]	[1.926]	[-1.719]	[-2.091]
		β_{SMB}		
	-0.283	**-0.209**	**0.109**	**0.025**
	[-2.258]	[-2.187]	[1.342]	[0.326]
	-0.081	**0.265**	**0.006**	**-0.014**
	[-0.718]	[2.340]	[0.086]	[-0.159]
		β_{HML}		
	-0.119	**-0.006**	**0.133**	**-0.081**
	[-0.879]	[-0.058]	[1.658]	[-0.793]
	-0.013	**-0.214**	**-0.065**	**-0.196**
	[-0.166]	[-1.692]	[-0.744]	[-2.016]

Note: This table represents factors of Fama-French 3 factor model from eight portfolios constructed by the gross profit-to-assets (G/A) and the operating profit-to-assets (O/A). All stocks in the portfolios are members of the 1st quartile of PB ratio (lowest PB). To test our hypotheses we only focus on 3rd and 4th quartile of G/A (the two highest G/A quartiles). The table gives the coefficients corresponding to each factor: market factor (M), the size (SMB) factor and the value (HML) factor, from Fama-French 3 factor model. The table also gives t-statistics for coefficients in square brackets. These results are derived using monthly stock returns from 1950-2014. The fundamental data is from Compustat. The price data is from CRSP. Each portfolio rebalances itself every year at the end of June.

Based on these results, we argue that Hypothesis 4 is supported.

Discussion of Results and Limitations of the Research

The results reported here are consistent with the dynamic capability explanation for abnormal returns to value investors' portfolios. The concept of dynamic capabilities, and their role in long-term sustainable competitive advantage, has evolved over the last twenty years largely independent of the fields of finance and accounting. However, by simultaneously considering how long-term resource-allocation decisions impact reported the accounting ratios that value investors use as their initial filters provide, a theoretically-grounded explanation for these investment outcomes emerges.

Within finance, the argument that there is a systematic underpricing of low-value and low-priced stocks in the equity markets still presents a likely partial explanation. However, the results from testing Hypothesis 4 in this research show that when the variables that underpin the finance argument are controlled for, significant positive returns remain in the equity portfolios based on the accounting ratio filters used by value investors. Most importantly, the results from all of the tests show that the general pattern of increasing returns to portfolios generally parallels the increasing degrees of investment in dynamic capability suggest should be seen. And, unlike financial explanations, these results are consistent with a distinctive managerial decision that both the accounting measures and value investors are capturing.

These results also leave us with two interesting, related questions for future research. First, why don't the value investors' returns quickly disappear as their choices for investment become known? The strength of the results from the string of studies by Fama and French (1992, 1993, 1995, 1996, 1998, 2006, 2012, 2015) would suggest that wise second-movers can save themselves the work that value investors do in searching for underpriced equities that will, in a portfolio, earn abnormal returns. These second movers can try to mimic the value investors' choices. While second-movers may not be able to mimic all of a value investor's choices, they should be able to copy a sufficiently large number of the investments such that market prices for the favored equities would rise and abnormal returns would disappear.

We offer two possible explanations that could cause market underpricing to remain. The first explanation is that the same hard-to-imitate investments that built a "moat" complicating a rival's attempt to fully understand a firm's advantage, also makes it hard for many investors to confidently understand a firm's potential for future earnings. To the extent the analysts have difficulty understanding or explaining the drivers of a firm's sustained competitive advantage, they will also have reduced confidence in future returns. This increases perceived risk in the future returns and produces a lower, risk-adjusted market price.

A second, related explanation for the lack of full and sustained market price adjustment comes from Prospect Theory (Khaneman and Tversky, 1979) and its implications for how subsequent investments are made by investors after initial abnormal returns are earned. Prospect Theory posits that investors

of all types become subject to heightened risk aversion when they perceive themselves in a position of relative gain (Barberis, et al., 2006). Generally speaking, once perceived to be in a position of gain on any risky activity, people in general will reduce further investments in the same risky activity to a level below that of an economically rational actor.

Prospect Theory argues that the greater the gain realized, the more likely the investor will try to lock in the gain by converting the initial investment to a "safer" investment. That is, they will sell, rather than invest more. Thus, Prospect Theory actually suggests that investors that initially follow the portfolios of the value investors and experience their success, will over time reduce, not increase, the size of their investments, thereby depressing the price of the underlying equities (Benartzi and Thaler, 1995).

The second interesting question for future research focuses on the firm managers. Given that our results provide evidence of the value of dynamic capability investments for long-term firm-level performance, why don't more general managers follow strategic management's recommendations and invest more in dynamic capabilities? We advance two possible arguments for this sub-optimal behavior.

The first is that the delayed returns to investments in dynamic capabilities create challenges for management of publicly traded firms when allocating scarce resources (Raman, 2011). Choices must be made between spending on the firm's current competitive capabilities that are needed to sustain and defend positions in current markets and investing in the firm's future positions in the new or evolving markets by spending on dynamic capabilities. Clayton Christensen (1997, 2003) shows that these resource allocation choices are difficult and that the decision metrics that managers often use are strongly skewed toward investment in contemporary, not future, competition. This bias is particularly strong for firms experiencing positive economic performance in their current market (Huff, et al., 1992; Tripsas and Gavetti, 2000). Christensen shows how this is myopic and ultimately can be fatal to firms, particularly in markets facing high levels of change (Bogner & Barr, 2000).

The second argument for why managers underinvest in dynamic capabilities is drawn from Agency Theory (Jensen and Meckling, 1976) and the assumptions that mangers will choose to act in their personal interests when they are not aligned with the interests of the firm. Agency Theory suggests that Boards of Directors should tie long-term competitiveness incentives into top managers' compensation packages so that they will make to make investments accordingly (Eisenhardt, 1989). However, in the short term, depressed stock prices and low operating metrics can lead to restless shareholders and disgruntled board members. Given the market's hyper-sensitivity to quarterly and annual returns for publicly traded equities on the US exchanges, top managers will likely underinvest in dynamic capabilities to prevent lowering their operating income and return metrics, and hereby avoid reporting a low P/B ratio.

These two questions, and the suggested alternative explanations for them, open up opportunities for future research.

There are also limitations to this research to mention. First, this research is based on accounting standards followed in the US. The US system of fully expensing costs such as R&D is widely criticized for its failure to align such costs with their impact on returns.

A second limitation is the course-grained nature of the variables used in this study. As noted, there are many other costs that go into the calculation of overhead and many of these are not associated with dynamic capability spending. Further, we noted up front that there are significant industry effects. While we were able to use all of the firms in the US equity markets in this study, it is reasonable to expect that the economy-wide phenomena we claim to have isolated will either be amplified or muted by controlling for industry. Here, too, the opportunity for future research is large.

Summary and Conclusions

We began this project with the observation that the well-publicized results of value investors such as Warren Buffet were consistent with the strategic management's expectations from firms with strong dynamic capabilities. To link the value investor's techniques with dynamic capabilities, there needed to be a correlation between the filters these investors used and the traits of dynamic capabilities.

The analysis here strongly suggests that the use of a low price-to-book ratio as a filter by value investors contains the common link. The ability of that ratio to be a course-grained filter for dynamic capability investment comes from the way in which the US accounting systems forces these expenditures into one of two commonly used performance measures. In turn, this forced classification in the accounting system creates the illusion of poor performance in firms that are, in fact, aggressively investing in their future competitiveness through what strategic management calls dynamic capabilities.

The more that we teased out the distinctions among the measures used in this study, the more pronounced the pattern of returns became. Firms with low P/B ratios and large gaps between the gross returns and operating returns are the ones with the largest cumulative average returns over time.

Although we deconstructed this relationship in one direction, starting with the P/B ratios and then looking at the gap between the two earnings measures, in investment practice the causation is the other way around. It is the large drop off between gross profits and operating profits that causes the P/B ratio to fall. The reason for the market's reaction to this gap may be controversial from an efficient-market financial perspective, as it is not based on the long-term performance potential of the firm. But it is exactly that missed relationship, picked up on by the value investors though the accounting ratios, that provides the evidence of returns to dynamic capabilities presented here.

While the method used here only employs a course-grained measure of the complicated causal relationship between the firm's non-direct expenses in each year and future competitive advantage from dynamic capabilities, there is a performance alignment with the prescriptions of the dynamic capabilities

literature across the population of publicly traded firms over a period of forty-four years. Looking at the pattern, high non-COGS spending and reduced near-term gross profits leads to greater long-term performance.

The other behaviors in the markets that surround the persistent above-market returns for value investors can be explained by applying the concept of dynamic capabilities and its grounding in the resource-based view of the firm. While other factors such as Prospect Theory-based risk avoidance may reduce the amount of mimicry of value investors, we can argue that it is causal ambiguity that provides the consistent, underlying anchor for the market frictions that sustain these returns.

Finally, there is a distortion here that may spill back onto the firm. The same inability of investors to fully appreciate the long-term value of dynamic capabilities may result in the punishment of managers who make such investments. It is unlikely that the underlying short-term behavior will change anytime soon. It is therefore critical that firms make clear to shareholders how long-term investments in dynamic capabilities are critical for firm performance.

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