

# Major Themes in Economics

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Volume 21

Article 4

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Spring 2019

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### Recommended Citation

Muller, Luke (2019) "Valuation Multiples: Identifying Undervalued Stocks From 1987 to 2017," *Major Themes in Economics*, 21, 15-28.

Available at: <https://scholarworks.uni.edu/mtie/vol21/iss1/4>

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# Valuation Multiples: Identifying Undervalued Stocks From 1987 to 2017

Luke Muller\*

**ABSTRACT.** This research reports the absolute returns and alpha generated by hypothetical portfolios arranged by six commonly used valuation multiples from 1987 to 2017. I find the best returns are offered by the Sales/TEV multiple while the FCF/TEV multiple generates the most Fama-French Three-Factor alpha. My results contradict two prior claims by Fama and French: 1. any valuation multiple is as good as another and 2. book value-to-market value is the preferred measure for identifying undervalued companies. I also examine the performance of each valuation multiple for small, mid, and large-cap companies and find that smaller stocks offer greater investment returns than larger stocks.

## I. Introduction

“If you want to have a better performance than the crowd, you must do things differently than the crowd.” – John Templeton, named “arguably the greatest global stock picker of the century” by *Money Magazine*.

Professional investors and academics constantly look for ways to achieve superior returns on stock investments than the market average offers. I suggest one method to generate superior returns is to look at the valuation multiples. If one is to make investment decisions based on multiples, it is helpful to know which multiples are actually useful to investors seeking to buy good stocks and avoid bad stocks - or in other words, how can you use valuation multiples to make money? This research reports the absolute returns of hypothetical portfolios arranged using six valuation multiples from 1987 to 2017. I also report the statistical significance of excess returns generated by each portfolio based on Fama-French Three-Factor alpha regressions. I find portfolios arranged by the Sales/TEV multiple produce the greatest absolute returns while portfolios arranged by the FCF/TEV multiple generate the greatest excess returns. My results contradict two prior claims by Fama and French: 1. any valuation multiple is as good as another and 2. book value-to-market value is the preferred multiple to identify undervalued stocks.

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\*Special thanks to Professor Ronnie Chen for his guidance and mentorship in collecting and arranging the data necessary for this research.

Additionally, I examine the performance of each valuation multiple for small-cap, mid-cap, and large-cap companies. I find small companies offer greater investment returns than larger companies.

## **II. Essential Background**

### **A. WHAT ARE VALUATION MULTIPLES?**

Valuation multiples are commonly used to value stocks and to make investment decisions. One example of a valuation multiple is the price-to-earnings ratio. The price-to-earnings ratio of a stock is the price per share of a company's stock divided by earnings or net income per share of a company's stock. Companies with high price-to-earnings ratios might be seen as overvalued while companies with low price-to-earnings ratios might be seen as undervalued. Valuation multiples compare any two measures found directly in or derived from a company's financial statements or market information. An abundance of valuation multiples exist, but the multiples discussed in this research are used frequently by both investment professionals and academics.

### **B. WHAT DOES ALPHA MEAN?**

Alpha is interpreted as the excess return on an investment over the return that can be expected from the investment. The term "generate alpha" refers to this excess return and is used frequently by investment professionals and academics.

Alpha is the excess return beyond the return expected from the Fama-French Three-Factor Model, which is one of the most widely used stock-pricing models in the world. The Fama-French Three-Factor Model predicts stock returns while adjusting expected returns for size risk, value risk, and market risk. The model considers the fact that smaller stocks and value stocks (stocks with a high ratio of book-value-to-market-value) regularly outperform the market average. Stocks with greater market risk perform relatively better when the rest of the market is doing well and relatively worse when the market is doing poorly. Over time, stocks with greater market risk are expected to generate greater returns because investors require more return for taking on more risk. For these reasons, greater returns are expected from smaller stocks, stocks with more value, and stocks with greater market risk, all else equal. In this research, alpha

is the value added from each valuation multiple strategy in terms of percent returns. Strategies that generate high alpha values are considered good investment strategies.

### C. ESSENTIAL TERMINOLOGY

The following terms are mentioned throughout this paper and are used to compute the valuation multiples evaluated in my own research:

- Earnings Before Interest, Taxes, and Depreciation and Amortization (EBITDA)
  - $EBITDA = \text{Operating Income Before Depreciation} + \text{Non-operating Income}$
- Total Enterprise Value (TEV)
  - $TEV = \text{Market Capitalization} + \text{Total Debt} + \text{Preferred Stock} - \text{Cash}$
- Free Cash Flow (FCF)
  - $FCF = \text{Net Income} + \text{Depreciation and Amortization} - \text{Working Capital Change} - \text{Capital Expenditures}$
- Book Value of Equity (Book)
  - $\text{Book Equity} = \text{Stockholder's Equity} - \text{Preferred Stock Par Value}$
- Equity
  - $\text{Equity} = \text{Market Capitalization of Stock}$
- Price (P)
  - $\text{Price} = \text{Market Price of the Stock}$
- Earnings (E)
  - $\text{Net Income Per Share of Common Stock}$
- Sales
  - $\text{Sales} = \text{Total Revenue of Firm}$

### III. Literature Review

Valuation multiples are used frequently in practice by professional investors and analysts when analyzing stocks and making investment decisions because of their simplicity. The literature on valuation multiples is inconsistent and by no means extensive, so it is still unclear which multiples investors can count on or if multiples can be trusted at all. In an often-cited paper, Eugene Fama and Kenneth French (1992) examine the

effects of company size and the book-value-to-market value ratio on investment returns from 1963 to 1990. The primary conclusion from Fama and French's research is the best stock returns were produced by companies with high book-value-to-market value multiples. Additionally, Fama and French (2011) have said

We always emphasize that different price ratios are just different ways to scale a stock's price with a fundamental, to extract the information in the cross-section of stock prices about expected returns. One fundamental (book value, earnings, or cash flow) is pretty much as good as another for this job, and the average return spreads produced by different ratios are similar to and, in statistical terms, indistinguishable from one another. We like BtM (book-value-to-market-value ratio) because the book value in the numerator is more stable over time than earnings or cash flow, which is important for keeping turnover down in a value portfolio.

Fama and French show superior returns can be achieved by using multiples to make investment decisions (Fama and French 1992). Yet Fama and French also say one multiple "is pretty much as good as another for this job." On this specific note, I respectfully disagree with two of the biggest names in finance academia. I also disagree with Fama and French's preference for the book-value-to-market value ratio over other valuation multiples.

Jing Liu, Doron Nissim, and Jacob Thomas examined 19 valuation multiples from 1982 to 1999 to determine which multiples best explain stock prices. They found, "in terms of relative performance, the following general rankings are observed consistently each year: forward earnings measures are followed by historical earnings measures, cash flow measures and book value of equity are tied for third, and sales performs the worst" (Liu, Nissim, and Thomas 2002, 135-172). Although forward-earnings measures (multiples involving future earnings estimates) are not evaluated in my research, the authors also found the price-to-earnings ratio and multiples using cash flow measures are both better performers than Fama and French's favorite, book-value-to-market value. The authors also noted multiples that included sales measures performed the worst of all measures.

In similar research using Romanian stocks, Dragos Ioan Minjina

looked at which valuation multiples best explained stock returns from 2003-2008. Minjina focused on which multiples best explained movements in stock prices using statistical measures such as mean absolute error, rather than focusing on which multiples achieved the highest absolute return. Minjina found the price-to-cash-flow multiple was best at explaining stock returns (Minjina 2009). Minjina is another author who disagrees with Fama and French but his findings are inconsistent with Liu, Nissim, and Thomas.

Tim Loughran and Jay Wellman also suggested a different measure explained stock returns better than the book value-to-market value ratio: the enterprise multiple (EM). The enterprise multiple is calculated as the enterprise value of a company (equity value + debt + preferred stock - cash) divided by operating income before depreciation and amortization (EBITDA). The authors showed “firms with low EM values appear to have higher discount rates and higher subsequent stock returns than firms with high EM values” (Loughran and Wellman 2011). Not only did Loughran and Wellman believe the enterprise multiple best explains movements in stock prices, but they also proposed superior returns can be achieved through investment strategies that rely on the enterprise multiple.

The most recent research on valuation multiples is by Wesley Gray and Jack Vogel (2012). Gray and Vogel compared the performance of hypothetical portfolios assembled from different valuation multiples in order to answer a simple but important question: which valuation metric has historically performed the best? The authors claim “over the 1971 through 2010 period analyzed, we find that EBITDA/TEV is the best valuation metric to use as an investment strategy relative to other valuation metrics” (Gray and Vogel 2012). This is consistent with Loughran and Wellman as both pairs of authors favored the use of ratios comparing enterprise value to EBITDA. Gray and Vogel also found the book-value-to-market value multiple is not the best performing, further building the case against Fama and French. Gray and Vogel note while there is a return spread between companies with high book-value-to-market value and companies with low book-value-to-market value, there is no significant alpha generated from strategies that used the book-to-market-value multiple.

The case against Fama and French’s claims regarding valuation multiples is strong. Fama and French say “different price ratios are pretty much as good as another,” while noting their multiple of choice is the

book-value-to-market value ratio. Other authors show significantly different results. Further investigation is needed because academics have not reached a consensus about which multiples can be trusted. Like Gray and Vogel, I examine the absolute returns of hypothetical portfolios built using valuation multiples and evaluate the statistical significance of each multiple based on the Fama-French Three-Factor alpha. Additionally, I report the performance of each valuation multiple for small, medium, and large companies and evaluate the findings.

#### **IV. Data**

The data sample includes all companies listed on U.S. stock exchanges. All stock price and return information was gathered from the Center for Research in Security Prices database. All accounting information necessary to compute the six valuation multiples was gathered from the Compustat database. In total, the sample consists of 24,566 unique companies and 117,213 observations of annual stock returns. The sample serves as an estimate of the entire U.S. stock market. The sample excludes all companies in the financial services, transportation, and utilities industries. This is common practice in investment research because these companies typically have different capital structures and are valued in different ways. For example, banks usually carry high amounts of debt that might normally signal financial distress for a firm in another sector. Companies in the top one percent and bottom one percent of market capitalization each year were removed to adjust for outliers. Companies with missing information were also excluded. The six valuation multiples used in the sample are:

1. EBITDA/TEV
2. FCF/TEV
3. Book/Market
4. P/E
5. P/FCF
6. Sales/TEV

#### **V. Research Method**

My research method is similar to Gray and Vogel (2012). In Panel A of Exhibits 1 through 4 the compound annual growth rate for firms in the

sample are measured each year from 1987 to 2017. Firms are sorted into quintiles at the beginning of each year for each valuation multiple and the compound annual growth rate for the entire quintile is reported. For example, quintile 1 represents companies with the lowest EBITDA/TEV ratios and quintile 5 represents companies with the highest EBITDA/TEV ratios. Quintile 1 firms can be seen as overvalued while quintile 5 firms can be seen as undervalued. Stocks in quintile 1 are often referred to as “growth” stocks while stocks in quintile 5 are referred to as “value” stocks for this reason. The returns are measured as equal-weight portfolios, meaning an equal amount of money is allocated to each quintile.

Panel B reports risk-adjusted performance based on the Fama-French Three-Factor Model. The statistics reported are the Three-Factor alpha generated for each hypothetical portfolio on a percentage basis and the statistical significance of the alpha generated. Statistical significance was determined by using an ordinary least squares regression of the annual returns for each portfolio against the expected annual return of each portfolio from the Fama-French Three-Factor Model.

### Exhibit 1: Valuation Multiple Performance for the Market

#### Equal-weight Portfolio Returns

| Panel A | EBITDA/TEV | FCF/TEV | Book/Market | P/E    | P/FCF  | Sales/TEV |
|---------|------------|---------|-------------|--------|--------|-----------|
| 1       | 8.10%      | 11.01%  | 7.51%       | 7.47%  | 7.91%  | 4.50%     |
| 2       | 8.85%      | 9.31%   | 9.57%       | 12.86% | 9.91%  | 11.05%    |
| 3       | 12.91%     | 10.44%  | 12.20%      | 17.86% | 18.98% | 13.98%    |
| 4       | 15.03%     | 14.09%  | 14.27%      | 14.29% | 15.30% | 15.61%    |
| 5       | 18.42%     | 18.26%  | 19.66%      | 10.68% | 11.33% | 18.52%    |
| 5-1     | 10.32%     | 7.25%   | 12.15%      | 3.21%  | 3.42%  | 14.02%    |

#### 3-Factor Alpha Regressions

| Panel B | EBITDA/TEV        | FCF/TEV          | Book/Market        | P/E               | P/FCF              | Sales/TEV          |
|---------|-------------------|------------------|--------------------|-------------------|--------------------|--------------------|
| 1       | -8.85%**<br>-2.27 | -6.11%<br>-1.62  | -5.37%***<br>-3.79 | -6.69%***<br>-3.3 | -5.24%***<br>-2.88 | -8.82%***<br>-3.81 |
| 2       | -4.21%**<br>-2.39 | -4.64%*<br>-2.01 | -1.56%<br>-1.12    | 3.69%<br>-1.11    | -6.63%**<br>-2.09  | -0.35%<br>-0.21    |
| 3       | 3.24%***<br>3.16  | -0.78%<br>-0.65  | 1.11%<br>0.8       | 4.88%**<br>2.37   | 4.9%*<br>1.87      | 2.46%*<br>1.81     |
| 4       | 4.39%***<br>3.52  | 4.46%***<br>4.68 | 1.93%<br>1.2       | 5.06%***<br>4.35  | 5.58%***<br>5.06   | 2.98%*<br>1.96     |
| 5       | 5.02%***<br>2.2   | 6.44%***<br>4.09 | 3.73%<br>1.16      | 0.08%<br>0.07     | 1.05%<br>0.92      | 4.04%<br>1.67      |

Significance levels are denoted as \*, \*\*, and \*\*\* which indicate significance at ten percent, five percent, and one percent levels.



## **VI. Results**

### **A. EXHIBIT 1**

Exhibit 1 shows results representing all stocks in the sample. On an absolute return basis, Sales/TEV is the best performing multiple with a quintile 5 return of 18.52% and a quintile 5 minus quintile 1 return spread of 14.02% (Panel A). The FCF/TEV multiple generated the most alpha in the sample as seen by the excess returns of 6.44% in quintile 5 (Panel B).

Previous literature has not shown multiples including sales measures to be the best performing in any regard. My results are contrary to Liu, Nissim, and Thomas, who found measures including sales were the worst multiples at explaining stock prices. Their argument has more merit when evaluating Three-Factor alpha results in Panel B, where the alpha generated by Sales/TEV is less significant than alpha generated from other multiples. Only Book/Market reports worse statistical significance.

Loughran and Wellman and Gray and Vogel's preferred measure, EBITDA/TEV, falls in the middle of the pack in terms of return spread, but shows Three-Factor alpha significance across all quintiles. EBITDA/TEV is significant at a maximum of five percent significance level for all quintiles. My results conflict with Gray and Vogel, who reported the largest return spread from EBITDA/TEV portfolios.

Book/Market, Fama and French's favorite multiple, shows an impressive quintile 5 minus quintile 1 spread of 12.15% but fails to generate significant alpha as shown in Panel B. The statistical significance of alpha generated from Book/Market might be understated because the expected return from the Fama-French Three-Factor Model already takes the book value-to-market value of company into account. The Three-Factor alpha results suggest you cannot generate significant excess returns on a risk adjusted basis using a Book/Market strategy, but you might be able to avoid the worst performing stocks (quintile 1).

The most widely used valuation multiple in practice, P/E, produces a return spread of only 3.21%, the worst in the sample. The best performing P/E portfolio is quintile 3, a result seen elsewhere only in the P/FCF measure. All other multiples achieve higher returns in the cheapest quintile. The consistent results between P/E and P/FCF suggest multiples using price as a fundamental are less reliable when evaluating undervalued and overvalued stocks. This could be because firms with greater perceived future growth prospects often trade at higher prices than

firms with less perceived growth prospects. Another explanation is the price fundamental solely relies on the market's perception of a firm whereas Total Enterprise Value and Book Value of Equity rely on other factors as well. Additionally, because P/E is the most commonly used multiple in practice, its overuse might lead to less opportunity for identifying undervalued firms. As investors purchase stocks trading at low P/E, the increased demand drives the prices of these stocks up.

#### B. EXHIBITS 2 THROUGH 4

Exhibit 2 shows the Panel A and Panel B data for small-cap stocks, which include the smallest 30 percent of firms as measured by market capitalization. Exhibit 3 shows data for mid-cap stocks, which include the middle 40 percent of firms. Exhibit 4 shows data for large-cap stocks which represent the largest 30 percent of firms.

#### Exhibit 2: Valuation Multiple Performance for Small Cap Stocks

##### Equal-weight Portfolio Returns

| Panel A | EBITDA/TEV | FCF/TEV | Book/Market | P/E    | P/FCF  | Sales/TEV |
|---------|------------|---------|-------------|--------|--------|-----------|
| 1       | 13.37%     | 14.26%  | 8.12%       | 12.75% | 12.57% | 8.45%     |
| 2       | 11.88%     | 14.00%  | 9.20%       | 14.83% | 31.26% | 12.30%    |
| 3       | 13.14%     | 13.25%  | 15.37%      | 18.22% | 15.90% | 16.96%    |
| 4       | 19.32%     | 15.32%  | 18.91%      | 20.21% | 22.63% | 20.66%    |
| 5       | 21.57%     | 22.38%  | 25.71%      | 13.84% | 15.01% | 20.71%    |
| 5-1     | 8.20%      | 8.12%   | 17.59%      | 1.09%  | 2.44%  | 12.26%    |

##### 3-Factor Alpha Regressions

| Panel B | EBITDA/TEV      | FCF/TEV          | Book/Market     | P/E             | P/FCF           | Sales/TEV        |
|---------|-----------------|------------------|-----------------|-----------------|-----------------|------------------|
| 1       | -4.85%<br>-0.79 | -2.81%<br>-0.55  | -6.64%<br>-1.7  | -1.07%<br>-0.33 | -1.42%<br>-0.47 | -6.56%<br>-1.39  |
| 2       | -3.90%<br>-0.96 | -2.05%<br>-0.49  | -2.86%<br>-1.13 | -2.29%<br>-0.54 | -2.42%<br>-0.62 | -1.01%<br>-0.33  |
| 3       | 0.67%<br>0.32   | -0.18%<br>-0.06  | 2.17%<br>0.9    | 1.38%<br>0.26   | -0.25%<br>-0.05 | 3.21%<br>1.18    |
| 4       | 7.4%***         | 3.91%**<br>2.21  | 4.45%<br>1.63   | 7.08%**<br>2.56 | 8.03%**<br>2.52 | 7.16%***<br>3.01 |
| 5       | 7.87%**<br>2.56 | 8.76%***<br>3.61 | 9.11%*<br>2.02  | 2.70%<br>1.53   | 3.82%*<br>2.06  | 4.52%<br>1.13    |

24 *Major Themes in Economics, Spring 2019***Exhibit 3: Valuation Multiple Performance for Mid Cap Stocks****Equal-weight Portfolio Returns**

| <b>Panel A</b> | EBITDA/TEV | FCF/TEV | Book/Market | P/E    | P/FCF  | Sales/TEV |
|----------------|------------|---------|-------------|--------|--------|-----------|
| 1              | 8.66%      | 11.56%  | 8.49%       | 8.83%  | 9.75%  | 6.37%     |
| 2              | 10.96%     | 11.03%  | 11.76%      | 12.59% | 9.97%  | 12.64%    |
| 3              | 13.20%     | 11.08%  | 13.58%      | 17.79% | 17.64% | 14.86%    |
| 4              | 15.02%     | 14.75%  | 14.54%      | 14.44% | 15.79% | 14.45%    |
| 5              | 17.42%     | 17.13%  | 17.18%      | 11.80% | 12.24% | 17.09%    |
| 5-1            | 8.76%      | 5.57%   | 8.69%       | 2.97%  | 2.49%  | 10.72%    |

**3-Factor Alpha Regressions**

| <b>Panel B</b> | EBITDA/TEV       | FCF/TEV          | Book/Market        | P/E               | P/FCF             | Sales/TEV         |
|----------------|------------------|------------------|--------------------|-------------------|-------------------|-------------------|
| 1              | -7.65%*<br>-2.05 | -5.23%*<br>-1.76 | -5.38%***<br>-3.03 | -4.59%**<br>-2.46 | -3.51%**<br>-2.07 | -6.94%**<br>-2.59 |
| 2              | -2.60%<br>-1.19  | -2.94%<br>-1.29  | 0.33%<br>0.19      | -3.74%<br>-1.41   | -5.49%**<br>-2.11 | 0.47%<br>0.25     |
| 3              | 3.30%***<br>3    | -0.58%<br>-0.37  | 2.43%**<br>2.36    | 4.79%**<br>2.51   | 3.43%<br>1.52     | 3.07%**<br>2.56   |
| 4              | 4.37%***<br>3.89 | 4.54%***<br>4.08 | 2.55%<br>1.68      | 5.34%***<br>5.2   | 6.18%***<br>5.92  | 3.04%**<br>2.41   |
| 5              | 4.63%**<br>2.57  | 6.5%***<br>5.01  | 2.95%<br>1.16      | 0.60%<br>0.43     | 1.76%<br>1.22     | 3.77%*<br>2.03    |

**Exhibit 4: Valuation Multiple Performance for Large Cap Stocks****Equal-weight Portfolio Returns**

| <b>Panel A</b> | EBITDA/TEV | FCF/TEV | Book/Market | P/E    | P/FCF  | Sales/TEV |
|----------------|------------|---------|-------------|--------|--------|-----------|
| 1              | 9.87%      | 9.74%   | 12.47%      | 9.89%  | 9.10%  | 10.06%    |
| 2              | 11.14%     | 10.53%  | 10.77%      | 14.80% | 14.19% | 11.96%    |
| 3              | 12.95%     | 12.18%  | 12.40%      | 14.00% | 15.01% | 12.39%    |
| 4              | 13.50%     | 13.65%  | 12.96%      | 12.05% | 12.44% | 14.01%    |
| 5              | 13.96%     | 15.91%  | 13.91%      | 10.95% | 11.33% | 13.30%    |
| 5-1            | 4.09%      | 6.17%   | 1.44%       | 1.06%  | 2.23%  | 3.24%     |

**3-Factor Alpha Regressions**

| <b>Panel B</b> | EBITDA/TEV              | FCF/TEV                   | Book/Market            | P/E                     | P/FCF                   | Sales/TEV              |
|----------------|-------------------------|---------------------------|------------------------|-------------------------|-------------------------|------------------------|
| 1              | -1.64%<br><i>-0.72</i>  | -1.68%<br><i>-0.64</i>    | 2.98%**<br><i>2.08</i> | -1.89%<br><i>-0.76</i>  | -1.67%<br><i>-0.69</i>  | 0.08%<br><i>0.04</i>   |
| 2              | 2.11%<br><i>1.47</i>    | 0.45%<br><i>0.25</i>      | 1.74%<br><i>1.38</i>   | 3.86%*<br><i>1.81</i>   | 2.99%<br><i>1.25</i>    | 2.93%*<br><i>1.77</i>  |
| 3              | 4.66%***<br><i>3.67</i> | 3.32%***<br><i>3.01</i>   | 3.83%**<br><i>2.4</i>  | 5.83%***<br><i>3.95</i> | 6.41%***<br><i>4.5</i>  | 3.53%**<br><i>2.43</i> |
| 4              | 4.5%***<br><i>2.8</i>   | 5.23%***<br><i>4.15</i>   | 3.56%**<br><i>2.27</i> | 4.06%***<br><i>3.48</i> | 4.39%***<br><i>3.94</i> | 4.58%***<br><i>3.3</i> |
| 5              | 3.39%<br><i>1.38</i>    | 6.65%***<br><i>0.0184</i> | 2.58%<br><i>1.17</i>   | 1.55%<br><i>1</i>       | 1.87%<br><i>1.24</i>    | 2.85%<br><i>1.58</i>   |

The returns are in aggregate greater for small-cap stocks, followed by mid-cap stocks and large-cap stocks in turn. The average returns from the hypothetical portfolios for small-cap, mid-cap, and large-cap stocks are 16.40%, 13.03%, and 12.38%. Return spreads are also greater for small and medium-size stocks than for large stocks. One reason for the difference in return spreads could be the lack of analyst and news coverage of small and mid-cap stocks compared to large-cap stocks. In general, less coverage means less information and less information leads to more opportunities for stock mispricing. Stock mispricing might lead to larger return spreads.

For small-cap stocks, the largest return spread comes from the Book/Market portfolios at 17.59%. Consistent with the results from the entire sample, Book/Market is the least significant in terms of alpha generated. EBITDA/TEV and FCF/TEV portfolios produce the most statistically significant alpha for small-cap stocks. The alpha generated by small cap stocks is less statistically significant than the alpha generated from the same investment strategies in mid and large-cap stocks. This could be because small stocks are considered riskier and require higher expected rates of return than larger stocks. Higher expected returns for small-cap stocks imply actual returns must exceed expected returns by relatively greater amounts than in mid and large-cap stocks in order to generate alpha. Less statistically significant alpha in small-cap stocks suggests investment strategies using multiples generate greater risk-adjusted excess returns in mid-cap and large-cap stocks.

Mid-cap panel data are similar to results for the entire sample. Sales/TEV is the best performer in terms of absolute return while FCF/TEV and EBITDA/TEV generate the most significant alpha.

For large companies, FCF/TEV is the best performing multiple as measured by absolute return and Three-Factor alpha. FCF/TEV is significant at the one percent level for quintiles 3-5, but not significant in quintiles 1 and 2. This suggests it might be easier to identify high performing stocks using the FCF/TEV multiple than it is to avoid poor performers when investing in large companies.

### C. LIMITATIONS AND DRAWBACKS

The results from this research are subject to limitations and drawbacks. The compound annual growth rate and alpha results from Panel A and Panel B will change when the sample time period is adjusted, although

the size and direction of these changes cannot be known without further testing. Further, the results from each hypothetical portfolio only represent investment strategies that exclude the financial, transportation, and utilities sectors as well as companies in the top and bottom one percent of market capitalization each year. Further research is needed to test the robustness of my results across different time periods and sectors. Another drawback is that a paradox exists that once a useful multiple is found and widely used by the public, that multiple might cease to be useful due to investors bidding up the prices of desired stocks as a result of increased demand.

## VII. Conclusion

The valuation multiples that perform the best across the entire sample are Sales/TEV and FCF/TEV. Portfolios arranged by the Sales/TEV multiple produce the greatest absolute returns while portfolios arranged by the FCF/TEV multiple generate the greatest excess returns adjusted for market risk, value risk, and size risk. My results for Sales/TEV are contrary to Liu, Nissim, and Thomas (2002), who claim multiples using a sales measure are the worst performing. Book/Market, Fama and French's (1992) favorite multiple, does not perform the best in Panel A nor Panel B. Book/Market portfolios also generate less statistically significant alpha than all other multiples evaluated. It is worth noting the statistical significance of alpha generated from Book/Market might be understated because the expected return from the Fama-French Three-Factor Model already takes the book value-to-market value of a company into account. My results contradict Fama and French's claims that one multiple is as good another and show other multiples add more value to investment strategies on an absolute return and risk-adjusted basis than Fama and French's favorite, Book/Market.

I find multiples with price as a fundamental are less reliable when identifying undervalued and overvalued stocks. The P/E and P/FCF multiples both report the greatest returns in quintile 3 and have much lower quintile 5 minus quintile 1 spreads than the other multiples evaluated.

I also find multiples perform differently when the sample is broken into small, mid, and large-cap stocks. Book/Market has the largest return spread while EBITDA/TEV and FCF/TEV generate the most statistically significant alpha for small-cap stocks. The results for mid-cap stocks are

consistent with results for the entire sample. FCF/TEV has the largest return spread and generates the most statistically significant alpha for large-cap stocks. My results show greater investment returns are offered by smaller stocks. The average returns for small, mid, and large-cap stocks are 16.40%, 13.03%, and 12.38%. Because small-cap stocks did not generate as much statistically significant alpha as mid-cap and large-cap stocks, my findings suggest investment strategies using multiples generate greater risk-adjusted excess returns in mid-cap and large-cap stocks.

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