New Evidence on the Relation between the Enterprise Multiple and Average Stock Returns

Forthcoming in the Journal of Financial and Quantitative Analysis

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September 5, 2010

ABSTRACT

Practitioners increasingly use the enterprise multiple as a valuation measure. The enterprise multiple is (equity value + debt + preferred stock – cash)/ (EBITDA). We document that the enterprise multiple is a strong determinant of stock returns. Following Fama and French (1993) and Chen, Novy-Marx, and Zhang (2010), we create an enterprise multiple factor that generates a return premium of 5.28% per year. We interpret the enterprise multiple as a proxy for the discount rate. Firms with low enterprise multiple values appear to have higher discount rates and higher subsequent stock returns than firms with high enterprise multiple values.

*We thank Hendrik Bessembinder (the editor), Paul Gao, Todd Houge, Bill McDonald, Paul Schultz, Sophie Shive, Christian Walkshaeusl, an anonymous referee, and seminar participants at the 2009 FMA meeting and University of Notre Dame for helpful comments. We are grateful to Hang Li for research assistance. The EM factor is available at http://www.nd.edu/~tloughra/.

I. Introduction

In this paper, we document new evidence on the relation between the enterprise multiple (EM) and average stock returns. EM is calculated as the enterprise value (equity value + debt + preferred stock - cash) divided by operating income before depreciation (EBITDA).[1] Low EM companies should be considered value firms while high enterprise multiple firms are growth firms. Our study of EM is motivated by the extensive use of EM as a valuation measure by practitioners as well as Tobin's (1969) *q*-theory of investment.

Over the sample period 1963-2009, the enterprise multiple appears similar to book-to-market (BE/ME) in terms of monthly cross-sectional regression coefficients and t-statistics. Though book-to-market and the enterprise multiple are correlated, we demonstrate that the expected return-enterprise multiple relation remains significant after controlling for book-to-market. As book-to-market is used to create the HML factor, we use the enterprise multiple to create a factor that mimics the return differences of low-minus-high EM portfolios. The EM factor generates a premium of 0.44% per month, or 5.28% per year, significant at the 1% level.

The enterprise multiple factor remains significant after controlling for the Carhart 4-factor model (Fama-French 3-factor model plus momentum) as well as the *q*-theory factor model of Chen, Novy-Marx, and Zhang (2010). The alpha is 0.16% per month (t-statistic of 2.39) when using the Carhart 4-factor model and is 0.35% per month (t-statistic of 3.00) using the Chen, Novy-Marx, and Zhang (2010) market, investment, and return-on-assets factors. Since the enterprise multiple factor loads on the investment and ROA factors, the enterprise multiple is related to but not dominated by the *q*-theory factor model. The EM factor appears to be a more

[1] Throughout the paper, we will use the terms EBITDA and operating income before depreciation interchangeably.

direct proxy for the discount rate and captures some of the investment and ROA factor effects.

We also examine the ability of the enterprise multiple factor to explain the value premium. Forming deciles based on alternative measures of value (book-to-market, market leverage, earnings-to-price, dividend-to-price, sales growth, and prior 36-month returns), we find the market and enterprise multiple factors can resolve the value premium puzzle when returns are value-weighted. If equally weighted returns of the value effect are the dependent variable, the enterprise multiple factor has only limited explanatory ability.

In sum, practitioner's use of the enterprise multiple appears well justified. Low enterprise multiple firms significantly outperform high enterprise multiple firms. The enterprise multiple factor fully explains the value-weighted stock return patterns for alternative measures of the value effect and is robust to controls for the Carhart 4-factor and Chen, Novy-Marx, and Zhang *q*-theory models.

II. Motivation and Hypothesis Development

Our study of the enterprise multiple is motivated by its increased practitioner use as a valuation tool. Kim and Ritter (1999), in a study on IPO valuation using data from a boutique research firm, noted that while all valuation metrics had significant shortcomings, EM generally performed as well as price-to-earnings and substantially better when valuing older firms.

More recently, valuation textbooks have incorporated discussion of enterprise value and EM. The valuation textbook, "Damodaran on Valuation" (2nd edition, 2006), dedicates a full chapter to value multiples based on enterprise value. McKinsey & Company's widely-used text, "Valuation: Measuring and Managing the Value of Companies" (4th edition, 2005), contains a detailed discussion on the use of enterprise value multiplies.

Damodaran (2006) summarizes the benefits of EM in an unpublished study of 550 equity research reports, noting that enterprise multiple, along with price-to-earnings and price-to-sales, were the most common relative valuation multiples used. He states, "In the past two decades, this multiple (EM) has acquired a number of adherents among analysts for a number of reasons."

One reason Damodaran cites for EM's increasing popularity is that it can be compared more easily across firms with differing leverage. Including debt is important, as firm debt levels can have an immense impact on the tabulation of enterprise value. For example, in 2005 General Motors had a market capitalization of $17 billion, but debt of $287 billion. Using market value of equity as a measure of size, General Motors was a mid-sized firm. Yet on the basis of unlevered cash flows (i.e., enterprise value), GM was clearly a large firm. Market value of equity by itself is unlikely to fully capture the effect GM's debt has on its returns.

Another reason for using the enterprise multiple is the use of operating income before depreciation as the earnings variable. As the McKinsey valuation text notes, operating income is not affected by nonoperating gains or losses. As a result, operating income before depreciation can be viewed as a more accurate and less manipulable measure of profitability than net income, allowing it to be used to compare firms within as well as across industries.

In addition to its increased use by practitioners, our study of EM is also motivated by the *q*-theory of investment from Tobin (1969) and extended by Cochrane (1991) and Liu, Whited, and Zhang (2009). Cochrane (1991) asserts that a no-arbitrage argument equates the firm's investment return with the return on the firm's assets. If managers have access to complete capital markets, they can trade a portfolio of assets that mimic the future investment return. Debt is not included in Cochrane's model, so the mimicking portfolio return is the return on the firm's equity. But intuitively, trading a portfolio of assets can also be interpreted as trading a combined portfolio of debt and equity, rather than just equity.

Liu, Whited, and Zhang (2009) extend Cochrane (1991) to generate a return relationship that is closer to EM. Liu, Whited, and Zhang also allow for debt financing in their model. As a result, the investment return is the weighted average of the stock return and the after-tax corporate bond return, generally known as the weighted average cost of capital (WACC). WACC is also called the unlevered investment return or discount rate. If we invert EM to become EBITDA/EV, it can be interpreted as a proxy for the WACC.[2] Preferred stock is not formally modeled in Liu, Whited, and Zhang, but can be considered part of the equity term without loss of generality. Rearranging the terms, the stock return then becomes the levered investment return.

Just as a firm's WACC is positively related to the levered investment return, or cost of equity, a firm’s EM should also be positively related to the cost of equity. Firms with a high enterprise multiple are by definition selling for a high valuation for a given dollar of operating income compared to companies with a low EM ratio. These high enterprise multiple firms have stronger growth opportunities, lower costs of capital, and thus lower expected stock returns than low enterprise multiple firms.

Yet, why should a firm’s expected stock returns covary with different values of the enterprise multiple? To help answer this question, we will test whether EM's practitioner use and theoretical motivation are empirically valid when tested against various control variables and

[2] Just as practitioners prefer reporting ME/BE instead of BE/ME, EM is generally expressed as EV/EBITDA.

factors. We will focus primarily on the 4-factor model of Carhart (1997) along with the new 3-factor model of Chen, Novy-Marx, and Zhang (2010).

The Chen, Novy-Marx, and Zhang factors are the market factor, an investment factor, and a return-on-assets (ROA) factor. The authors present strong evidence that their *q*-theory factor model provides a parsimonious description of the cross-section of expected stock returns. In particular, the authors show that investment and ROA are related to the discount rate, or WACC. Since Chen, Novy-Marx, and Zhang's new factors are created using economic fundamentals, the factors should be less affected by investor mispricing. Unlike Fama and French's interpretation of their factors, Chen, Novy-Marx, and Zhang do not view their investment and ROA factors as risk factors.

From the discussion above, we develop the following hypothesis:

> Hypothesis 1: Expected returns decrease with the enterprise multiple. Stocks with high enterprise multiples (signaling high growth opportunities) should have lower discount rates and earn lower expected returns than firms with low enterprise multiple values.

Our intuition follows the same logic of Chen, Novy-Marx, and Zhang. One should view a firm's stock price as the expected cash flow divided by the discount rate. The numerator of the enterprise multiple is the present value of all future cash flows available to be distributed to shareholders and bondholders. So firms with a high enterprise multiple are high valuation firms (i.e., they are selling for a large multiple of current earnings). Firms with high expected cash flows relative to operating income (i.e., high enterprise multiple) have low discount rates. Firms with low expected cash flows relative to operating income have high discount rates. We first test this hypothesis in Table 2.

From this initial hypothesis, we develop three main empirical questions based on the expected characteristics of EM. First, is the enterprise multiple variable robust in cross-sectional regressions when included with factors for SMB, HML, UMD, investment, and ROA? We examine this question in Tables 3 and 4 using the Fama and French portfolio approach to control for multicollinearity in the explanatory variables.

Second, is the enterprise multiple factor robust in cross-sectional regressions when included with factors for SMB, HML, UMD, investment, and ROA? We examine this in Table 8 after we develop the EM factor. The EM factor is constructed in similar fashion to the HML factor from Fama and French (1993) and the investment and ROA factors of Chen, Novy-Marx, and Zhang (2010). Since underlying theory indicates that EM is a more direct proxy for the discount rate, and thus combines the effect of both investment and ROA, EM should capture some of the effect of both of these variables.

Finally, can the enterprise multiple factor explain the alpha from zero-cost portfolios of alternative measures of the value premium? The value premiums considered are book-to-market; market leverage; earnings-to-price; dividend-to-price; sales growth; and long-term stock return reversals. We examine this question in Table 10 after considering several alternative value measures from Fama and French (1993), Lakonishok, Shleifer, and Vishny (1994), and DeBondt and Thaler (1985).

III. Data Section and Summary Statistics

The sample selection process follows Fama and French (1992) and includes all New York Stock Exchange (NYSE), American Stock Exchange (Amex), and Nasdaq firms with available CRSP and Compustat information. We exclude all financial firms (Standard Industrial Classification codes between 6000 and 6999) from the analysis. The final sample includes only firms with ordinary common equity as defined by CRSP. To avoid a back-filling bias, firms are required to have two years of Compustat data before entering our sample.

Stock returns and market capitalizations are from the monthly CRSP file. All accounting information is obtained from Compustat. Firms must have non-zero market values of equity as of June of year t and December of year t-1 to be included in the final sample.

Stock returns are measured from July 1963 through December 2009. Implementing the Fama and French (1992, 1993) methodology, we create the sample in June of year t. A firm's size is its market capitalization (stock price multiplied by shares outstanding) as of June of year t. Stock returns are from July of year t through June of year t+1. The book value of equity is Compustat data CEQ plus balance sheet deferred taxes and investment tax credit (item TXDITC).

Enterprise value (EV) is market value of equity plus total debt (Compustat data items DLC and DLTT (short and long term debt)) plus preferred stock value (item PSTKRV) minus cash and short-term investments (item CHE). The enterprise multiple (EM) is EV/EBITDA: enterprise value divided by operating income before depreciation (Compustat item OIBDP). A more detailed description of our paper's variables is contained in the Appendix.

Our use of operating income before depreciation differs from the method advocated in the McKinsey valuation text. In their textbook, Koller, Goedhart, and Wessels (2005) argue for the use of *forecasted* operating income. Clearly, the use of forward-looking operating income would be a better measure than the historical operating income we use. However, there exists no database, to our knowledge, that contains forecasted operating income for thousands of firms going back to the early 1960s.

There are 129,211 firm-year observations available from CRSP/Compustat. Three additional data screens are implemented: 4,911 firm-years are removed due to missing or negative book values of equity; 2,767 firm-years are removed due to missing enterprise value or operating income numbers; and 16,660 firm-years are discarded due to negative operating income before depreciation values. Our final sample contains 104,873 firm-year observations during the 1963-2009 time period.

One data screen needs additional explanation. Since other papers like Fama and French (1992, 2008) and Daniel and Titman (1997) remove firms with negative book values of equity from their sample, for consistency reasons we remove negative EBITDA firm-year observations. Firms with negative EBITDA value are, on average, quite small in market value terms, have low average stock prices ($5.72), very low prior year returns (2.1%), average book-to-market ratios close to the quintile 4 mean, and poor average subsequent returns. In aggregate, negative EBITDA firms represent only 1.5% of the total market value of firms with available information.

Mathematically, negative EBITDA firms would be categorized as low EM firms, yet one could make strong arguments for their placement as high EM firms. Given the ambiguity of whether negative EBITDA firms belong in the extreme value or growth group, and to remain consistent with prior papers which delete firms with negative book values (for book-to-market) or negative earnings (for P/E), we require firm-year observations to have positive operating income before depreciation values to enter the sample.

Table 1 reports the equally weighted summary statistics for the 104,873 firm-year observations over the 1963-2009 time period. To limit the impact of outliers, the enterprise multiple and book-to-market variables are winsorized at the 1% and 99% percentiles. The average market value is $1,558.2 million while the median value is $107.8 million. The average enterprise multiple value is 11.3 while the median value is 7.1. So for the average firm, investors pay $11.3 in debt and equity for every one dollar of operating income. The average book-to-market ratio over the time period is 0.95 while its median value is 0.73.

IV. Empirical Results

A. Monthly Cross-Sectional Regressions: 1963-2009

Since EM is a relative value measure, we will examine how EM performs in monthly cross-sectional regressions while also controlling for book-to-market, the most commonly-used value measure. Table 2 examines the results of cross-sectional monthly regressions over the 1963-2009 sample period. This table is provided to allow a direct comparison with the analysis of Fama and French (1992).

The dependent variable is the raw monthly return for firm i in calendar month j. There are four independent variables: size (market capitalization as of June of year t); book-to-market (prior year's book value of equity divided by the market value as of December of year t-1); prior returns (raw buy-and-hold return from month j-12 to month j-2); and the enterprise multiple ((equity value + debt value + preferred stock – cash)/operating income as of December of year t-1). All independent variables are winsorized at the 1% and 99% percentiles. Table 2 reports the average slope values from the 558 monthly regressions. The t-statistics are reported in parentheses.

The first regression in Table 2 replicates Fama and French (1992, Table III) with data through 2009. The time period Fama and French (1992) analyzed ended in December of 1990. The average size coefficient of -0.12 in row (1) is almost identical to the value reported by Fama and French. The average coefficient on the BE/ME ratio is smaller at 0.23 (versus 0.35) and less significant than during Fama and French's original time period. Overall, the results remain similar to prior research of Fama and French (1992) even after extending the sample through 2009. When the momentum variable of Carhart (1997) is added in regression (2), the size and BE/ME average slope values are generally unchanged. Momentum is significant with a t-statistic of 4.19.

In row (3), the only independent variable is EM. Note that its sign is negative. This is the opposite of the BE/ME coefficients, because for EM the market value term is in the numerator while the accounting term is in the denominator. Also note the average coefficient value of -0.33 is larger in absolute value than the BE/ME coefficient from rows (1) and (2). EM is also significant, with a t-statistic of –5.36. Regression (4) includes size, book-to-market, momentum, and enterprise multiple in the same regression. In the row (4) regressions, all the average slope values are statistically significant.[3] With the exception of the sign difference, BE/ME and EM

[3] Since there is a chance that the enterprise multiple is cross-sectionally correlated with microstructure noise in security prices, we also implement a correction procedure introduced by Asparouhova, Bessembinder, and Kalcheva (2010). Their methodological adjustment is to estimate the cross-sectional regressions using weighted least squares (WLS) with the prior-period gross (one plus) return as the weighting variable. All the independent variables from the monthly cross-sectional regressions in row (4) of Table 2 remain significant after implementing the Asparouhova, Bessembinder, and Kalcheva (2010) correction procedure.

have very similar average slope values. Neither variable appears to dominate the other during the 1963-2009 time period. Since the negative relationship between EM and returns is relatively strong and appears robust, Hypothesis 1 is confirmed.

However, since the BE/ME and EM characteristics tend to be highly correlated cross-sectionally, the extent to which one can interpret any individual slope coefficient is problematic. For this reason, we will also use the Fama and French portfolio approach: factor returns are much less correlated than the characteristics themselves.

B. Performance of Monthly Low-minus-High Enterprise Multiple Portfolios

How large is the magnitude of the enterprise multiple effect? Is the effect robust to the Carhart 4-factor and the *q*-theory factor models? As a gauge of what investors could potentially earn in terms of subsequent monthly stock returns, Table 3 creates deciles based on yearly enterprise multiple values.

Each June during 1963-2009, all sample firms are sorted into deciles on the basis of the enterprise multiple. Panel A reports average equally weighted monthly returns in the post-formation period of 1.73% for firms in the low enterprise multiple decile compared to 0.91% for companies in the high decile. The low EM decile should be considered value firms while high enterprise multiple firms are growth firms. If the returns are value-weighted, the average returns are 1.23% and 0.59% for the respective extreme deciles. The average value-minus-growth zero-cost portfolio generates equally weighted returns of 0.82% and value-weighted returns of 0.64%. Are these returns robust to alternative multiple factor models?

Panel B of Table 3 reports the regression results within the Carhart 4-factor framework. The factors (market, SML (small minus large), HML (value minus growth), and UMD (momentum)) are from Wharton Research Data Services. In the regressions, the dependent variable is the value-minus-growth (low-minus-high) monthly enterprise multiple decile return. The first three rows of the panel use an equally weighted return procedure while the last three rows value-weight the monthly returns. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

For the equally weighted dependent variable, the Carhart 4-factor model does not fully explain the abnormal performance of the low-minus-high enterprise multiple portfolio. The alpha from the 3-factor model, in row (2), is 0.62% per month (t-statistic of 5.39). In row (3), the 4-factor model alpha is 0.52% per month (t-statistic of 3.98), which is over 6% on an annualized basis. On an equally weighted return basis, the low-minus-high enterprise multiple portfolio return is significant after controlling for market, size, book-to-market, and momentum. Not surprisingly, the low-minus-high enterprise multiple portfolio returns load heaviest on the HML factor.

For the value-weighted returns, the Carhart 4-factor model completely explains the abnormal performance of the low-minus-high enterprise multiple portfolio returns. The alpha from the 3-factor model is an insignificant 0.13% per month and is only 0.04% per month using the 4-factor framework.

As an alternative benchmark, how does the low-minus-high enterprise multiple portfolio return perform in the *q*-theory factor model of Chen, Novy-Marx, and Zhang (2010)? The *q*-theory factor model consists of Fama and French’s market factor, in addition to the investment and return-on-assets (ROA) factors. To what extent is the enterprise multiple effect an investment effect, an ROA effect, or neither?

Chen, Novy-Marx, and Zhang (2010) report strong empirical evidence that an investment factor and return-on-assets factor along with the market factor summarize the cross-sectional variation of stock returns. Their investment factor is the monthly difference (low-minus-high) between the average returns on the two low investment-to-assets portfolios and the average returns on the two high investment-to-assets portfolios. Investment-to-assets is the annual change in gross property, plant, and equipment plus the annual change in inventories divided by the lagged book value of assets. Chen, Novy-Marx, and Zhang (2010) intuitively argue that investment predicts future stock returns because high costs of capital implies low NPV for new capital given expected cash flows, and in turn low investment. Wu, Zhang, and Zhang (2010) find that adding an investment factor into a standard regression framework sharply reduces the magnitude of Sloan’s (1996) accrual anomaly.

The Chen, Novy-Marx, and Zhang ROA factor is the monthly difference (high-minus-low) between the average returns on the two high-ROA portfolios and the average returns on the two low-ROA portfolios. Return-on-assets (ROA) is defined as income before extraordinary items divided by one-quarter-lagged total assets. ROA is a predictor of future realized stock returns because high expected ROA relative to low investment implies high firm discount rates.

Table 4 reports the results using the investment and ROA factors of Chen, Novy-Marx, and Zhang to explain the low-minus-high enterprise multiple portfolio returns. Since the investment and ROA factors are only available during the January 1972 to June 2009 time period, each of the regressions has 450 monthly observations in this table compared to 558 monthly observations in the other tables. The starting date of the Chen, Novy-Marx, and Zhang factors is restricted by the availability of quarterly earnings and asset data from Compustat. The first two rows equally weight the monthly low-minus-high enterprise multiple decile portfolio returns while the last two rows value-weight the dependent variable returns.

In Panel A, the alphas from the market, investment, and ROA factor regression are consistently positive and significant. For the equally weighted returns in row (2), the alpha is 0.62% per month with a t-statistic of 3.89. When the dependent variable is value-weighted in row (4), the alpha is 0.74% per month (t-statistic of 2.89). Hence, the low-minus-high enterprise multiple returns (value-minus-growth) are robust to the investment and ROA factors of Chen, Novy-Marx, and Zhang (2010). It appears that the enterprise multiple is neither strictly an investment nor a ROA effect.

In Panel B, we break out the regressions from rows (2) and (4) of Panel A and run the value and growth deciles individually against the *q*-theory factors. For all rows of Panel B, the dependent variable is the monthly EM decile return minus the monthly risk-free rate. The coefficients in row (2) of Panel A equal the difference in the coefficients of rows (5) and (6) in Panel B; the coefficients in row (4) equal the difference in the coefficients of rows (7) and (8). Thus, the row (2) alpha of 0.62 is equal to the row (5) alpha of 1.03 (value decile) minus 0.41 from row (6) (growth decile).

It appears that most of the alpha in rows (2) and (4) comes from the value decile (low EM). In row (5), the equally weighted value decile generates a significant alpha of 1.03% per month, or 12.36% annually. The growth decile alpha in row (6) is 0.41%, with a t-statistic of 1.97. For the value-weighted regressions in rows (7) and (8), the value decile alpha is a significant 0.60% per month (t-statistic of 3.70), while the growth decile alpha is -0.14% per month and insignificant.

It is also noteworthy that the coefficients of rows (2) and (4) are generally of opposite sign from the coefficients in the separate regressions. For example, the positive ROA factor coefficients in rows (2) and (4) result from the difference of (mostly) significantly negative coefficients in rows (5)-(8).

Between Tables 3 and 4, the monthly EM value-minus-growth returns were positive and significant for all but two of the specifications--the value-weighted Fama-French 3-factor and value-weighted Carhart 4-factor. In the other eight regressions, regression alphas ranged from 0.52% per month (row (3) in Table 3, Panel B) to 1.09% per month (row (1) in Table 4, Panel A). All eight were significant at the 1% level.

C. Monthly Returns by Size and Enterprise Multiple Quintiles

To better gauge where the enterprise multiple effect is strongest across market capitalization quintiles, Table 5 reports the equally weighted (Panel A) and value-weighted (Panel B) monthly stock returns after sorts on size and enterprise multiple. Each year in June, only NYSE-listed firms are used to create the size and enterprise multiple quintiles.

Controlling for size, the low EM portfolios (value firms) consistently have higher average monthly returns than the high EM portfolios (growth firms). The largest average return difference for the equally weighted returns (Panel A) occurs in size quintile 3. In that size quintile, the average subsequent monthly return for the low EM portfolio is 1.45% compared to

0.93% for the high EM portfolio. In Panel B (value-weighted returns), the largest difference between the extreme EM groups occurs in the smallest size quintile (0.53%).

The average monthly return difference between low and high EM quintiles is 0.44% for the equally weighted returns and 0.42% when the returns are value-weighted. On an annualized basis, the average difference between the extreme EM quintiles controlling for size is an economically meaningful 5.28% and 5.04%, respectively. In total, five low-minus-high portfolios (long low EM quintiles and short high EM quintiles) for each weighting method are created using the size and EM cutoffs. Although the return differences appear robust, are the portfolio alphas significant within the CAPM and the Carhart 4-factor model regressions?

Table 6 reports the regression results for the monthly low-minus-high enterprise multiple quintiles on the 1 and 4-factor models. In each regression, the dependent variable is low-minus-high portfolio monthly return of the low EM quintile minus the high EM quintile for each of the five size quintiles. In Panel A, the returns are equally weighted while in Panel B the returns are value-weighted.

Of the ten regressions in Panel A of Table 6, seven have significant alphas at the 5% level. The alphas are not significant when using the Carhart 4-factor framework in size quintiles 2, 4, and large. When the monthly dependent returns are value-weighted in Panel B, the alphas are only significant for the small size quintiles within the Carhart 4-factor model. For the CAPM model, the alphas are generally significant, only the low-minus-high return for the largest size quintile has an alpha with a significance level less than 2 (1.84).

D. Creation of the EM Factor

In this section, we create the EM factor in a similar manner as the HML factor from Fama and French (1993) and the investment and ROA factors of Chen, Novy-Marx, and Zhang (2010). We create a factor that mimics the return differences of the low-minus-high enterprise multiple portfolios. Each June of year t (1963-2009), all NYSE, Amex, and Nasdaq firms with available Compustat information are used to create size and EM groups. First, size groups are created by using the median NYSE firm. The sample is then divided into 3 EM groups using only NYSE firms to create yearly breakpoints for the bottom 30% (low), middle 40% (middle), and top 30% (high). We exclude firms with negative or missing EM values.

Hence, six portfolios, based on size and EM, are created each year. The EM factor each month is the simple average of the value-weighted returns on the two low EM portfolios minus the average value-weighted returns of the two high portfolios. Panel A of Table 7 reports the summary statistics for both the EM and Fama-French/Carhart factors during the 1963-2009 time period. Note that the SMB factor is not statistically significant at the 5% level (t-statistic of 1.87) and is heavily skewed, with a mean of 0.25 and a median of only 0.07. This skewness is due to the strong seasonal nature of the SMB factor. Only in January do small firms have significantly higher average returns than large firms.

Similar to prior results with individual stocks, the HML and EM factors are both highly significant. HML has a mean factor value of 0.42% per month. The EM factor has a mean value of 0.44% per month or 5.28% per year. Panel B of Table 7 reports the monthly factor correlations. The monthly correlation between the EM factor and the SML is -0.2458. Not surprisingly, the book-to-market and enterprise multiple factors are quite correlated (0.8061).

While EM and HML factors are highly correlated, the correlations are not perfect, and the differences in some of the values are noteworthy for when they occur in the sample. Figure 1 reports the time-series of monthly differences (HML minus EM) over 1963-2009. Note that the differences appear to be greatest around periods of market uncertainty, particularly around 1973, 1977, 1981, and 2008.

In an attempt to determine whether book-to-market is more procyclical than the enterprise multiple, Panel C of Table 7 separates the sample time period into recession (as defined by the National Bureau of Economic Research) and non-recession months.[4] The EM factor has higher returns in recession months than HML (0.69% versus 0.58%), while in non-recessionary months both factors average approximately the same returns (0.39% versus 0.38%). Notice that both the value-based HML and EM factors have stronger relative performance in recession months than in non-recessionary periods.

As noted by Daniel and Titman (1997) and Loughran (1997), book-to-market has a strong January seasonal component. In Figure 1, five of the eight largest positive return differences between HML and EM are in January. During our sample period, HML has substantially higher returns than EM in the month of January (1.54% versus 0.57%) while EM returns average 12 basis points higher than HML in the other 11 calendar months.

Is the EM factor statistically significant after controlling for the Carhart 4-factor and the Chen, Novy-Marx, and Zhang (2010) *q*-theory models? Table 8 reports the results with the EM factor as the dependent variable. Regressing the enterprise multiple factor on the market factor in

[4] The NBER recession dates are obtained from http://www.nber.org/cycles.html. A number of other papers have used this procedure to categorize months by recessionary periods.

row (1) generates a significant alpha of 0.52% per month and an adjusted-R^2 value of 11.7%. In row (2), the alpha drops to 0.19% per month (t-statistic of 2.95) and the adjusted-R^2 value jumps to 65.8% when the Fama-French size and book-to-market factors are added.

The alpha, although still significant, drops further when Carhart's momentum factor is added in row (3). Not surprisingly, the EM factor loads heavily on the HML factor. The enterprise multiple factor does not have significant loadings on either SMB or UMD.

The last row of Table 8 uses the investment and ROA factors of Chen, Novy-Marx, and Zhang (2010) as explanatory variables. As noted earlier, the Chen, Novy-Marx, and Zhang factors are only available during the January 1972 to June 2009 time period (450 months). The EM factor loads positively on both the investment and ROA factors. Even with this significant loading, the Chen, Novy-Marx, and Zhang alpha is 0.35% per month (t-statistic of 3.00) with an adjusted-R^2 value of 21.0%. Thus, the enterprise multiple factor has positive and significant alphas even after controlling for the Fama-French/Carhart and *q*-theory factors.

E. Can the Enterprise Multiple Factor explain Alternative Measures of the Value Effect?

Numerous papers have documented that value firms have higher realized returns than growth firms. Due to the prominence of Fama and French (1992, 1993), most investors think of the value effect as the difference between the stock returns of high book-to-market firms (value) versus the returns on low book-to-market firms (growth). Although book-to-market is indeed the most commonly used measure, the value premium can be measured many other ways.

Table 9 reports the equally and value-weighted decile stock returns for six different measures of value during the 1963-2009 time period: book-to-market; market leverage; earnings-to-price; dividend-to-price; sales growth; and long-term stock return reversals. Fama and French (1992) serve as the motivation for examining book-to-market, market leverage (total assets-to-market value of equity), and earnings-to-price. Since it is difficult to categorize negative earnings-to-price firms into value or growth categories, the earnings-to-price column includes only firms with positive earnings. Following Keim (1985), we create 10 portfolios in terms of dividend yield (dividend-to-price) only for firms having non-zero dividends.

Sales growth, based on the methodology of Lakonishok, Shleifer, and Vishny (1994), should be a good measure of potential contrarian profits. Lakonishok, Shleifer, and Vishny (1994) include only NYSE and Amex firms in their analysis and have a 5-year weighted sales rank to categorize firms into glamour and value groups. We follow their exact weighted average sales growth rank procedure giving more weight to recent sales growth. However, to enhance comparability with the rest of our paper, we also include Nasdaq firms in the sales growth sample. To be included in the sales growth column, firms need five prior years of the Compustat annual sales data item.

Our last measure of the value effect comes from DeBondt and Thaler's (1985) overreaction hypothesis. Each year, we sort all firms on the basis of the prior 36-month buy-and-hold prior returns. To be included in this column, firms must have at least 36-months of available CRSP returns prior to the June formation date. Although DeBondt and Thaler (1985) use December as an arbitrary portfolio formation month, to be consistent with the rest of our analysis, we use June as the portfolio formation month. Also, while DeBondt and Thaler restrict their sample to only NYSE firms, we include NYSE, Amex, and Nasdaq firms in our analysis.

There is some disagreement in the literature as to whether the value effect is evidence of irrational overreaction by investors (see DeBondt and Thaler (1985) and Lakonishok, Shleifer, and Vishny (1994)) or a rational response to costly reversibility and the countercyclical price of risk (Zhang (2005)). For our purpose in trying to explain stock market return patterns, we are not concerned which interpretation of the value premium prevails. We are merely interested if the enterprise multiple factor can explain the stock return patterns generated by the various value effect measures.

Each June, non-financial firms with the available data are sorted into deciles. Table 9 reports the average subsequent monthly stock returns for the 10 portfolios as well as a value-minus-growth return row. Panel A reports the equally weighted stock returns while in Panel B, the stock returns are value-weighted. For the first 4 columns of each panel (book-to-market, market leverage, earnings-to-price, and dividend-to-price), companies in the high decile are defined as value firms. In the last 2 columns of each panel (sales growth and prior 36-month stock performance), firms placed in the low decile would be considered value firms.

The bottom row reports a strong effect across all six value measures. In all the columns, value firms have higher subsequent monthly returns than growth firms. However, when the monthly returns are value-weighted (Panel B), the value premium is, on average, substantially lower than when using equally weighted returns. Using equally weighted returns, the value-minus-growth monthly return is largest for book-to-market (1.00%) and smallest for dividend-to-price, 0.26%. When monthly stock returns are value-weighted, the value-minus-growth return is largest for both book-to-market and market leverage (0.51%) and smallest for sales growth (0.21%).

How much of these large monthly value premiums can be explained by the enterprise multiple factor? To address this question, in Table 10 we use Fama-French's market factor and our enterprise multiple factor to explain the value premium. The dependent variable in each row of Table 10 is the value-minus-growth decile monthly return. The two explanatory variables are Fama-French's market factor and the enterprise multiple factor. Panel A reports equally weighted returns while Panel B uses value-weighted value-minus-growth decile returns as the dependent variable.

In the Panel A regressions with the market factor as the sole independent variable, all the alphas are positive and highly significant. The market factor by itself explains little of the equally weighted value effect. When the enterprise multiple factor is added to the Panel A regressions, all of the alphas drop in magnitude and significance. For example, using the value-minus-growth book-to-market equally weighted return difference as the dependent variable, the alpha in row (1) is 1.10% per month (market factor only) compared to 0.56% per month when the EM factor is added as an explanatory variable in row (2). Yet, even though the alpha coefficient values drop in magnitude, only in the earnings-to-price and dividend-to-price rows are the alphas insignificant in the presence of the EM factor.

However, when the returns are value-weighted in Panel B of Table 10, the enterprise multiple completely explains the value premium puzzle. In none of the regressions is the alpha positive and statistically significant once the enterprise multiple factor is added to the regressions. For example, for the book-to-market value-minus-growth returns, the CAPM alpha in row (1) is 0.53% per month (t-statistic of 2.50) while the alpha is -0.15% per month (t-statistic of -0.85) with the EM factor added as an independent variable in row (2).

Overall, the market and enterprise multiple factors have the complete ability to explain the abnormal returns generated by various value premium trading strategies when value-weighted returns are used. For equally weighted returns of the value effect, the enterprise multiple factor has only limited explanatory ability. In all the regressions, value-minus-growth returns load positively and significantly on the enterprise multiple factor.

In a recent paper, Lewellen, Nagel, and Shanken (2010) argue that asset pricing models should not be evaluated solely on the basis of explaining average returns on 5-by-5 size and book-to-market portfolios. They insist that high cross-sectional R^2 values on size and book-to-market portfolios often provide a misleading indication of the model's true performance. The three authors show that getting a high cross-sectional R^2 value is relatively easy for an asset pricing model because loadings on proposed factors often line up with expected stock returns.

In our paper, we do not evaluate the enterprise multiple factor's ability to explain size and BE/ME portfolios. Our analysis instead focuses on the return difference between value-minus-growth portfolios, which have much lower R^2 values than when attempting to explain size and BE/ME portfolios. Our focus is on the alpha from a value-minus-growth portfolio rather than on a cross-sectional R^2 value.

V. Conclusion

Increasingly, practitioners use the enterprise multiple (EM) as one measure of relative firm valuation. The valuation textbooks of Damodaran (2006) and Koller, Goedhart, and Wessels (2005) also use enterprise multiples. EM is calculated as the enterprise value (equity value, preferred stock, and debt, minus cash) divided by operating income before depreciation

(EBITDA). Is use of the enterprise multiple in valuation really justified in terms of being able to explain realized stock returns?

During the 1963-2009 time period, we find strong evidence that the enterprise multiple is related to subsequent stock returns. Controlling for size, low EM firms outperform high EM firms by more than 5% per year. As book-to-market is used to calculate the HML factor, we also use the enterprise multiple to create a factor designed to mimic the return differences of low versus high EM portfolios. The EM factor generates a value premium of 0.44% per month, or 5.28% per year, significant at the 1% level. Thus, the practitioner's use of EM is justified by the empirical evidence.

The enterprise multiple factor is also robust to the controls of the Carhart 4-factor and Chen, Novy-Marx, and Zhang (2010) *q*-theory factor models (market, investments, and ROA). The enterprise multiple factor alpha controlling for the Carhart 4-factors is 0.16% per month (t-statistic of 2.39) while the alpha is 0.35% per month (t-statistic of 3.00) controlling for the Chen-Novy-Marx-Zhang *q*-theory factors. Interestingly, the EM factor loads positively on both the investment and ROA factors. This appears to be due to EM being a more direct proxy for the discount rate, which allows it to capture some of the effect of both the investment and ROA factors.

The market and EM factors, moreover, can explain the value-weighted stock return patterns of alternative value measures (book-to-market; market leverage; earnings-to-price; dividend-to-price; sales growth; and long-term stock return reversals). If returns are equally weighted, the market and enterprise multiple factors have limited ability to explain the variation in returns for the value-minus-growth decile portfolios.

What drives the enterprise multiple effect in stock returns? We interpret the enterprise multiple as a proxy for the unlevered investment return (i.e., the weighted average cost of capital), which is in turn positively related to the firm's cost of equity. Firms with high enterprise multiple values (signaling high valuation ratios) appear to have lower discount rates and lower subsequent realized stock returns than firms with low EM values.

Overall, the enterprise multiple factor can be used by the literature to measure abnormal return performance in event or valuation studies. The new factor appears to do quite well in explaining the returns across alternative value trading strategies. The enterprise multiple factor is available on a university website.

Appendix. Definitions of the Variables Used in the Paper

Enterprise Multiple (EM)	Enterprise value (EV) is market value of equity plus the prior year's total debt (Compustat data items DLC and DLTT (short and long term debt)) plus preferred stock value (item PSTKRV) minus cash and short-term investments (item CHE). The enterprise multiple (EM) is EV/EBITDA: enterprise value divided by the prior year's operating income before depreciation (Compustat item OIBDP).
Enterprise Multiple Factor	The EM factor each month is the simple average of the value-weighted returns on the two low EM portfolios minus the average value-weighted returns of the two high portfolios.
Size	A firm's size is its market capitalization (stock price multiplied by shares outstanding) as of June of year t.
Book-to-Market	This variable is the prior year's book value of equity (Compustat data item CEQ plus balance sheet deferred taxes and investment tax credit (item TXDITC)) divided by the firm's market value as of December of year t-1.
ln(1+prior)	As defined in Fama and French (2008), this variable is the natural log of the firm's raw buy-and-hold return from month j-12 to month j-2.
Investment Factor	This factor is created by Chen, Novy-Marx, and Zhang (2010). It is the monthly difference (low-minus-high) between the average returns on the two low investment-to-assets portfolios and the average returns on the two high investment-to-assets portfolios. Investment-to-assets is the annual change in gross property, plant, and equipment plus the annual change in inventories divided by the lagged book value of assets.
ROA Factor	This factor is created by Chen, Novy-Marx, and Zhang (2010). It is the monthly difference (high-minus-low) between the average returns on the two high-ROA portfolios and the average returns on the two low-ROA

	portfolios. Return-on-assets (ROA) is defined as income before extraordinary items divided by one-quarter-lagged total assets.
Market Leverage	This variable is the prior year's total assets (Compustat item AT) divided by market value of equity as of December of year t-1.
Earnings-to-Price	This variable is the prior year's equity income (income before extraordinary (item IB), minus dividends on preferred stock (item DVP, if available), plus income statement deferred taxes (item TXDI, if available) divided by market value of equity as of December of year t-1. Only firms with positive earnings are included for the variable.
Dividend-to-Price	This variable is the prior year's dividends (item DVC) divided by market value of equity as of December of year t-1. Dividend-to-price includes only firms with dividends greater than zero.
Sales Growth	This variable is based on Lakonishok, Shleifer, and Vishny (1994). For each firm in each of the prior 5 years (-1, -2, -3, -4, and -5) to the June formation date, the sales growth (Compustat item SALE) is calculated. Then, for each year, all companies are ranked by sales growth in each particular year. Next, we calculate each firm's weighted average rank, assigning the weight of 5 to the firm's growth rank in year -1, the weight of 4 to its growth rank in year -2, etc. Sales growth deciles are created on the basis of the firm's weighted average sales growth rank over the prior 5 years.
Prior 36-monthly Returns	This variable is the firm's 36-month buy-and-hold returns prior to the June formation date.
Fama-French/Carhart Factors	The market, SML (small-minus-large), HML (value-minus-growth), and UMD (momentum) factors are from Wharton Research Data Services.

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FIGURE 1
Time-series Pattern of the Monthly Difference between the HML and EM Factors, 1963-2009

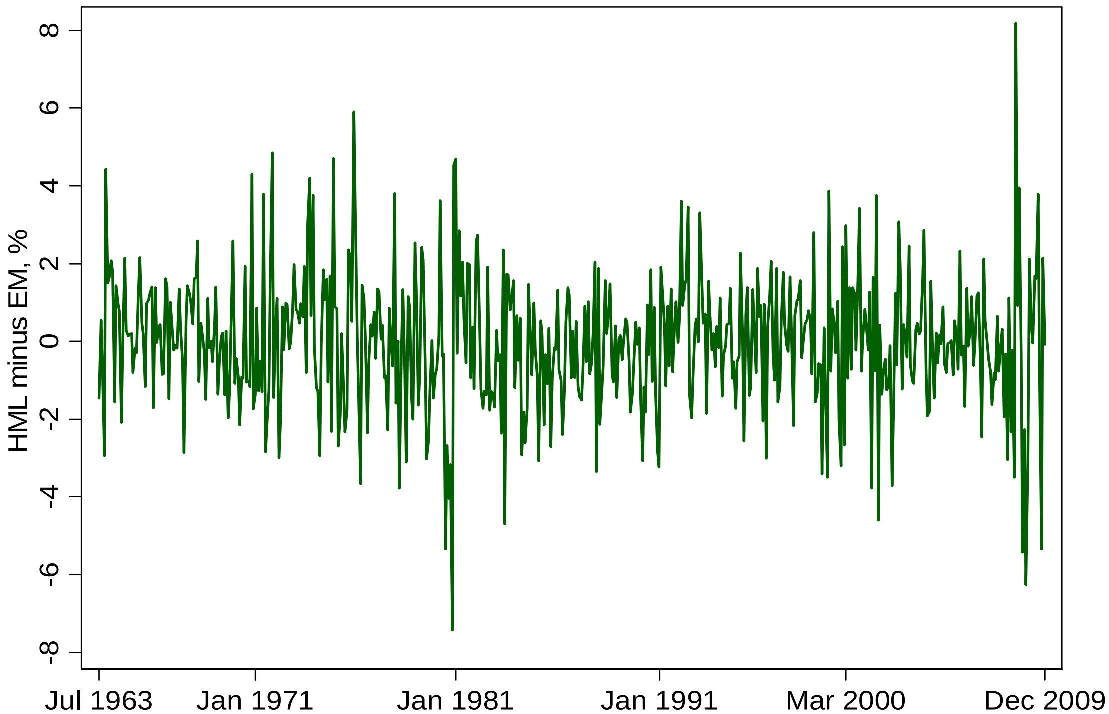

TABLE 1
Summary Statistics, 1963-2009

All non-financial firms listed on the NYSE, Amex, or Nasdaq with relevant CRSP and Compustat information are included in the sample. To be included in the table, firms must have non-negative and non-missing BE/ME and EM values. There are 104,873 firm-year observations for the items in each row. A firm's size is its market capitalization (price times shares outstanding) as of June of year t. Enterprise multiple (EM) is calculated as EV/EBITDA: enterprise value (equity value + debt value + preferred stock – cash)/(operating income before depreciation) as of December of year t-1. The book-to-market ratio (BE/ME) is the prior year's book value of equity divided by the firm's market value as of December of year t-1. The EM and book-to-market variables are winsorized at the 1% and 99% percentiles.

Item	Mean	25th	Median	75th
Market Value (in millions)	$1,558.2	$24.3	$107.8	$564.3
Subsequent Year Return	16.3%	-17.1%	7.4%	35.9%
Enterprise Multiple (EM)	11.3	4.8	7.1	10.7
Book-to-Market	0.95	0.41	0.73	1.21

TABLE 2

Average Slope Values from Monthly Cross-Sectional Regressions of Monthly Return on Size, Book-to-Market, Prior Return, and EM, July 1963-December 2009 (558 months)

The universe of firms (NYSE, Amex, and Nasdaq) includes all non-financial companies with relevant CRSP and Compustat information as of June of year t. The dependent variable is the raw monthly return for firm i in calendar month j. A firm's size is its market capitalization (price times shares outstanding) as of June of year t. The book-to-market ratio (BE/ME) is the prior year's book value of equity divided by the firm's market value as of December of year t-1. Prior return is the raw buy-and-hold return from month j-12 to month j-2. EM (enterprise multiple) is EV/EBITDA: (equity value + debt value + preferred stock – cash)/(operating income before depreciation) as of December of year t-1. All independent variables are winsorized at the 1% and 99% percentiles. All rows have 558 monthly observations. The t-statistics are in parentheses. To be included in any of the regressions, firms must have non-negative and non-missing BE/ME and EM values.

$$r_{ij} = a_{0j} + a_{1j}\,\ln(\text{Size})_{ij} + a_{2j}\,\ln(\text{BE/ME})_{ij} + a_{3j}\,\ln(1+\text{prior})_{ij} + a_{4j}\,\ln(\text{EM})_{ij} + e_{ij}$$

Model	Intercept	ln(Size)	ln(BE/ME)	ln(1+prior)	ln(EM)
(1) All Firms	1.98	-0.12	0.23		
(1963-2009)	(5.55)	(-3.04)	(3.41)		
(2) All Firms	1.85	-0.14	0.23	0.81	
(1963-2009)	(5.81)	(-3.72)	(3.56)	(4.19)	
(3) All Firms	2.02				-0.33
(1963-2009)	(8.95)				(-5.36)
(4) All Firms	2.21	-0.15	0.15	0.77	-0.16
(1963-2009)	(7.90)	(-3.98)	(2.57)	(4.07)	(-3.08)

TABLE 3

Performance of Low Minus High Enterprise Multiple Portfolios

The universe of firms (NYSE, Amex, and Nasdaq) includes all non-financial companies reporting relevant CRSP and Compustat information as of June of each year, 1963-2009. Each year, the sample is sorted into deciles on the basis of enterprise multiple. Enterprise multiple (EM) is defined as EV/EBITDA: (equity value + debt value + preferred stock – cash)/ (operating income before depreciation) as of December of year t-1. See the Appendix for more detailed descriptions of the variables. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

Panel A. Monthly Returns for Enterprise Multiple Deciles

Decile	Enterprise Multiple EW Returns	Enterprise Multiple VW Returns
Low	1.73%	1.23%
2	1.71%	1.26%
3	1.56%	1.32%
4	1.43%	1.09%
5	1.35%	1.03%
6	1.27%	0.90%
7	1.23%	0.91%
8	1.11%	0.88%
9	0.99%	0.79%
High	0.91%	0.59%
Value-Growth	0.82%	0.64%

Panel B. Monthly Enterprise Multiple Decile (Value-minus-Growth) Returns as the Dependent Variable

Row	Weighting Method	Alpha	MKT	SMB	HML	UMD	Adjusted R^2
1	EW	0.95	-0.33				15.7%
		(6.54)	(-6.91)				
2	EW	0.62	-0.15	-0.13	0.70		46.9%
		(5.39)	(-4.69)	(-2.92)	(13.26)		
3	EW	0.52	-0.13	-0.13	0.74	0.11	48.4%
		(3.98)	(-3.97)	(-3.04)	(12.79)	(2.06)	
4	VW	0.74	-0.24				4.4%
		(3.48)	(-3.59)				
5	VW	0.13	-0.05	0.22	1.14		41.9%
		(0.77)	(-1.17)	(2.98)	(14.53)		
6	VW	0.04	-0.03	0.22	1.17	0.10	42.4%
		(0.25)	(-0.74)	(3.08)	(15.26)	(1.92)	

TABLE 4

Performance of Low Minus High Enterprise Multiple Portfolios Controlling for the Investment and ROA Factors of Chen, Novy-Marx, and Zhang (2010)

The universe of firms (NYSE, Amex, and Nasdaq) includes all non-financial companies reporting relevant CRSP and Compustat information. Long Chen provided us the investment and ROA factors which are only available during January 1972 to June 2009. Each year, the sample is sorted into deciles on the basis of enterprise multiple. Enterprise multiple (EM) is defined as EV/EBITDA: (equity value + debt value + preferred stock – cash)/ (operating income before depreciation) as of December of year t-1. See the Appendix for more detailed descriptions of the variables. Each row contains 450 monthly observations. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

Panel A. Monthly Enterprise Multiple Decile (Value-minus-Growth) Returns as the Dependent Variable

Row	Weighting Method	Alpha	MKT	Investment Factor	ROA Factor	Adjusted R^2
1	EW	1.09	-0.33			16.8%
		(6.59)	(-6.35)			
2	EW	0.62	-0.20	0.47	0.38	36.3%
		(3.89)	(-4.10)	(5.28)	(6.28)	
3	VW	0.92	-0.28			5.9%
		(3.74)	(-3.59)			
4	VW	0.74	-0.23	0.26	0.11	7.2%
		(2.89)	(-2.91)	(1.64)	(1.11)	

Panel B. Monthly Enterprise Multiple Decile (Value or Growth) Returns minus the Risk-Free Rate as the Dependent Variable

Row	Weighting Method	Alpha	MKT	Investment Factor	ROA Factor	Adjusted R^2
5	EW-Value	1.03	0.98	0.33	-0.20	66.7%
		(5.95)	(18.73)	(3.63)	(-3.32)	
6	EW-Growth	0.41	1.18	-0.14	-0.58	76.4%
		(1.97)	(26.20)	(-1.35)	(-8.59)	
7	VW-Value	0.60	0.95	-0.25	-0.06	65.8%
		(3.70)	(17.09)	(-2.41)	(-0.81)	
8	VW-Growth	-0.14	1.18	-0.51	-0.17	78.7%
		(-0.83)	(27.52)	(-5.43)	(-3.05)	

TABLE 5

Monthly Stock Returns by Size and Enterprise Multiple Quintiles, 1963-2009

Portfolios are formed each June (1963-2009). The monthly returns are from July of year t to June of year t+1. The yearly size and EM cutoffs are determined using only NYSE firms. Enterprise Multiple (EM) is defined as EV/EBITDA: (equity value + debt value + preferred stock – cash)/(operating income before depreciation) as of December of year t-1. A firm's size is its market capitalization (price times shares outstanding) as of June of year t. All non-financial firms listed on the NYSE, Amex, and Nasdaq with available CRSP and Compustat information are included in the table.

Panel A. Equally weighted Monthly Returns

	EM Quintiles					
Size Quintiles	Low (Value)	2	3	4	High (Growth)	Diff Low – High
Small	1.81%	1.59%	1.50%	1.58%	1.32%	0.49%
2	1.50%	1.43%	1.26%	1.32%	1.17%	0.33%
3	1.45%	1.40%	1.30%	1.04%	0.93%	0.52%
4	1.31%	1.40%	1.07%	1.01%	0.88%	0.43%
Large	1.21%	1.00%	0.97%	0.90%	0.79%	0.42%
Average	1.46%	1.36%	1.22%	1.17%	1.02%	0.44%

Panel B. Value-Weighted Monthly Returns

	EM Quintiles					
Size Quintiles	Low (Value)	2	3	4	High (Growth)	Diff Low – High
Small	1.59%	1.48%	1.27%	1.40%	1.06%	0.53%
2	1.51%	1.43%	1.25%	1.38%	1.16%	0.35%
3	1.45%	1.37%	1.28%	1.02%	0.95%	0.50%
4	1.33%	1.39%	1.07%	0.98%	0.87%	0.46%
Large	1.07%	0.96%	0.86%	0.85%	0.79%	0.28%
Average	1.39%	1.33%	1.15%	1.13%	0.97%	0.42%

TABLE 6

CAPM and Carhart 4-Factor Regressions on Monthly Size and Enterprise Multiple Quintiles (Low minus High), 1963-2009

Portfolios are formed each June (1963-2009). The monthly returns are from July of year t to June of year t+1. The yearly size (market capitalization) and EM cutoffs are determined using only NYSE firms. Enterprise multiple (EM) is defined as EV/EBITDA: (equity value + debt value + preferred stock – cash)/ (operating income before depreciation) as of December of year t-1. All non-financial firms listed on the NYSE, Amex, and Nasdaq with available CRSP and Compustat information are included in the table. For each size quintile, the monthly difference between the low enterprise multiple and high enterprise multiple quintile equally and value-weighted stock returns are the dependent variable for the regressions. The Fama-French/Carhart factors are obtained from Wharton Research Data Services. See the Appendix for more detailed descriptions of the variables. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology. Each row contains 558 monthly observations.

Panel A. Monthly Enterprise Multiple Quintile (Low-minus-High) Equally weighted Returns as the Dependent Variable

Row	Size Quintile	Alpha	MKT	SMB	HML	UMD	Adjusted R^2
1	Small	0.59	-0.25				12.4%
		(4.77)	(-7.36)				
2	Small	0.45	-0.09	-0.38	0.32	0.06	35.7%
		(3.47)	(-2.87)	(-7.10)	(5.20)	(1.04)	
3	2	0.46	-0.32				12.2%
		(2.79)	(-6.88)				
4	2	0.10	-0.09	-0.28	0.79	0.02	48.1%
		(0.67)	(-2.59)	(-4.22)	(13.75)	(0.34)	
5	3	0.63	-0.26				8.7%
		(3.96)	(-5.37)				
6	3	0.27	-0.06	-0.18	0.79	-0.02	45.1%
		(1.97)	(-1.66)	(-3.74)	(14.18)	(-0.38)	
7	4	0.50	-0.17				3.9%
		(3.23)	(-3.55)				
8	4	0.01	-0.00	0.09	0.84	0.07	40.3%
		(0.08)	(-0.02)	(2.00)	(16.45)	(1.51)	
9	Large	0.48	-0.14				2.8%
		(3.09)	(-3.23)				
10	Large	-0.02	0.03	0.06	0.82	0.11	37.3%
		(-0.19)	(0.88)	(1.27)	(15.59)	(3.32)	

Panel B. Monthly Enterprise Multiple Quintile (Low-minus-High) Value-Weighted Returns as the Dependent Variable

Row	Size Quintile	Alpha	MKT	SMB	HML	UMD	Adjusted R^2
1	Small	0.64	-0.27				12.5%
		(4.65)	(-6.65)				
2	Small	0.40	-0.10	-0.32	0.50	0.05	38.9%
		(2.76)	(-2.63)	(-5.88)	(7.60)	(0.66)	
3	2	0.48	-0.32				12.2%
		(2.94)	(-7.02)				
4	2	0.12	-0.10	-0.27	0.79	0.02	47.7%
		(0.83)	(-2.64)	(-3.75)	(13.88)	(0.35)	
5	3	0.61	-0.26				8.4%
		(3.82)	(-5.28)				
6	3	0.27	-0.06	-0.17	0.77	-0.03	43.3%
		(1.92)	(-1.79)	(-3.64)	(13.76)	(-0.59)	
7	4	0.53	-0.17				3.9%
		(3.33)	(-3.64)				
8	4	0.03	-0.00	0.09	0.85	0.07	40.3%
		(0.23)	(-0.09)	(2.00)	(16.88)	(1.28)	
9	Large	0.34	-0.12				1.5%
		(1.84)	(-2.52)				
10	Large	-0.17	0.05	0.08	0.86	0.08	30.1%
		(-1.09)	(1.12)	(1.45)	(12.13)	(1.81)	

TABLE 7
Factor summary statistics and correlations

The monthly factor returns are in percentages. Thus, 0.25 for SMB in Panel A is 25 basis points per month. The SML (small minus large), HML (value minus growth), and UMD (momentum) Fama-French/Carhart factors are from Wharton Research Data Services. The EM factor is created to mimic the return difference between low and high enterprise multiple (EM) portfolios. The monthly EM factor is the simple average of the value-weighted returns on the two low EM portfolios minus the average value-weighted returns of the two high EM portfolios. In Panel C, we categorize the sample months into recession and non-recession periods using data from the NBER. See the Appendix for more detailed descriptions of the variables.

Panel A. All months, 1963-2009 (N = 558)

Item	SMB Factor	HML Factor	UMD Factor	EM Factor
Mean	0.25	0.42	0.72	0.44
Median	0.07	0.41	0.82	0.51
t-value on Mean = 0	1.87	3.34	3.90	4.10

Panel B. Monthly factor correlations (N = 558)

	SMB Factor	HML Factor	UMD Factor	EM Factor
SMB Factor	1.0000			
HML Factor	-0.2390	1.0000		
UMD Factor	-0.0092	-0.1632	1.0000	
EM Factor	-0.2458	0.8061	-0.0612	1.0000

Panel C. Recession and non-recession months, 1963-2009 (N = 558)

Item	Number of Months	HML Factor	EM Factor
Recession Months	89	0.58	0.69
Non-recession Months	469	0.38	0.39
Total	558	0.42	0.44

TABLE 8
CAPM, Fama-French, Investment, and ROA Factor Regressions on the Enterprise Multiple Factor

We regress the EM factor on both the traditional factors (the market, SMB, HML, and UMD) and the investment and ROA factors of Chen, Novy-Marx, and Zhang (2010). The EM factor is created to mimic the return difference between low and high enterprise multiple (EM) portfolios. The monthly EM factor is the simple average of the value-weighted returns on the two low EM portfolios minus the average value-weighted returns of the two high EM portfolios. The Fama-French/Carhart factors are obtained from Wharton Research Data Services. Long Chen provided us the investment and ROA factors which are only available during January 1972 to June 2009. Rows 1 to 3 contain 558 monthly observations while the last row has 450 observations. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

Row	Alpha	MKT	SMB	HML	UMD	Investment	ROA	Adjusted R^2
1	0.52	-0.19						11.7%
	(5.11)	(-6.24)						
2	0.19	-0.05	-0.03	0.66				65.8%
	(2.95)	(-2.95)	(-1.13)	(22.95)				
3	0.16	-0.04	-0.03	0.67	0.03			66.0%
	(2.39)	(-2.54)	(-1.12)	(23.48)	(1.60)			
4	0.35	-0.14				0.25	0.16	21.0%
	(3.00)	(-4.10)				(3.28)	(3.50)	

TABLE 9

Equally and Value-Weighted Monthly Returns across Measures of Value

The universe of firms (NYSE, Amex, and Nasdaq) includes all non-financial companies reporting CRSP and Compustat information as of June of each year, 1963-2009. Each year, the sample is sorted into deciles on the basis of 6 alternative definitions of value (book-to-market, market leverage, earnings-to-price, dividend-to-price, sales growth, and prior 36-month returns). See the Appendix for more detailed descriptions of the variables. All monthly returns are equally weighted in Panel A and valued-weighted in Panel B.

Panel A. Equally weighted Returns

Decile	Book-to-Market	Market Leverage	Earnings-to-Price	Dividend-to-Price	Sales Growth	Prior 36-monthly returns
Low	0.84%	0.88%	1.10%	1.07%	1.50%	1.79%
2	1.00%	1.09%	1.13%	1.22%	1.47%	1.47%
3	1.15%	1.13%	1.18%	1.23%	1.35%	1.38%
4	1.18%	1.25%	1.22%	1.19%	1.33%	1.30%
5	1.25%	1.33%	1.22%	1.28%	1.41%	1.34%
6	1.38%	1.40%	1.27%	1.27%	1.28%	1.29%
7	1.50%	1.46%	1.44%	1.31%	1.21%	1.23%
8	1.45%	1.41%	1.45%	1.30%	1.37%	1.29%
9	1.72%	1.57%	1.46%	1.29%	1.21%	1.22%
High	1.84%	1.79%	1.58%	1.33%	1.13%	1.05%
Value-Growth	1.00%	0.91%	0.48%	0.26%	0.37%	0.74%

Panel B. Value-Weighted Returns

Decile	Book-to-Market	Market Leverage	Earnings-to-Price	Dividend-to-Price	Sales Growth	Prior 36-monthly returns
Low	0.87%	0.88%	0.94%	0.85%	1.14%	1.24%
2	0.90%	0.85%	0.88%	0.82%	1.12%	0.96%
3	0.93%	0.87%	0.87%	0.95%	1.02%	1.14%
4	0.81%	0.87%	0.89%	0.92%	1.03%	1.00%
5	0.97%	1.07%	0.78%	0.92%	0.93%	1.03%
6	1.09%	0.93%	1.06%	0.92%	0.94%	1.08%
7	1.21%	1.06%	1.06%	1.00%	0.86%	0.95%
8	1.00%	1.18%	1.09%	1.03%	0.88%	0.99%
9	1.28%	1.04%	1.22%	1.05%	0.90%	0.90%
High	1.38%	1.39%	1.21%	1.10%	0.93%	0.86%
Value-Growth	0.51%	0.51%	0.27%	0.25%	0.21%	0.38%

TABLE 10
Alternative Measures of Value and the EM Factor

The universe of firms (NYSE, Amex, and Nasdaq) includes all non-financial companies reporting CRSP and Compustat information as of June of each year, 1963-2009. Each year, the sample is sorted into deciles on the basis of 6 alternative definitions of value (book-to-market, market leverage, earnings-to-price, dividend-to-price, sales growth, and prior 36-month returns). Panel A equal weights the returns while Panel B reports value-weighted returns. Each row contains 558 monthly observations. See the Appendix for more detailed descriptions of the variables. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

Panel A. Equally weighted Returns

Row	Dependent Variable: Value-minus-Growth Decile Returns	Alpha	MKT	EM	Adjusted R^2
1	Book-to-Market	1.10	-0.24		5.8%
		(6.19)	(-3.81)		
2	Book-to-Market	0.56	-0.04	1.05	37.5%
		(3.93)	(-0.71)	(12.55)	
3	Market Leverage	0.96	-0.12		0.8%
		(4.34)	(-1.53)		
4	Market Leverage	0.38	0.10	1.12	24.7%
		(1.95)	(1.45)	(9.06)	
5	Earnings-to-Price	0.57	-0.23		7.4%
		(3.86)	(-4.56)		
6	Earnings-to-Price	0.13	-0.06	0.86	37.2%
		(0.99)	(-1.47)	(10.34)	
7	Dividend-to-Price	0.46	-0.47		24.9%
		(3.07)	(-9.11)		
8	Dividend-to-Price	0.11	-0.34	0.67	39.1%
		(0.82)	(-6.46)	(8.68)	
9	Sales Growth	0.47	-0.23		12.9%
		(4.17)	(-6.61)		
10	Sales Growth	0.30	-0.17	0.33	20.1%
		(2.69)	(-4.73)	(6.73)	
11	Prior 36-month	0.76	-0.05		0.00%
		(3.16)	(-0.69)		
12	Prior 36-month	0.54	0.03	0.43	2.8%
		(2.18)	(0.39)	(2.65)	

Panel B. Value-Weighted Returns

Row	Dependent Variable: Value-minus-Growth Decile Returns	Alpha	MKT	EM	Adjusted R^2
1	Book-to-Market	0.53	-0.05		0.1%
		(2.50)	(-0.65)		
2	Book-to-Market	-0.15	0.20	1.31	36.7%
		(-0.85)	(3.69)	(13.13)	
3	Market Leverage	0.46	0.13		0.1%
		(1.95)	(1.52)		
4	Market Leverage	-0.26	0.39	1.39	33.5%
		(-1.32)	(5.64)	(11.58)	
5	Earnings-to-Price	0.35	-0.19		2.2%
		(1.52)	(-2.37)		
6	Earnings-to-Price	-0.45	0.11	1.56	45.8%
		(-2.51)	(1.67)	(15.14)	
7	Dividend-to-Price	0.48	-0.55		18.6%
		(2.20)	(-8.41)		
8	Dividend-to-Price	-0.06	-0.35	1.04	37.1%
		(-0.31)	(-5.39)	(9.79)	
9	Sales Growth	0.31	-0.24		5.7%
		(1.66)	(-5.16)		
10	Sales Growth	-0.08	-0.10	0.75	20.9%
		(-0.44)	(-2.21)	(7.62)	
11	Prior 36-month	0.35	0.06		0.0%
		(1.17)	(0.65)		
12	Prior 36-month	0.04	0.18	0.59	3.6%
		(0.14)	(1.85)	(2.74)	