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SEPARATING WINNERS FROM LOSERS AMONG VALUE AND GROWTH STOCKS IN DIFFERENT US EXCHANGES: 1969–2011

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The purpose of this paper is twofold: (a) to determine whether there is value premium in our sample of US stocks for the period May 1, 1969–April 30, 2011; and (b) to examine whether an additional screening to the first step of the value investing process can be employed to separate the outperforming value and growth stocks from the underperforming ones. In this paper, we document the following: We find a consistently strong and pervasive value premium over the sample period. We show that there are distinct differences between US exchanges which means that papers that aggregate all US exchanges under one umbrella may dilute findings and bias conclusions. The stocks of AMEX firms, high business risk firms and firms that report extraordinary items experience worse returns than the rest of the US stocks in our sample. We find that P/E based sortings produce better overall results than sortings based on P/B. We are able to construct a composite score indicator (SCORE), combining various fundamental and market metrics, which enable us not only to separate the winners from the losers among value and growth stocks, but also to predict future returns of value and growth stocks. SCORE portfolios give better results for sortings based on P/E and when we employed a cross-section–time series medians approach. Results remain robust for a time period out of sample, for negative P/E or P/B ratio firms and for the firms that were excluded from SCORE-based performance, namely, AMEX stocks, stocks with high business risk and firms that reported extraordinary items the year before. Finally, we provide evidence that the return of a portfolio strategy that buys (sells) stocks that rank low (high) in the composite score indicator has significant explanatory power in an asset pricing model framework and that such a strategy earns statistically significant positive returns.

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1 Introduction

A large body of academic research has shown that value (i.e., low price-to-earnings (P/E) or price-to-book (P/B)) stocks tend to have higher average returns than growth (i.e., high P/E or P/B) stocks. This finding has been confirmed both in North America and around the globe (see, for example, Basu, 1977; Chan *et al.*, 1991; Fama and French, 1992, 1993, 1995, 1996; Lakonishok *et al.*, 1994; Chan and Lakonishok, 2004; Athanassakos, 2009, 2011a). Value investing, thus defined, has born fruits over time.

However, academic papers have examined only part of what value investing is all about. Screening for low P/E or low P/B stocks lets value investors identify *possibly* undervalued stocks (see Greenwald, 2001).[1] For example, on average, 39% of all value stocks in our sample had a negative return in the year following the sorting into value and growth stocks—47% of the growth stocks had, on average, a negative return. Value investors invest only in *truly* undervalued stocks which they identify by carefully valuing individually each of the low P/E or low P/B stocks to determine their intrinsic value and arriving at their investment decision using the concept of the "margin of safety" (see Graham, 2003).[2] But as Athanassakos (2011b) has shown, this is a very time-consuming exercise. Is there an additional screening an average investor can follow which will enable him/her to identify the low P/E or P/B stocks that are *truly* undervalued, without having to go through the time-consuming exercise of valuation?

Using AMEX, NASDAQ, and NYSE stock market data for the period 1969–2011, the purpose of this paper is twofold. First, to determine whether there is a value premium in our sample of US stocks for the period May 1, 1969–April 30, 2011 and in so doing shed further light into the value premium question. Second, to examine whether an additional screening to the first step of the value investing process can be employed to separate good (i.e., outperforming) value and growth stocks from bad (i.e., underperforming) ones. In this regard, we will test not only whether this screening can better predict future stock returns by selecting the stocks with superior performance, but also whether it is extra risk that drives such outperformance.

Piotroski (2000) uses a composite score of individual firm fundamental ratios of past performance, such as profitability, liquidity, capital structure, and operating efficiency to examine the attractiveness of a value stock. He finds that those stocks with the highest composite score tend to outperform those with the lowest score. Mohanram (2005) designs his own composite score indicator that helps him differentiate the winning from the losing growth stocks. Bird and Casavecchian (2007), on the other hand, develop a financial strength model consisting of 23 accounting variables which can differentiate good from bad value stocks. Finally, Athanassakos (2013) constructs a composite indicator, based on company fundamentals of Canadian stocks that are not cross-listed in the US, which enables him to identify value and growth stocks with superior performance.

This study differs from previous studies in a number of distinct ways.

We segregate the data by US exchange. As NYSE, NASDAQ and AMEX tend to attract different liquidity, capitalization and industry stocks, one can argue that value (or growth) stocks may be more prevalent in one market than another.[3]

In addition to the P/B ratio, which is most frequently used in studies of the value premium,[4] we also use the P/E ratio as another screening metric to separate stocks into value and growth and in

doing so we carry out an out-of-sample test of earlier findings.[5] Moreover, unlike previous research that examined only value stocks (see Piotroski, 2000) or growth stocks (see Mohanram, 2005), in this paper we examine both value and growth stocks to better compare and understand the pattern of value and growth stock returns. And unlike Athanassakos (2013), who examined the normally small and of low liquidity Canadian stocks that are not cross-listed over a short time period, we examine a more diverse sample of the US stocks over a much longer time period to obtain more meaningful and generalizable findings.

We use (a) contemporaneous medians of each fundamental or market metric within value or growth firms, and (b) cross-section–time series medians as benchmarks for assigning a good or bad signal to a specific firm-related fundamental or market metric. The latter approach is more intuitive and easier to apply going forward than the former which is closer to the method used by previous studies (see Mohanram, 2005; Athanassakos, 2013). We also use a different set of variables to separate the outperforming from underperforming value and growth stocks as another level of screening to low (high) P/E or low (high) P/B ratios.

Furthermore, while previous studies use the COMPUSTAT database to derive trailing price to earnings (P/E) and price-to-book value (P/B) ratios, where sorting in value and growth takes place as of June of year (t), with earnings per share and book value per share as of fiscal year end of year ($t-1$), this study employs COMPUSTAT and trailing ratios where sorting into value and growth happens as of April of year (t), as the stocks in our sample had already reported financials (for fiscal year ($t-1$)) by the end of April of year (t).[6]

Finally, we form P/B and P/E based quartiles rather than deciles in order to avoid biasing the tests in favor of finding support for the value premium, as evidenced in the simulations carried out by Conrad *et al.* (2003).

In this paper, we document the following:

We find a consistently strong and pervasive value premium over the May 1, 1969–April 30, 2011 sample period.

We show that there are distinct differences between US exchanges which means that papers that aggregate all US exchanges under one umbrella may dilute findings and bias conclusions.

The stocks of AMEX firms, high business risk firms and firms that report extraordinary items experience worse returns than the rest of the US stocks in our sample.

We find that P/E based sortings produce better overall results than sortings based on P/B.

We are able to construct a composite score indicator (SCORE), combining various fundamental and market metrics, which enable us not only to separate the winners from the losers among value and growth stocks, but also to predict future returns of value and growth stocks. SCORE portfolios give better results for sortings based on P/E and when we employed a cross-section–time series medians approach. Results remain robust for a time period out of sample, for negative P/E or P/B ratio firms and for the firms that were excluded from SCORE-based performance, namely, AMEX stocks, stocks with high business risk and firms that reported extraordinary items the year before.

Finally, we provide evidence that the return of a portfolio strategy that buys (sells) stocks that rank low (high) in the composite score indicator has significant explanatory power in an asset pricing model framework and that such

a strategy earns statistically significant positive returns.

The rest of this paper is structured as follows. Section 2 develops the research questions and forms related expectations. Section 3 details the data sources, sample selection and methodology. Section 4 reports the empirical results, constructs a composite score indicator and tests the performance of strategies based on this indicator in an asset pricing framework, Section 5 presents some further analysis and Section 6 concludes the paper and discusses the implications of findings and future research directions.

2 Research questions and formation of expectations

2.1 Value stocks should outperform growth stocks: The value premium

Based on prior research (see, for example, Basu, 1977; Chan *et al.*, 1991; Fama and French, 1992, 1993, 1995, 1996; Lakonishok *et al.*, 1994; Chan and Lakonishok, 2004; Athanassakos, 2009, 2011a), either due to higher risk or underpricing due to excess pessimism, value stocks in our sample should have higher return than growth stocks.

2.2 Stock price performance in relation to company historical financial statements and market-related information: Setting the basis for the composite indicator

In this section, following Athanassakos (2013), we examine a number of company fundamentals and market variables/metrics and their relationship with a stock's performance and set the basis for constructing the composite indicator. The metrics examined are stock liquidity, firm size and measures of profitability, efficiency, financial leverage/liquidity, business risk and occurrence of extraordinary items and/or restatement of financial statements.

2.2.1 Stock liquidity

Baker and Stein (2004) and Fang *et al.* (2008) show that high liquidity stocks have higher P/E and P/B ratios and lower expected returns and vice versa.

At the same time, value stocks, normally low liquidity stocks, are avoided by institutional investors who have too much money to invest in and low liquidity stocks do not provide enough depth to make investing worthwhile (see Ackert and Athanassakos, 2003). Because of this, the stock of such companies may be undervalued.

We expect a negative relationship between stock liquidity and stock returns. In this paper, we proxy liquidity with the ratio of trading volume (for the year prior to May of year (t)) to shares outstanding as at the end of April of year (t) (see Datar *et al.*, 1998).

2.2.2 Firm size

Kothari *et al.* (1995) find that the value premium is stronger for small cap stocks. Athanassakos (2011a) reports that value stocks tend to be smaller than growth stocks. At the same time, many institutional investors tend to avoid smaller cap stocks as they have too much money to manage and such stocks cannot absorb enough flow (see Greenwald *et al.*, 2001). Moreover, Ackert and Athanassakos (2003) find that smaller cap companies tend to be followed by fewer analysts. As a result, smaller cap companies tend to be less in the public eye than larger companies. This leads to the possible underpricing of smaller stocks vis-à-vis larger stocks.

We expect a negative relationship between firm size (market cap) and stock returns. In this paper, we estimate market cap by multiplying price per share times shares outstanding at the end of April of year (t).

2.2.3 *Profitability*

Current and historical firm profitability, at all levels of the income statement, gives an investor confidence about the company's ability to generate profitability and growth in the future, too.

Piotroski (2000) finds that value firms have poorer historical earnings growth than growth stocks. Value stocks' poorer historical earnings growth may prompt investors to become overly pessimistic about the future profitability of such stocks leading to underpricing and better future stock performance (and vice versa for growth stocks). As a result, consistent with reversion to the mean, we expect that historical profitability growth will be negatively related to stock returns. On the other hand, consistent with momentum in profitability, we expect that profitability growth will be positively related to stock returns.

In this paper, we measure profitability growth by prior year's (i.e., year $(t-1)$) annual EPS, EBIT and revenue growth rates.

2.2.4 *Efficiency*

A management team that manages well the balance sheet and income statement is said to be efficient. In this paper, we will use asset turnover (Asset/Revenues) to measure how efficiently a firm manages its balance sheet and operating margin (EBIT/Revenues) to measure how well a company manages its income statement. The **inverse** of asset turnover and operating margin are two components of the before tax return on invested capital (ROIC). A firm that manages to earn an ROIC over its cost of capital creates value.

Since, as reported earlier, there is plenty of evidence to indicate that value stocks outperform growth stocks, we expect that value firms have better or, at least, no worse **inverse** of asset turnover and/or operating margin than growth firms. Moreover, we expect that these metrics' historical performance is positively related to stock returns.

2.2.5 *Leverage and liquidity*

Fama and French (1995) argue that value firms are more financially distressed than growth firms. Having more debt (in relation to equity) than is optimal adds to financial distress, especially in bad economic times. Moreover, Hecht (2002) shows that financial leverage drives the value premium. At the same time, a company which cannot meet its short-term obligations, namely, a low liquidity firm, can also be viewed as being in financial distress.

We expect leverage to be positively and liquidity to be negatively related to stock returns. In this paper, we measure leverage by the total debt (short-term debt plus long-term debt plus financial leases) to equity ratio, and liquidity by the current ratio (cash plus short-term investments plus accounts receivable plus inventories over current liabilities) and cash to assets.

2.2.6 *Occurrence of extraordinary items and/or restatement of financial statements*

A firm that practices aggressive revenue recognition, among other things, will tend to restate its historical financials or will tend to frequently incur non-recurring charges. This may imply that either the manager does not understand the business well or there are conflicts that affect his/her performance. Firms that have historically restated their financials frequently and/or incurred non-recurring charges are not trusted by the markets and, thus, are considered riskier.[7] This may depress their stock price affording them a better future performance.

In this paper, we use a binary variable that takes on the value of 1 if a company reports extraordinary items/non-recurring charges in the prior year and 0 if it does not. We expect firms that report extraordinary items to outperform firms that do not and stock returns to be positively related to historical occurrence of extraordinary charges.

2.2.7 Business risk

While there is plenty of evidence to support the existence of a value premium, there is little research to examine whether value stocks belong to riskier industry sectors than growth stocks, which may justify value stocks' higher returns.

We examine the relationship between business risk and value and growth stock returns. The various industry groups are categorized into three business risk categories—low, medium and high, based on findings by Athanassakos (1998), as explained in Section 3.

We expect a positive relationship between the business risk classifications referred to above and stocks returns.

2.3 Stock performance indicator: A composite score—another step in the value investing process

The relationship of stock returns with the company fundamentals and market metrics discussed above will set the basis for the construction of a composite indicator. We will test the indicator's ability to separate outperforming value and growth stocks from underperforming ones. The methodology and determination of the composite indicator will be explained and discussed later.

We expect value and growth stocks that have better composite indicator values to outperform those with worse composite indicator values.

3 Data and methodology

Our sample includes companies that traded on AMEX, NASDAQ and NYSE US Stock Exchanges for the period 1969–2011, as well as their financials for the period 1968–2009.

This paper uses data from COMPUSTAT from which trailing price to earnings (P/E), total returns, stock liquidity, market cap and firm fundamentals are derived.[8] For the trailing P/E (P/B) ratios, the price (P) is as of the end of April of year (t) and E (B) is the fully diluted annual earnings per share (book value per share) for companies with fiscal year end in year ($t-1$), as reported in COMPUSTAT.[9] Annual total stock returns are calculated as the price change plus the dividend from May 1 of year (t) to April 30 of year ($t+1$) over the price in May 1 of year (t).

Firm fundamentals, derived from company financials, are defined as follows: CASH is cash over assets. EBIT Margin is EBIT over Revenues. TURNOVER is assets over revenues (times). CURRENT RATIO is the ratio of cash plus short-term investments, inventories and accounts receivable to current liabilities (times). DEBT is short- and long-term debt as well as financial leases to equity. REV Growth, EBIT Growth and EPS Growth are the annual growth rates of revenues, EBIT and EPS, respectively for fiscal year ($t-1$). Market metrics are defined as follows: MARKET CAP is derived by multiplying price per share times shares outstanding at the end of April of year (t). LIQUIDITY is the annual trading volume of the year prior to May of year (t) over shares outstanding as at April of year (t). We also construct the following variables: EXTRA is a binary variable signifying the occurrence of reporting extraordinary charges and restating historical financials in year ($t-1$) or not (yes = 1, no = 0). BRISK is the industry code that captures an industry's business risk (1 = low business risk, 2 = medium business risk and 3 = high business

risk). BRISK assigns industry groups from COMPUSTAT to business risk categories which are based on the results reported by Athanassakos (1998).

The industries belonging to each of the three business risk categories referred to above are from Athanassakos (2013).

To prevent problems arising from including negative P/E (P/B) ratio firms, and eliminate likely data errors (see Griffin and Lemmon, 2002; Cohen *et al.*, 2003), we have excluded firms with negative P/E or P/B ratios and those with P/E values over 500 and P/B values over 30.[10] Finally, to be included in our sample a stock had to have a price over $1 and to have reported financials in COMPUSTAT.[11]

After all aforementioned screenings, we end up with 90,423 cross-sectional–time series (firm-year) observations belonging to a cumulative number of 8,570 unique companies. Of those companies 1,217 are listed on AMEX, 3,244 on NYSE and 4,109 on NASDAQ.

At the end of April of every year (t), starting in 1969, firms are ranked based on trailing P/E or P/B ratios from low to high and the ranked firms are divided into four groups of equal size. Quartile-1 (Q_1) is the lowest P/E or P/B ratio portfolio or the value stocks, while Quartile-4 (Q_4) is the highest P/E or P/B ratio portfolio or the growth stocks. This process is repeated for each year of our sample. For each stock within each quartile, total returns are calculated for the following year (i.e., May year (t) to April year ($t+1$)) and equally weighted mean (and median) returns for each quartile are derived (see Fama and French, 1992; Lakonishok *et al.*, 1994).[12]

Non-overlapping forward annual stock returns (adjusted for stock splits and stock dividends) are thus obtained from May 1, 1969 to April 30, 2011. Trailing company fundamentals, as defined earlier, are for the period 1968–2009. Uni(bi)variate analysis is carried out that looks at value and growth stock performance and the relationship of value and growth stock returns with company fundamentals, firm size and stock liquidity. A composite score indicator is constructed based on the methodology discussed in Section 4.5. The composite score indicator's ability to differentiate outperforming from underperforming value and growth stocks and better forecast future value and growth stock returns is examined and the performance of strategies based on this indicator is analyzed in an asset pricing framework.

4 Empirical results

4.1 Summary statistics

Table 1 reports the summary statistics of key variables for the AMEX (Panel A), NASDAQ (Panel B), NYSE (Panel C) and All Exchanges (Panel D) firms included in our sample. The table includes the mean, median, minimum and maximum of each variable.

The statistics reported in Table 1 indicate important differences across exchanges. AMEX stocks have lower valuation statistics and returns than NASDAQ and NYSE. Moreover, AMEX firms have better asset turnover, but inferior other key financials such as EBIT margin, EPS, EBIT and Revenue growth rates, stock liquidity and market cap than NASDAQ and NYSE firms. As one would expect, NASDAQ stocks have the least debt to equity ratio while NYSE the highest, given the type of industries these exchanges tend to attract.

The EBIT margin and asset turnover for the median AMEX firm in the sample are 7.90% and 0.724, respectively. The figures for NASDAQ and NYSE are 9.40% and 0.848% and 10.6% and 0.895%, respectively. The median growth

Table 1 Descriptive statistics.

Variable	Median	Mean	Maximum	Minimum
Panel A: *AMEX*				
EBIT margin	0.079	0.101	0.935	−6.051
Current ratio	2.245	2.968	96.825	0.000
Cash	0.036	0.064	0.997	−0.099
Debt	0.290	0.307	1.000	0.000
Turnover	0.724	1.248	117.282	0.058
EPS growth	0.030	0.229	156.000	−92.000
EBIT growth	0.120	0.107	395.270	−1993.000
REV growth	0.120	0.405	894.820	−0.970
Liquidity	0.229	0.380	23.107	0.000
Market Cap	19.811	169.740	79251.000	0.576
Return	0.024	0.127	12.210	−0.925
P/E	12.354	23.539	500.000	0.043
P/B	1.271	1.877	28.656	0.079
Panel B: *NASDAQ*				
EBIT margin	0.094	0.111	1.334	−22.820
Current ratio	2.537	3.348	113.380	0.090
Cash	0.067	0.127	0.982	−0.063
Debt	0.150	0.212	0.980	−0.060
Turnover	0.848	1.226	864.222	0.059
EPS growth	0.020	0.091	295.000	−3212.430
EBIT growth	0.160	0.231	3372.000	−1714.220
REV growth	0.160	0.568	6500.800	−199.290
Liquidity	0.776	1.417	272.905	0.000
Market Cap	100.261	1093.190	596475.750	0.027
Return	0.054	0.185	22.875	−0.967
P/E	18.806	32.363	500.000	0.006
P/B	2.099	2.986	29.591	0.000
Panel C: *NYSE*				
EBIT margin	0.106	0.132	1.205	−9.647
Current ratio	1.870	2.164	90.887	0.000
Cash	0.028	0.055	0.961	−0.058
Debt	0.340	0.343	1.170	0.000
Turnover	0.895	1.321	286.178	0.063
EPS growth	0.060	0.183	823.000	−288.650
EBIT growth	0.130	0.137	727.530	−1579.080
REV growth	0.110	0.195	249.680	−1.010
Liquidity	0.440	0.771	20.577	0.000
Market Cap	485.648	3822.698	504239.580	0.163

Table 1 (*Continued*)

Variable	Median	Mean	Maximum	Minimum
Panel C (*Continued*)				
Return	0.104	0.167	9.178	−0.991
P/E	14.993	21.673	500.000	0.130
P/B	1.796	2.513	29.824	0.000
Panel D: *Total sample*				
EBIT margin	0.099	0.121	1.334	−22.820
Current ratio	2.104	2.676	113.370	0.000
Cash	0.037	0.082	0.997	−0.099
Debt	0.280	0.292	1.170	−0.060
Turnover	0.857	1.279	864.222	0.058
EPS growth	0.050	0.156	823.000	−3212.430
EBIT growth	0.140	0.167	3372.000	−1993.000
REV growth	0.130	0.351	6500.800	−199.290
Liquidity	0.479	0.947	272.905	0.000
Market Cap	182.477	2430.306	596475.750	0.027
Return	0.080	0.169	22.875	−0.991
P/E	15.866	25.679	500.000	0.006
P/B	1.825	2.607	29.824	0.000

The table reports summary information for 90,423 firm-year observations of 8,570 unique firms that are listed on US exchanges. Of those companies, 1,217 companies are listed on AMEX, 3,244 on NYSE and 4,109 on NASDAQ. All data are from COMPUSTAT and are available from 1968–2011. P/E is price as at April of year (t) over earnings per share as fiscal year end ($t-1$). P/B is price as at April of year (t) over book value per share as fiscal year end ($t-1$). Return is the annual return for the year following the sorting into portfolios. Cash is cash over assets. EBIT Margin is EBIT over Revenues. Turnover is assets over revenues (times). Liquidity is trading volume for the year prior to May of year (t) as a percentage of shares outstanding. Current Ratio is the ratio of cash plus short-term investments, inventories and accounts receivable to current liabilities (times). Market Cap is market cap in millions of US dollars determined by multiplying shares outstanding by price per share as at April of year (t). Debt is short- and long-term debt as well as financial leases to equity. REV, EBIT and EPS growth are the annual growth rates of revenues, EBIT and EPS, respectively for the fiscal year ($t-1$).

rates of revenues, EPS and EBIT have been positive over the sample period for all exchanges, with NASDAQ stocks experiencing the fastest EBIT and revenue growth and NYSE stocks the fastest EPS growth. The median firm is not overleveraged as indicated by the debt to equity ratio—NYSE's debt to equity at .34 is the highest among all exchanges. The median market cap for AMEX stocks is US$19.81 million, for NASDAQ US$100.3 million and for NYSE US$485.6 million. As it should be expected NASDAQ stocks have maintained the highest level of cash in their balance sheet and have the highest current ratio with median values of 6.7% and 2.54, respectively. Finally, the median AMEX firm has traded about 23%, the median NASDAQ firm 78% and the median NYSE firm 44% of the shares outstanding over the previous year. In all exchanges there is a large difference between the mean and median stock returns (and of the other variables) indicating many positive outliers in the sample.[13]

4.2 Univariate analysis

4.2.1 The value premium over time and at different states of the world

Table 2, Panels A and B, reports, respectively, the median annual stock returns of P/E and P/B sorted quartiles for all exchanges and the value premium ($Q_1 - Q_4$) per year, subperiod and total sample. A value premium exists in our sample of US stocks under both sorting procedures. The median value premium, based on P/E sorting, is 7.57%—not reported here, the median value premium is 8.3% for AMEX, 6.7% for NYSE and 8.5% for NASDAQ stocks. Based on P/B sorting, the median annual value premium is 5.77%—not reported here, the median value premium is 10.4% for AMEX, 4.2% for NYSE and 7.5% for NASDAQ stocks. The value premium is economically and statistically significant at traditional levels of significance, using median tests, for the May 1, 1969 to April 30, 2011 period, as expected according to Section 2.1 and consistent with previous evidence (see Athanassakos, 2009, 2011a).

Table 2, Panels A and B, also reports the value premium for two subperiods. They purport to show the evolution of the value premium from May 1, 1969–April 30, 1988 to May 1, 1989–April 30, 2011. As can be seen from these panels, there is a positive and statistically significant median value premium in both subperiods and under

Table 2 Median annual stock returns to P/E or P/B ratio (April, trailing) based value and growth strategies by year, subperiod, total sample and state of the world: May 1, 1969–April 30, 2011.

	P/E ratio sorted quartiles				Value premium
Year	Q_1 (Value) Return	Q_2 and Q_3 Return	Q_4 (Growth) Return	Total Return	$Q_1 - Q_4$ Return
Panel A: *P/E based sorting*					
1969	−0.2435	−0.3145	−0.4137	−0.3202	0.1702
1970	0.4275	0.3342	0.2690	0.3333	0.1585
1971	0.0144	0.0727	0.1004	0.0579	−0.0860
1972	−0.1160	−0.2874	−0.3128	−0.2617	0.1967
1973	−0.1805	−0.1606	−0.1447	−0.1624	−0.0357
1974	−0.0284	0.0269	−0.0193	0.0000	−0.0091
1975	0.4922	0.3409	0.1707	0.3206	0.3215
1976	0.2136	0.1523	−0.0068	0.1269	0.2205
1977	0.3303	0.1752	0.1408	0.2051	0.1895
1978	0.1677	0.1278	0.1700	0.1509	−0.0022
1979	−0.0116	0.0331	0.1020	0.0330	−0.1137
1980	0.5339	0.4745	0.5141	0.5009	0.0198
1981	−0.0368	−0.1238	−0.2391	−0.1367	0.2023
1982	0.5705	0.5737	0.6018	0.5760	−0.0312
1983	0.0992	−0.0117	−0.1194	−0.0241	0.2186
1984	0.2431	0.1416	−0.0421	0.1134	0.2852
1985	0.4059	0.3131	0.2500	0.3185	0.1559
1986	0.1731	0.1001	0.0333	0.1051	0.1398

Table 2 (*Continued*)

Year	P/E ratio sorted quartiles: Q_1 (Value) Return	Q_2 and Q_3 Return	Q_4 (Growth) Return	Total Return	Value premium $Q_1 - Q_4$ Return	
Panel A (*Continued*)						
1987	−0.0090	−0.1186	−0.0457	−0.0568	0.0366	
1988	0.1708	0.1363	0.1010	0.1386	0.0698	
1989	−0.0153	0.0191	0.0028	0.0073	−0.0181	
1990	0.0416	0.1032	0.0535	0.0814	−0.0119	
1991	0.1249	0.1247	0.0500	0.1109	0.0749	
1992	0.0909	0.0853	0.0485	0.0813	0.0424	
1993	0.0798	0.0667	0.0859	0.0728	−0.0061	
1994	0.0562	0.0677	0.0552	0.0657	0.0010	
1995	0.1752	0.2170	0.2602	0.2185	−0.0851	
1996	0.0465	0.0583	−0.1004	0.0145	0.1469	
1997	0.3796	0.3510	0.3398	0.3586	0.0399	
1998	−0.2052	−0.1563	−0.1847	−0.1758	−0.0205	
1999	−0.0320	−0.0216	0.1096	0.0058	−0.1415	
2000	0.0779	0.1166	−0.1891	0.0226	0.2670	
2001	0.2153	0.1474	−0.0206	0.1066	0.2359	
2002	−0.0993	−0.1344	−0.1755	−0.1428	0.0762	
2003	0.5874	0.3730	0.3542	0.4113	0.2332	
2004	0.1815	0.0854	0.0131	0.0837	0.1684	
2005	0.3101	0.2012	0.2934	0.2474	0.0167	
2006	0.1676	0.1103	0.0768	0.1099	0.0908	
2007	−0.0802	−0.0887	−0.1341	−0.0994	0.0539	
2008	−0.3973	−0.3250	−0.3906	−0.3586	−0.0067	
2009	0.5739	0.3946	0.3846	0.4309	0.1893	
2010	0.0214	0.1751	0.2487	0.1609	−0.2272	
						$Q_1 \neq Q_4$
						P-values
1968–1988	0.1286	0.0948	0.0282	0.0844	0.1005	< 0.0001
1989–2010	0.0954	0.0858	0.0413	0.0767	0.0541	< 0.0001
1968–2010	0.1111	0.0897	0.0354	0.0800	0.0757	< 0.0001

	No. of observations: Q_1 (Value)	Q_2 and Q_3	Q_4 (Growth)
1968–1988	8470	19164	10852
1989–2010	10805	26553	14579
1968–2010	19275	45717	25431

Table 2 (*Continued*)

	P/B ratio sorted quartiles				Value premium
Year	Q_1 (Value) Return	Q_2 and Q_3 Return	Q_4 (Growth) Return	Total Return	$Q_1 - Q_4$ Return
Panel B: *P/B based sorting*					
1969	−0.2460	−0.3428	−0.3762	−0.3202	0.1302
1970	0.3571	0.3236	0.3242	0.3333	0.0329
1971	0.0392	0.0334	0.2001	0.0579	−0.1609
1972	−0.1675	−0.2895	−0.2858	−0.2617	0.1183
1973	−0.1351	−0.1667	−0.1773	−0.1624	0.0422
1974	−0.0096	0.0131	−0.0135	0.0000	0.0039
1975	0.5012	0.3409	0.1511	0.3206	0.3501
1976	0.2084	0.1597	−0.0103	0.1269	0.2187
1977	0.2891	0.1959	0.1561	0.2051	0.1329
1978	0.1600	0.1322	0.1693	0.1509	−0.0093
1979	−0.0027	0.0222	0.1394	0.0330	−0.1421
1980	0.5000	0.4946	0.5416	0.5009	−0.0416
1981	−0.0707	−0.1241	−0.2464	−0.1367	0.1757
1982	0.6221	0.5536	0.5964	0.5760	0.0257
1983	0.1260	−0.0266	−0.1614	−0.0241	0.2874
1984	0.1549	0.1171	0.0367	0.1134	0.1182
1985	0.3039	0.3126	0.3527	0.3185	−0.0488
1986	0.1585	0.1034	0.0450	0.1051	0.1135
1987	−0.0090	−0.0402	−0.1357	−0.0568	0.1267
1988	0.1579	0.1340	0.1254	0.1386	0.0325
1989	−0.0411	0.0000	0.0862	0.0073	−0.1272
1990	−0.0009	0.0806	0.1779	0.0814	−0.1788
1991	0.1230	0.1173	0.0746	0.1109	0.0484
1992	0.1275	0.0981	0.0050	0.0813	0.1225
1993	0.1347	0.0674	0.0314	0.0728	0.1033
1994	0.0667	0.0671	0.0583	0.0657	0.0084
1995	0.1605	0.2147	0.3030	0.2185	−0.1425
1996	0.0625	0.0256	−0.1096	0.0145	0.1721
1997	0.3767	0.3229	0.3904	0.3586	−0.0138
1998	−0.1742	−0.2039	−0.1051	−0.1758	−0.0691
1999	0.0472	−0.0312	0.0658	0.0058	−0.0185
2000	0.0807	0.0940	−0.2159	0.0226	0.2966
2001	0.2485	0.1131	−0.0117	0.1066	0.2602
2002	−0.1274	−0.1559	−0.1301	−0.1428	0.0027
2003	0.6456	0.3813	0.3046	0.4113	0.3409
2004	0.1573	0.0797	0.0342	0.0837	0.1231
2005	0.2962	0.2495	0.1934	0.2474	0.1028
2006	0.1665	0.0884	0.0649	0.1099	0.1016

Table 2 (*Continued*)

	P/B ratio sorted quartiles				Value premium	
Year	Q_1 (Value) Return	Q_2 and Q_3 Return	Q_4 (Growth) Return	Total Return	$Q_1 - Q_4$ Return	
Panel B (*Continued*)						
2007	−0.1674	−0.0839	−0.0695	−0.0994	−0.0978	
2008	−0.3973	−0.3507	−0.3413	−0.3586	−0.0560	
2009	0.6110	0.4079	0.3677	0.4309	0.2434	
2010	0.1151	0.1586	0.2404	0.1609	−0.1253	
						$Q_1 \neq Q_4$
						P-values
1968–1988	0.1227	0.0821	0.0450	0.0844	0.0777	< 0.0001
1989–2010	0.0997	0.0761	0.0547	0.0767	0.0450	< 0.0001
1968–2010	0.1096	0.0789	0.0519	0.0800	0.0577	< 0.0001
	No. of observations					
	Q_1 (Value)	Q_2 and Q_3	Q_4 (Growth)			
1968–1988	9614	19254	9618			
1989–2010	12978	25976	12983			
1968–2010	22592	45230	22601			

This table reports median annual returns of value, growth, other and total sample of US stocks for the period May 1, 1969–April 30, 2011. Every year, starting in April 30, 1969, firms are ranked based on P/E (Panel A) or P/B (Panel B) ratios from low to high and the ranked firms are divided into four groups of equal size. Returns are then obtained for the following year starting in May 1, 1969. This table reports the median subsequent annual returns of prior April P/E (P/B) sorted quartiles (from lowest (Q_1) to highest (Q_4)), respectively and the value premium (Q_1–Q_4) per year, subperiod (1968–1988 and 1989–2010) and total sample (1968–2010). P-values for the median tests are based on χ^2 tests for testing the null hypothesis that the median returns of the value and growth strategies are equal. Return stands for the annual subsequent year returns of the sample stocks. P/E stands for the ratio of the price per share at the end of a given April divided by trailing earnings per share as at the end of fiscal year of the year before. P/B stands for the ratio of the price per share at the end of a given April divided by trailing book value per share (BVPS) as at the end of fiscal year of the year before. Annual stock returns, price per share, trailing EPS and trailing BVPS are from COMPUSTAT.

both sorting procedures. Moreover, the hypothesis that the median value premiums are equal across subperiods is rejected at traditional levels of significance. The value premium has declined significantly over time for the stocks in our sample. This finding may indicate that arbitrage has worked in the US exchanges, even though impediments to arbitrage, arising from the existence of behavioral/institutional factors (see Barberis and Shleifer, 2003; D'Avolio, 2002), may have prevented the value premium from being completely eliminated over time.[14]

Finally, an examination of the value premium per annum in Table 2, Panels A and B, shows that the median value premium is positive irrespective of whether there is a bull or bear market or there is a recession or recovery under both the P/E and P/B sorting procedures.[15] These findings are in line with those of Chan and Lakonishok (2004) and Athanassakos (2009, 2011a).

Not reported here, on average, over the period May 1, 1969–April 30, 2011, about 39% of the

Table 3 Mean and median annual returns for value and growth stocks (based on P/E or P/B sortings) by reporting of extraordinary items and/or restating financial statements in the prior year: May 1, 1969–April 30, 2011.

		Value (Q_1)			Growth (Q_4)		Value premium	
Extraordinary items	OBS	Mean	Median	OBS	Mean	Median	Mean	Median
				Panel A: AMEX				
				P/E				
No reporting	2722	0.178	0.063	2172	0.092	−0.009	0.087	0.072
Reporting	509	0.174	0.043	716	0.075	−0.063	0.099	0.107
				P/B				
No reporting	2616	0.205	0.100	1508	0.089	−0.021	0.115	0.121
Reporting	578	0.205	0.064	410	0.132	−0.034	0.073	0.098
				Panel B: NYSE				
				P/E				
No reporting	7922	0.226	0.142	9356	0.145	0.064	0.081	0.079
Reporting	1236	0.213	0.136	1819	0.145	0.074	0.068	0.062
				P/B				
No reporting	5840	0.245	0.156	10259	0.168	0.102	0.077	0.054
Reporting	1226	0.242	0.144	1456	0.175	0.102	0.067	0.042
				Panel C: NASDAQ				
				P/E				
No reporting	5815	0.254	0.095	9822	0.163	0.014	0.090	0.081
Reporting	518	0.244	0.114	1219	0.149	0.000	0.095	0.114
				P/B				
No reporting	5329	0.278	0.128	8327	0.188	0.053	0.090	0.075
Reporting	566	0.285	0.115	965	0.150	0.000	0.135	0.115

All mean and median returns for value stocks are statistically different from the corresponding returns for growth stocks at least at the 5% level of significance.

value stocks had a negative return as opposed to 47% for the growth stocks.

4.2.2 The value premium for firms reporting or not extraordinary items

Table 3 reports the mean and median returns of value and growth stocks depending on whether firms report extraordinary items or not. It shows that value stock returns always exceed those of growth stocks, irrespective of reporting or not extraordinary items, the exchange or the sorting procedure. For AMEX and NYSE, in almost all cases, both mean and median value premiums are higher when a firm is not reporting extraordinary items than when it is, although only half of the

time the differences are statistically different from zero at traditional levels of significance. However, for NASDAQ, the value premium for firms reporting extraordinary items is always higher than that of the non-reporting firms and is mostly statistically significant. In general, value firms report less frequently extraordinary items than growth firms. Moreover, contrary to our expectations discussed in Section 2.2.6, value firms for AMEX and NYSE firms that report extraordinary items have lower returns than firms that do not. It is the opposite for NASDAQ firms, which, however, is consistent with expectations discussed in Section 2.2.6. As far as growth firms, AMEX and NASDAQ firms that report extraordinary items have lower returns than firms that do not. The opposite is the case for NYSE firms. However, results are not always statistically significant at traditional levels of significance.

4.2.3 The value premium across business risk categories

Table 4 reports the mean and median annual value and growth stock returns per business risk category within which the companies in our sample belong. Overall, for value firms, there are about 23% of firms in the low business risk category, 43% in the medium risk category and 34% in the high business risk category. The corresponding numbers for growth firms are 21%, 35% and 43%, respectively. There are many more high business risk growth firms than value firms. This is primarily driven by the NASDAQ stocks, as for the other exchanges most growth firms are in the medium business risk category, as is the case for the value firms. In all three business risk categories, value stocks outperform growth stocks by a wide margin, in all exchanges and under both sorting procedures. There is no single business risk group that contributes to the outperformance of value vs growth stocks. While in every business risk category value outperforms growth in almost all cases, the value premium reaches its highest value in the medium risk category and statistically/economically declines as we go from medium to high business risk category. However, not consistent with the expectation set forth in Section 2.2.7, there is no clear relationship between business risk for the various exchanges and value and growth stock returns.

Findings in this section reinforce evidence reported in Section 4.1 that there are distinct differences between US exchanges which means that papers that aggregate all US exchanges under one umbrella may dilute findings and bias conclusions.

4.3 Bivariate analysis

In this section, we sub-divide the P/E and P/B sorted quartiles, independently, into two groups (above and below median) by cash/assets (CASH), current ratio (CURRENT), asset turnover (TURNOVER), operating margin (MARGIN), Revenue growth (REVG), EBIT growth rate (EBITG), EPS growth rate (EPSG), stock liquidity (LIQUIDITY), firm-size (MARKET CAP) and debt to equity ratio (DEBT) and examine not only whether value outperforms growth for above and below median groups of the aforementioned variables, but also how value and growth stock returns evolve as we go from below to above median values of the above variables and the relationship of value and growth stock returns with company fundamentals and market metrics. However, we only report here the evidence when sorting independently by CASH, TURNOVER, EBITG, DEBT, LIQUIDITY and MARKET CAP, as the combination of these six fundamental and market metrics produced a composite indicator with the best forecasting ability compared to any other six variable combination.[16]

Table 4 Mean and median annual returns for value and growth stocks (based on P/E or P/B sortings) by business risk group: May 1, 1969–April 30, 2011.

		Value (Q_1)			Growth (Q_4)		Value premium	
Business risk	OBS	Mean	Median	OBS	Mean	Median	Mean	Median
				Panel A: AMEX				
				P/E				
Low	375	0.167	0.114	342	0.068	−0.031	0.099	0.144
Medium	1103	0.180	0.055	1206	0.102	−0.012	0.078	0.066
High	605	0.194	0.095	565	0.133	0.000	0.061	0.095
				P/B				
Low	1464	0.228	0.138	2595	0.190	0.130	0.038	0.008
Medium	2681	0.258	0.166	4420	0.156	0.098	0.101	0.069
High	2131	0.242	0.151	4005	0.174	0.099	0.067	0.052
				Panel B: NYSE				
				P/E				
Low	2118	0.193	0.110	2214	0.154	0.074	0.039	0.036
Medium	3665	0.239	0.160	4299	0.145	0.077	0.094	0.083
High	2740	0.224	0.134	3839	0.151	0.057	0.074	0.077
				P/B				
Low	378	0.182	0.106	255	0.108	−0.013	0.074	0.119
Medium	1172	0.189	0.089	791	0.121	−0.018	0.068	0.107
High	565	0.231	0.115	379	0.138	−0.005	0.093	0.120
				Panel C: NASDAQ				
				P/E				
Low	1360	0.262	0.118	2371	0.161	0.035	0.101	0.084
Medium	2509	0.262	0.111	2784	0.156	0.015	0.106	0.097
High	2433	0.238	0.063	5853	0.166	0.001	0.072	0.062
				P/B				
Low	1301	0.287	0.155	2182	0.190	0.083	0.097	0.072
Medium	2381	0.274	0.126	2353	0.154	0.034	0.120	0.091
High	2181	0.278	0.114	4726	0.197	0.037	0.082	0.076

All mean and median returns for value stocks are statistically different from the corresponding returns for growth stocks at least at the 5% level of significance.

As evidence in the preceding sections showed that AMEX stocks and stocks that report extraordinary items had lower stock returns over time and against companies not-reporting extraordinary items than other stocks in the sample, and as high business risk groups had generally lower returns combined with their higher business risk, which is something that value investors are averse to,[17]

from now on our sample will exclude AMEX stocks, high business risk stocks and stocks that report extraordinary items.[18]

4.3.1 *Value and growth stock returns and asset turnover*

The value and growth quartiles are now independently sorted by asset turnover (TURNOVER). Table 5 reports the mean and median annual returns of value (lowest quartile, Q_1) and growth (highest quartile, Q_4) portfolios which are sorted by TURNOVER into portfolios of below and above median TURNOVER values. Panels A and B employ a contemporaneous medians approach, while Panels C and D a cross-section–time series medians approach to calculate above and below fundamental medians returns for value and growth stocks. The difference in these approaches is explained in detail in Section 4.5.

We see that in all Panels, value stocks outperform growth stocks irrespective of TURNOVER. We also see that in all Panels within both value and growth stocks, below median turnover stocks earn returns that exceed those of median turnover stocks[19]; the mean differences are statistically

Table 5 Mean and median annual returns for stocks with TURNOVER, EBIT MARGIN, REVENUE GROWTH, EBIT GROWTH, EPS GROWTH, LIQUIDITY, DEBT, CASH, CURRENT RATIO and MARKET CAP which are above or below their contemporaneous (Panels A and B) and cross-section–time series (Panels C and D) median values for value and growth stocks: May 1, 1969–April 30, 2011.

		Value (Q_1)			Growth (Q_4)	
	OBS	Mean	Median	OBS	Mean	Median
Panel A: *By P/E sorting*						
Cash						
Below median	4970	**0.226**	**0.129**	5730	**0.126**	0.051
Above median	4128	**0.257**	**0.141**	4824	**0.174**	0.056
Turnover						
Below median	4555	**0.255**	0.125	5285	**0.166**	0.053
Above median	4540	**0.225**	0.138	5273	**0.128**	0.052
EBITG						
Below median	4581	**0.227**	0.140	5320	0.155	0.056
Above median	4414	**0.253**	0.123	5133	0.141	0.045
Debt						
Below median	4484	**0.230**	0.130	5227	0.159	0.045
Above median	4447	**0.251**	0.137	5137	**0.138**	**0.061**
Market Cap						
Below median	4576	**0.291**	**0.140**	5307	**0.190**	**0.046**
Above median	4518	**0.189**	**0.128**	5251	**0.106**	**0.059**
Liquidity						
Below median	4744	**0.262**	**0.153**	5654	0.149	**0.061**
Above median	4349	**0.217**	**0.110**	4905	0.146	**0.038**

Table 5 (*Continued*)

		Value (Q_1)			Growth (Q_4)	
	OBS	Mean	Median	OBS	Mean	Median
Panel B: *By P/B sorting*						
Cash						
Below median	4055	**0.239**	**0.136**	5831	**0.136**	**0.079**
Above median	3355	**0.285**	**0.168**	4934	**0.206**	**0.107**
Turnover						
Below median	3711	**0.288**	0.153	5392	**0.187**	0.096
Above median	3692	**0.231**	0.145	5374	**0.148**	0.088
EBITG						
Below median	3713	**0.236**	**0.143**	5365	0.161	0.090
Above median	3622	**0.288**	**0.160**	5221	0.173	0.090
Debt						
Below median	3658	0.261	0.153	5364	**0.176**	0.089
Above median	3612	0.261	0.146	5252	**0.160**	0.092
Market Cap						
Below median	3720	**0.305**	**0.163**	5417	**0.208**	0.092
Above median	3682	**0.212**	**0.138**	5349	**0.128**	0.092
Liquidity						
Below median	3807	**0.274**	**0.163**	5798	**0.173**	**0.098**
Above median	3600	**0.245**	**0.130**	4973	**0.162**	**0.082**
Panel C: *By P/E sorting*						
Cash						
Below median	5006	**0.228**	0.132	5767	**0.129**	0.049
Above median	4109	**0.255**	0.135	4807	**0.170**	0.060
Turnover						
Below median	4590	**0.260**	0.137	5303	**0.163**	0.049
Above median	4524	**0.221**	0.130	5270	**0.133**	0.057
EBITG						
Below median	4522	**0.214**	0.130	5227	0.157	0.053
Above median	4467	**0.266**	0.138	5237	0.146	0.052
Debt						
Below median	4550	**0.222**	**0.121**	5195	**0.160**	0.046
Above median	4428	**0.256**	**0.143**	5250	**0.136**	0.059
Market Cap						
Below median	4617	**0.302**	**0.154**	5328	**0.197**	0.057
Above median	4497	**0.177**	**0.118**	5245	**0.098**	0.049

Table 5 (*Continued*)

		Value (Q_1)			Growth (Q_4)	
	OBS	Mean	Median	OBS	Mean	Median
Panel C (*Continued*)						
Liquidity						
Below median	4779	**0.272**	**0.156**	5687	**0.155**	**0.060**
Above median	4336	**0.205**	**0.101**	4886	**0.139**	**0.042**
Panel D: *By P/B sorting*						
Cash						
Below median	4076	**0.241**	**0.140**	5898	**0.145**	**0.084**
Above median	3348	**0.283**	**0.164**	4889	**0.195**	**0.101**
Turnover						
Below median	3728	**0.297**	**0.165**	5418	**0.184**	0.094
Above median	3696	**0.223**	**0.136**	5370	**0.152**	0.089
EBITG						
Below median	3700	**0.238**	0.146	5311	**0.159**	0.089
Above median	3640	**0.283**	0.152	5310	**0.175**	0.090
Debt						
Below median	3691	**0.249**	**0.140**	5318	**0.160**	0.088
Above median	3592	**0.271**	**0.160**	5313	**0.175**	0.093
Market Cap						
Below median	3740	**0.318**	**0.175**	5467	**0.213**	**0.101**
Above median	3684	**0.201**	**0.125**	5321	**0.121**	**0.084**
Liquidity						
Below median	3826	**0.290**	**0.171**	5857	**0.181**	**0.101**
Above median	3597	**0.228**	**0.118**	4931	**0.152**	**0.078**

Above and below median returns are statistically different from each other at least at the 5% level of significance in cases where returns are **bolded**.

Mean and median returns in Panels A and B are the mean and median returns of all contemporaneous results over the sample period, while in Panels C and D are the mean and median of cross-section–times series results over the sample period. The table excludes AMEX firms, high business risk firms and firms that reported extraordinary items the year before. Turnover is the asset turnover (assets/revenues). REVG is the annual growth rate of revenues, EBITG is the annual growth rate of EBIT, EPSG is the annual growth rate of EPS. Liquidity is stock trading liquidity (volume/shares outstanding). Cash is cash over assets. EBIT Margin is EBIT over Revenues. Turnover is assets over revenues (times). Liquidity is trading volume for the year prior to May of year (t) as a percentage of shares outstanding. Current Ratio is the ratio of cash plus short-term investments, inventories and accounts receivable to current liabilities (times). Market Cap is market cap in millions of US dollars determined by multiplying shares outstanding by price per share as at April of year (t). Debt is short- and long-term debt as well as financial leases to equity.

significant at traditional levels of significance. These findings are consistent with Section 2.2.4.

4.3.2 *Value and growth stock returns and EBIT growth rate*

The value and growth quartiles are now independently sorted by EBIT growth rate (EBITG). Table 5 reports the mean and median annual returns of value (lowest quartile, Q_1) and growth (highest quartile, Q_4) portfolios which are sorted by EBITG into portfolios of below and above median EBITG values.

We see that in all Panels value stocks outperform growth stocks irrespective of EBITG. We also see that in all Panels value stocks with high EBIT growth rate statistically and economically outperform the low EBIT growth rate stocks as far as mean returns are concerned. With regards to the growth stocks, differences are not statistically significant. These findings are consistent with the momentum hypothesis discussed in Section 2.2.3.

4.3.3 *Value and growth stock returns and cash to assets*

The value and growth quartiles are now independently sorted by cash to assets (CASH). Table 5 reports the mean and median annual returns of value (lowest quartile, Q_1) and growth (highest quartile, Q_4) portfolios which are sorted by CASH into portfolios of below and above median CASH values.

We see that in all Panels value stocks outperform growth stocks irrespective of CASH. We also see that in all Panels value and growth stocks with high CASH beat statistically and economically the low CASH stocks. These findings are not consistent with findings in Section 2.2.5—they will be further discussed later.

4.3.4 *Value and growth stock returns and stock liquidity*

The value and growth quartiles are now independently sorted by stock liquidity (LIQUIDITY). Table 5 reports the mean and median annual returns of value (lowest quartile, Q_1) and growth (highest quartile, Q_4) portfolios which are sorted by LIQUIDITY into portfolios of below and above median LIQUIDITY values.

We see that in all Panels value stocks outperform growth stocks irrespective of LIQUID. We also see that in all Panels both value and growth below median stock liquidity stocks attain returns that exceed those of above median stock liquidity stocks. Most of the mean and median differences are statistically significant. These findings are consistent with findings in Section 2.2.1.

4.3.5 *Value and growth stock returns and firm size*

The value and growth quartiles are now independently sorted by firm size (MARKET CAP). Table 5 reports the mean and median annual returns of value (lowest quartile, Q_1) and growth (highest quartile, Q_4) portfolios which are sorted by MARKET CAP into portfolios of below and above median MARKET CAP values.

We see that in all Panels value stocks outperform growth stocks irrespective of SIZE. We also see that in all Panels both value and growth small cap stocks have returns that exceed those of large cap stocks. Most of the mean and median differences are statistically significant. These findings are consistent with findings in Section 2.2.2.

4.3.6 *Value and growth stock returns and debt to equity*

The value and growth quartiles are now independently sorted by debt to equity (DEBT). Table 5

reports the mean and median annual returns of value (lowest quartile, Q_1) and growth (highest quartile, Q_4) portfolios which are sorted by DEBT into portfolios of below and above median DEBT values.

We see that in all Panels value stocks outperform growth stocks irrespective of DEBT. We also see that in all Panels both value and growth high DEBT stocks have returns that exceed those of low DEBT stocks. Most of the mean and median differences are statistically significant. These findings are consistent with Section 2.2.5.

The presence and pervasiveness of a value premium is fully supported by the evidence provided in this section.

4.4 Regression analysis

In this section, we examine, in a more formal fashion, the relationship between forward stock returns and historical firm fundamentals and market metrics of US value and growth firms. To this end, we estimate the following regressions[20]:

For P/E-based sortings:

$$\begin{aligned} R_{i,t} = {} & a_0 + a_1 * \text{CASH}_{i,t-1} \\ & + a_2 * \text{EBIT GROWTH}_{i,t-1} \\ & + a_3 * \text{DEBT}_{i,t-1} \\ & + a_4 * \text{MARKET CAP}_{i,t-1} \\ & + a_5 * \text{LIQUIDITY}_{i,t-1} \\ & + a_6 * \text{TURNOVER}_{i,t-1} + e_{i,t} \end{aligned} \quad (1)$$

For P/B-based sortings:

$$\begin{aligned} R_{i,t} = {} & a_0 + a_1 * \text{CASH}_{i,t-1} \\ & + a_2 * \text{EBIT GROWTH}_{i,t-1} \\ & + a_3 * \text{DEBT}_{i,t-1} \\ & + a_4 * \text{MARKET CAP}_{i,t-1} \\ & + a_5 * \text{LIQUIDITY}_{i,t-1} + e_{i,t} \end{aligned} \quad (1')$$

where the dependent variable, $R_{i,t}$, is the annual (forward) return for firm i at time t. The independent variables include the asset turnover (TURNOVER), stock liquidity (LIQUIDITY), firm size (MARKET CAP), EBIT growth rate (EBIT GROWTH), Debt to equity (DEBT) and Cash to Assets (CASH). All independent variables are as at time $t - 1$.

Some of the variables discussed earlier are not included in regressions (1) and (1′) as there were found to be significantly correlated with each other. Follow-up diagnostic tests showed no evidence of multicollinearity in regressions (1) and (1′).[21]

Table 6 reports estimates of the coefficients of models (1) and (1′) using three estimation techniques and annual data from May 1, 1969 through April 30, 2011. The first column reports estimates of the model using pooled ordinary least squares (OLS). The second column reports estimates of a "fixed effects" model.[22] In the third column, the estimates are averages of annual OLS estimates, following Fama and MacBeth (1973)—regressions (1) and (1′) are estimated for each year and annual estimates are then averaged.[23,24]

4.4.1 Explaining returns[25]

The coefficient estimates of models (1) and (1′) reported respectively in Table 6, Panels A and B, for EBIT GROWTH, DEBT, MARKET CAP, TURNOVER and LIQUIDITY are consistent with our hypotheses. Table 6 shows that larger, higher turnover (or lower inverse turnover) and more liquid firms have lower returns than those that have lower turnover, are smaller and less liquid. At the same time, firms that have higher DEBT and EBIT GROWTH rates have higher returns than those with lower DEBT and EBIT GROWTH rates.[26] The coefficient of CASH, however, is positive as opposed to the negative

Table 6 Estimation results for regressing forward stock returns for value and growth stocks against a number of dependent variables from company financials.

Independent variables	Pooled OLS	Fixed effects	Fama and Macbeth
Panel A: *P/E sortings*			
Intercept	0.175 (16.05)***	−0.022 (0.60)	0.195 (5.14)***
Cash	0.225 (4.13)***	0.061 (2.18)**	0.426 (2.37)**
EBIT Growth	0.0003 (2.05)**	0.00003 (1.14)	0.0007 (0.32)
Debt	0.104 (4.51)***	0.063 (1.97)**	0.055 (2.33)**
Market Cap	−0.000002 (4.44)***	−0.000002 (3.33)***	−0.000008 (2.37)**
Liquidity	−0.006 (2.98)***	−0.0142 (4.37)***	−0.067 (3.34)***
Turnover	−0.008 (3.26)***	−0.002 (1.66)*	−0.00091 (0.11)
Adjusted R^2	0.60%	18.2%	4.31%
Panel B: *P/B sortings*			
Intercept	0.179 (17.01)***	0.179 (0.95)	0.199 (5.25)***
Cash	0.292 (5.23)***	0.134 (3.58)***	0.515 (3.48)***
EBIT Growth	0.0003 (2.00)**	0.0001 (1.83)*	0.0002 (1.33)
Debt	0.099 (4.26)***	0.084 (4.33)***	0.082 (3.02)**
Market Cap	−0.000002 (6.53)***	−0.000001 (5.87)***	−0.000001 (2.96)**
Liquidity	−0.006 (3.00)***	−0.007 (4.07)***	−0.006 (3.54)***
Adjusted R^2	0.64%	14.7%	3.11%

The table reports estimates of the coefficients of model (1) (Panel A) and model (1′) (Panel B) using three estimation techniques and annual data from May 1, 1969 through April 30, 2011. The regressions exclude AMEX firms, high business risk firms and firms that reported extraordinary items the year before. The regressions use 16,792 (firm-year) value and growth firm observations. The first column reports estimates of the models using times-series cross-sectional Pooled OLS. The second column reports estimates of a "fixed effects" model (i.e., year, industry and exchange dummies were added to regressions (1) and (1′)). In the third column, the estimates are averages of annual OLS estimates, following Fama and MacBeth (1973). The dependent variable is the individual firm annual stock returns. The independent variables include Cash/Assets (CASH), Assets/Revenues (TURNOVER—only Panel A), stock trading liquidity (LIQUIDITY), firm size (MARKET CAP), annual growth rate of EBIT (EBIT GROWTH) and total debt to equity (DEBT). The *t*-statistic is reported below each coefficient estimate in parentheses. *, **, *** indicate significance at the 10%, 5%, 1% level, respectively.

sign expected. CASH may not be a measure of liquidity (in the sense discussed in Section 2.2.5), but rather a measure of flexibility to pursue profitable opportunities. Having cash enables companies to purse more easily profitable projects without being dependent on the generosity of the markets for raising funds, and this benefits the companies over time affording them positive stock returns. TURNOVER, being insignificant, is dropped from Equation (1′) and so it does not appear in Table 6, Panel B. The coefficients of all variables reported in Table 6, Panels A and B, are significant at traditional levels of significance for the pooled OLS regressions, but they are not all significant for the "fixed effects" and FM regressions.

4.5 Composite score indicator

We now use the research results documented earlier to construct a composite score indicator based on company fundamentals and market metrics which will provide another screening following the low-high P/E (or low-high P/B) screening and enable us to separate the outperforming from the underperforming value and growth stocks without having to carry out an in-depth valuation.

To form such a composite score indicator, we employ two different methodologies. The first approach is the cross-section–time series medians approach and the other is the contemporaneous medians approach.[27] According to the first approach, an overall median is calculated for market cap, stock liquidity, turnover, debt to equity, cash to assets and EBIT growth separately for the value and growth firms from 1969 to 2011. According to the second approach, we obtain the contemporaneous medians of market cap, stock liquidity, turnover, debt to equity, cash to assets and EBIT growth separately for the value and growth firms for every year. Then, under both methods, based on the market cap, stock liquidity, turnover, debt to equity, cash to assets and EBIT growth of each value or growth firm in relation to the previously calculated medians for the fundamental and market metrics, we assign binary values (0 or 1) to each sample firm.[28] For example, in Tables 5[29] and 6, we see that market cap, stock liquidity and turnover (P/E sorting only) are negatively related to future performance, while cash to assets, debt to equity and EBIT growth are positively related. As a result, if a firm has market cap, stock liquidity or turnover below their respective cross-section–time series (or contemporaneous) medians, we assign to the firm the value of zero. A firm with cash to assets, debt to equity and EBIT growth rates that are above their respective cross-section–time series (or contemporaneous) medians also receives the value of zero. Otherwise, values are equal to one. This way a value or growth firm receives a signal for each of the fundamental and market metrics.

Under both procedures, the sum of the above firm-specific values for market cap, stock liquidity, debt to equity, turnover (P/E sorting only), cash to assets and EBIT growth constitutes the composite (SCORE) indicator for each firm. We rank all value and growth stocks by the SCORE indicator and form six value and growth portfolios when sorting is based on P/E and five portfolios when sorting is based on P/B. Since by construction, the lower the SCORE the better it is, we should expect that the lower the SCORE, the better the performance of a stock and vice versa.

Table 7 reports the relationship between the composite (SCORE) indicator and forward value and growth annual stock returns. There is a negative relationship between the SCORE indicator and annual stock returns for value and growth stocks, as expected from Section 2.3. For value firms (Panel A—P/E: Cross-section–time series medians approach), the two lowest SCORE portfolios have mean annual returns of 54.4% and 38.9%, whereas the two highest SCORE

Table 7 Mean and median annual returns of stocks based on the composite score for value and growth stocks: May 1, 1969–April 30, 2011.

		Value (Q_1)			Growth (Q_4)		Value premium	
Score	OBS	Mean	Median	OBS	Mean	Median	Mean	Median
Panel A: *P/E sortings (cross-section–time series medians)*								
0	53	0.544	0.295	51	0.310	0.162	0.234	0.133
1	498	0.389	0.192	464	0.175	0.076	0.214	0.116
2	1466	0.300	0.168	1632	0.198	0.082	0.102	0.086
3	2414	0.264	0.141	3008	0.170	0.050	0.094	0.091
4	2680	0.209	0.122	3427	0.126	0.050	0.083	0.072
5	1754	0.177	0.115	1817	0.106	0.040	0.071	0.075
6	446	0.133	0.084	341	0.082	−0.005	0.051	0.089
P-values [SCOREs (0 and 1) ≠ SCOREs (5 and 6)]		0.0001	0.0001		0.0001	0.0001		
Panel B: *P/B sortings (cross-section–time series medians)*								
0	254	0.452	0.279	256	0.283	0.167	0.169	0.113
1	1092	0.324	0.173	1555	0.245	0.132	0.079	0.042
2	2154	0.307	0.180	3444	0.178	0.092	0.129	0.088
3	2456	0.222	0.126	3808	0.142	0.079	0.080	0.046
4	1352	0.180	0.107	1782	0.121	0.084	0.059	0.023
5	226	0.164	0.088	149	0.116	0.055	0.048	0.034
P-values [SCOREs (0 and 1) ≠ SCOREs (4 and 5)]		0.0001	0.0001		0.0001	0.0001		
Panel C: *P/E sortings (contemporaneous medians)*								
0	59	0.521	0.241	49	0.345	0.110	0.176	0.131
1	465	0.370	0.187	432	0.176	0.067	0.195	0.120
2	1444	0.285	0.142	1665	0.211	0.068	0.074	0.074
3	2457	0.269	0.144	3024	0.149	0.059	0.120	0.086
4	2770	0.210	0.124	3343	0.140	0.049	0.071	0.074
5	1679	0.181	0.121	1806	0.094	0.033	0.087	0.088
6	437	0.172	0.118	400	0.135	0.054	0.037	0.064
P-values [SCOREs (0 and 1) ≠ SCOREs (5 and 6)]		0.0001	0.0001		0.0001	0.0001		

Table 7 (*Continued*)

		Value (Q_1)			Growth (Q_4)		Value premium	
Score	OBS	Mean	Median	OBS	Mean	Median	Mean	Median
Panel D: *P/B sortings (contemporaneous medians)*								
0	216	0.390	0.239	239	0.285	0.110	0.105	0.129
1	1096	0.359	0.188	1605	0.224	0.118	0.135	0.070
2	2283	0.275	0.161	3451	0.187	0.097	0.088	0.064
3	2398	0.221	0.126	3709	0.139	0.083	0.082	0.043
4	1291	0.204	0.127	1739	0.130	0.080	0.074	0.047
5	250	0.228	0.164	251	0.111	0.088	0.117	0.076
P-values [SCOREs (0 and 1) ≠ SCOREs (4 and 5)]		0.0001	0.0001		0.0001	0.0001		

SCORE is a composite indicator of a number of fundamental and market firm characteristics. The table excludes AMEX firms, high business risk firms and firms that reported extraordinary items the year before.

portfolios have mean annual returns of 17.7% and 13.3%. The corresponding mean annual returns for the growth portfolio are 31%/17.5% and 10.6%/8.2%, respectively. For value firms (Panel C—P/E: Contemporaneous medians approach), the two lowest SCORE portfolios have mean annual returns of 52.1% and 37%, whereas the two highest SCORE portfolios have mean annual returns of 18.1% and 17.2%. The corresponding mean annual returns for the growth portfolio are 34.5%/17.6% and 9.4%/13.5%, respectively.

Similarly, for value firms (Panel B—P/B: Cross-section–time series medians approach), the two lowest SCORE portfolios have mean annual returns of 45.2% and 32.4%, whereas the two highest SCORE portfolios have mean annual returns of 18% and 16.4%. The corresponding mean annual returns for the growth portfolio are 28.3%/24.5% and 12.1%/11.6%, respectively. For value firms (Panel D—P/B: Contemporaneous medians approach), the two lowest SCORE portfolios have mean annual returns of 39% and 35.9%, whereas the two highest SCORE portfolios have mean annual returns of 20.4% and 22.8%. The corresponding mean annual returns for the growth portfolio are 28.5%/22.4% and 13%/11.1%, respectively. Median annual returns reported in Table 7 are consistent with the mean values.[30]

As shown in Table 7, mean and median returns of stocks with SCORE values of 0 and 1 are statistically different from those with SCORE values of 5 (or 4) and 6 (or 5) at traditional levels of significance.

Finally, Table 7 demonstrates that (a) P/E sorting gives better difference in returns between the lowest and the highest SCORE portfolios than sorting based on P/B and (b) the cross-section–time-series medians approach gives better results than the contemporaneous medians approach. Given that the cross-section–time series medians approach is easier to apply going forward, it is the preferred method for forming the SCORE portfolios. As a result, from now on we only report results for the cross-section–time series medians approach.

Table 8 Number of observations per year for the lowest and the highest SCORE portfolios for the value and growth stocks: May 1, 1969–April 30, 2011 (Pertaining to Table 7, Panel A).

	P/E ratio-sorted quartiles			
	Q_1 (Value)		Q_4 (Growth)	
Year	Lowest	Highest	Lowest	Highest
1969	0	4	0	3
1970	2	4	2	2
1971	1	3	1	2
1972	1	4	3	3
1973	2	2	1	2
1974	2	2	1	3
1975	1	2	2	3
1976	8	4	1	2
1977	3	3	3	2
1978	2	5	4	3
1979	1	2	4	3
1980	1	7	0	3
1981	1	5	1	2
1982	2	13	2	6
1983	0	15	0	3
1984	0	6	2	11
1985	0	5	0	8
1986	2	16	1	11
1987	2	9	0	13
1988	1	8	0	9
1989	2	6	1	3
1990	1	5	2	3
1991	0	5	3	3
1992	2	6	1	3
1993	2	5	2	3
1994	1	3	3	3
1995	3	4	0	10
1996	1	6	1	12
1997	1	11	2	17
1998	0	20	0	12
1999	1	17	1	4
2000	0	11	0	22
2001	1	14	3	23
2002	1	17	0	9
2003	4	11	1	8
2004	0	19	0	13
2005	0	29	1	12
2006	0	29	0	17
2007	0	33	0	26
2008	0	28	0	25
2009	0	34	0	15
2010	1	9	0	4
Total Obs.	53	446	51	341

Table 8 reports the number of observations per year for the lowest and the highest SCORE portfolios for the value and growth stocks based on P/E sorting. We observe that the findings reported in Table 8 are spread across the sample years and are not concentrated in any particular year.[31] In other words, results reported in Table 7 are based on cross-sectional differences as opposed to time series differences and thus what we observe is not reaction to the market but rather reaction to company-specific performance.[32,33]

Next, we examine whether the composite SCORE indicator proxies for risk, with lower SCORE indicating higher risk, which may justify the higher return of the low SCORE portfolios. Tables 9 and 10 contain the evidence in this regard.

Table 9 reports median values of a number of risk-related fundamental and market metrics, such as stock liquidity (LIQUID), current ratio (CURRENT), market cap (MV), debt to equity (DEBT), occurrence of reporting extraordinary items (EXTRA) and stock's business risk category (BRISK), and relates them to the SCORE indicator for both value and growth stocks, where separation in value and growth is based on P/E.

Table 9 Median risk-related variables of stocks by the composite score for value and growth stocks (P/E sortings: Cross-section–time series medians): May 1, 1969–April 30, 2011.

	Value (Q_1)								Growth (Q_4)							
SCORE	OBS	P/E	LIQUID	CURRENT	MV	DEBT	EXTRA	BRISK	OBS	P/E	LIQUID	CURRENT	MV	DEBT	EXTRA	BRISK
0	75	6.300	0.180	1.710	27.450	0.530	0	1.440	109	28.300	0.240	2.010	73.730	0.460	0	1.610
1	309	6.400	0.260	2.210	36.190	0.410	0	1.630	372	29.000	0.320	2.260	38.280	0.390	0	1.660
2	438	6.800	0.340	2.460	137.840	0.350	0	1.700	546	31.200	0.470	2.450	1146.330	0.320	0	1.670
3	537	7.900	0.790	2.420	1870.100	0.330	0	1.660	440	32.500	0.720	2.650	1997.400	0.290	0	1.630
4	316	8.700	1.020	2.320	3237.200	0.320	0	1.630	251	35.400	1.150	2..93	2389.600	0.250	0	1.580
5	1754	9.100	1.310	2.110	4248.400	0.330	0	1.640	1817	38.300	1.530	2.820	2925.100	0.230	0	1.580
6	446	9.400	1.630	2.010	4661.400	0.260	0	1.720	340	41.200	1.760	2.970	3602.100	0.160	0	1.560

EXTRA is the occurrence of reporting extraordinary charges and restarting historical financials in year $(t-1)$ (yes = 1, no = 0). LIQUID is trading volume for the year prior to May of year (t) as a percentage of shares outstanding. CURRENT is the ratio of cash plus short-term investments, inventories and accounts receivable to current liabilities (times). SIZE is market cap in millions of US dollars determined by multiplying shares outstanding by price per share as at April of year (t). BRISK is the industry code that captures an industry's business risk (1 = low business risk, 2 = medium business risk and 3 = high business risk). DEBT is short- and long-term debt as well as financial leases to equity and SCORE is a composite indicator of a number of fundamental and market firm characteristics.

Median tests, based on χ^2 tests, show that the P/E of the lowest SCORE portfolio is statistically different from the P/E of the highest SCORE portfolio at least at the 5% level of significance for both value and growth stocks. The same is also the case for LIQUID, CURRENT, MV and DEBT of the lowest vs the highest SCORE portfolios.

Table 10 Median risk related variables of stocks by the composite score for value and growth stocks (P/B sortings: Cross-section–time series medians): May 1, 1969–April 30, 2011.

	Value (Q_1)								Growth (Q_4)							
SCORE	OBS	P/B	LIQUID	CURRENT	MV	DEBT	EXTRA	BRISK	OBS	P/B	LIQUID	CURRENT	MV	DEBT	EXTRA	BRISK
0	254	0.580	0.170	2.020	16.110	0.470	0	2	256	3.490	0.280	1.700	72.040	0.440	0	2
1	1092	0.660	0.190	2.090	24.120	0.420	0	2	1555	3.820	0.300	1.890	100.500	0.350	0	2
2	2154	0.780	0.260	2.260	40.650	0.350	0	2	3444	3.980	0.440	2.010	209.400	0.280	0	2
3	2456	0.890	0.510	2.180	110.000	0.20	0	2	3808	4.170	0.760	1.990	704.900	0.230	0	2
4	1352	0.900	0.700	2.100	215.600	0.260	0	2	1782	4.190	1.000	1.860	1446.800	0.220	0	2
5	226	0.970	0.820	2.080	257.800	0.230	0	2	149	4.050	1.140	1.880	1684.100	0.120	0	2

EXTRA is the occurrence of reporting extraordinary charges and restarting historical financials in year $(t-1)$ (yes = 1, no = 0). LIQUID is trading volume for the year prior to May of year (t) as a percentage of shares outstanding. CURRENT is the ratio of cash plus short-term investments, inventories and accounts receivable to current liabilities (times). MV is market cap in millions of US dollars determined by multiplying shares outstanding by price per share as at April of year (t). BRISK is the industry code that captures an industry's business risk (1 = low business risk, 2 = medium business risk and 3 = high business risk). DEBT is short- and long-term debt as well as financial leases to equity and SCORE is a composite indicator of a number of fundamental and market firm characteristics.

Median tests, based on χ^2 tests, show that the P/E of the lowest SCORE portfolio is statistically different from the P/B of the highest SCORE portfolio at least at the 5% level of significance for both value and growth stocks. The same is also the case for LIQUID, MV and DEBT of the lowest vs the highest SCORE portfolios.

The evidence shows that most of the risk variables are related to the SCORE indicator. For both value and growth stocks, the lowest SCORE portfolios have higher leverage and lower P/E and current ratio than the highest SCORE portfolios. At the same time, the lowest SCORE portfolios have lower stock liquidity and contain smaller stocks than the highest SCORE portfolios. These results are statistically significant at traditional levels of significance. Moreover, not reported here, the standard deviations of returns (STD(RET)) decline as we go from low to high SCORE portfolios—80.8% (low), 88.8%, 65.4%, 69.4%, 54.8%, 50.2% and 44.1% (high). The evidence is similar in Table 10 where separation in value and growth is based on P/B. As a result, there is some evidence in these tables to support the argument that risk may drive the SCOREsorted portfolio performance.[34]

Given the above findings, we will now examine whether a SCORE-based factor is priced in a formal asset pricing model which extends the Fama and French three factor model (see Fama and French, 1995).

The Fama and French three factors are the excess return of the value-weighted market portfolio (RMF), the return on small minus the return on large stocks (SMB) and the return on high minus the return on low book-to-market (B/M) ratio firms (HML). In this paper, instead of the return on high minus the return on low book-to-market (B/M) ratio firms (HML), we will substitute the return on low minus the return on high price-to-earnings (P/E) ratio firms (LMH) or the return on low minus the return on high price-to-book (P/B) ratio firms (LMH).

We augment the Fama and French three-factor model by adding another factor, namely, return on low SCORE minus return on high SCORE portfolios (LSMHS), thus constructing a four-factor model with a SCORE-based factor as the fourth factor. The construction of LSMHS follows standard practice. Stocks are sorted by SCORE and two portfolios are created. One portfolio includes stocks with a SCORE of 0, 1 and 2 and the other portfolio includes stocks with a SCORE of 4, 5 and 6 for P/E sortings or 3, 4 and 5 for P/B sortings. The annual value-weighted returns of low SCORE and high SCORE portfolios are calculated. This process is repeated every year from May 1, 1969 to April 30, 2011. LSMHS is then defined as the difference in annual returns between the low SCORE and the high SCORE portfolios. The resulting augmented model is as follows:

$$\begin{aligned} R_{it} - R_{ft} = a &+ b(R_{mt} - R_{ft}) + c(R_{st} - R_{bt}) \\ &+ d(R_{lt} - R_{ht}) \\ &+ e(R_{lst} - R_{hst}) + e_t \end{aligned} \tag{2}$$

where,

R_{it} = annual stock return for firm i at time t
R_{ft} = risk free rate (annual return on the 91-day t-bill)
R_{mt} = annual return on the value-weighted market portfolio
R_{st} = annual return on the small stock portfolio
R_{bt} = annual return on the large stock portfolio
R_{lt} = annual return on the low P/E (or P/B) portfolio
R_{ht} = annual return on the high P/E (or P/B) portfolio
R_{lst} = annual return on the low SCORE portfolio (SCOREs 0, 1 and 2)
R_{hst} = annual return on the high SCORE portfolio (SCOREs 4, 5 and 6 for P/E sortings or 3, 4 and 5 for P/B sortings)
e_t = error term

The annual returns on the value-weighted market portfolio and the 91 day t-bill, as well as the rest of data are from COMPUSTAT.

Regression (2) is also run separately for each score portfolio to determine whether factor

loadings change in any particular direction as we go from low SCORE to high SCORE portfolios and provide further evidence for or against the risk argument.

Table 11, Panels A and B, reports the results for the Fama and French three-factor model and augmented factor model (2) for sortings based on P/E and P/B, respectively. The results from running model (2) for each SCORE portfolio separately are also reported in these panels. Significance levels of regression coefficients reported in Panels A and B are based on Newey–West adjusted t-statistics.

In both Panels of Table 11 and for both Fama and French and extended models, the intercepts are statistically insignificant attesting to the models' correct specification and their performance adequacy. The LMH (value) factor is not significant in explaining returns in either the three-factor model or the augmented model for P/E sortings (Panel A), despite the fact that there is a large value premium as reported in earlier tables. However, consistent with the Fama and French model, LMH is significant in explaining returns in both the three-factor model and the augmented model for P/B sortings—the sorting methodology employed by Fama and French. The coefficients of RMF and SMB are positive and statistically significant. Finally, for both sorting procedures, the coefficient of LSMHS for the total sample is positive and statistically significant

Table 11 Time series regression results of annual stock returns on the three Fama–French factors and augmented four factors: May 1, 1969–April 30, 2011.

Subsample	Intercept a	RMF b	SMB c	LMH d	LSMHS e
Panel A: P/E					
Three factor	0.016	0.850	0.800	−0.015	—
(P-value)	(0.053)	(0.15)	**(0.00)**	(0.15)	
Augmented three factor	0.005	0.870	0.650	−0.008	0.240
(P-value)	(0.588)	**(0.00)**	**(0.00)**	(0.48)	**(0.00)**
Augmented/score 0	0.017	1.980	−0.420	−0.180	3.398
(P-value)	(0.95)	**(0.03)**	(0.77)	(0.34)	(0.09)
Augmented/score 1	−0.066	1.120	0.297	0.170	1.961
(P-value)	(0.36)	**(0.00)**	(0.44)	**(0.00)**	**(0.00)**
Augmented/score 2	0.007	0.759	0.610	−0.037	0.906
(P-value)	(0.76)	**(0.00)**	**(0.00)**	(0.19)	**(0.00)**
Augmented/score 3	−0.009	0.800	0.880	−0.009	0.290
(P-value)	(0.62)	**(0.00)**	**(0.00)**	(0.69)	(0.06)
Augmented/score 4	−0.006	0.860	0.508	0.014	0.210
(P-value)	(0.65)	**(0.00)**	**(0.00)**	(0.97)	(0.11)
Augmented/score 5	0.019	0.940	0.339	0.002	0.009
(P-value)	(0.18)	**(0.00)**	**(0.00)**	(0.91)	(0.94)
Augmented/score 6	0.026	0.870	0.210	−0.004	0.015
(P-value)	(0.93)	**(0.00)**	(0.42)	(0.93)	(0.96)

Table 11 (*Continued*)

Subsample	Intercept a	RMF b	SMB c	LMH d	LSMHS e
Panel B: *P*/*B*					
Three factor	0.006	0.960	0.670	0.170	—
(*P*-value)	(0.33)	**(0.00)**	**(0.00)**	**(0.00)**	
Augmented three factor	0.001	0.950	0.560	0.140	0.270
(*P*-value)	(0.89)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.01)**
Augmented/score 0	0.079	0.930	1.480	0.080	−0.288
(*P*-value)	(0.08)	(0.00)	**(0.00)**	(0.34)	(0.72)
Augmented/score 1	0.007	0.910	0.900	−0.012	0.610
(*P*-value)	(0.69)	**(0.00)**	**(0.00)**	(0.89)	(0.06)
Augmented/score 2	−0.001	1.010	0.580	0.190	0.380
(*P*-value)	(0.93)	**(0.00)**	**(0.00)**	**(0.01)**	(0.07)
Augmented/score 3	0.000	0.970	0.570	0.100	−0.080
(*P*-value)	(0.97)	**(0.00)**	**(0.00)**	(0.07)	(0.69)
Augmented/score 4	−0.160	0.890	0.300	0.380	−0.150
(*P*-value)	(0.14)	**(0.00)**	**(0.00)**	**(0.00)**	(0.46)
Augmented/score 5	−0.065	0.690	0.900	0.870	−0.590
(*P*-value)	(0.06)	**(0.00)**	**(0.00)**	**(0.00)**	(0.41)

Cross-section–Time series medians

The following three-factor and augmented four-factor regressions are employed to produce this table:

$$R_{it} - R_{ft} = a + b(R_{mt} - R_{ft}) + c(R_{st} - R_{bt}) + d(R_{lt} - R_{ht}) + e_t \tag{2'}$$

and

$$R_{it} - R_{ft} = a + b(R_{mt} - R_{ft}) + c(R_{st} - R_{bt}) + d(R_{lt} - R_{ht}) + e(R_{lst} - R_{hst}) + e_t \tag{2}$$

where, R_{it} is the annual stock return, R_{ft} is the risk-free rate (annual return on the 91-day t-bill), R_{mt} is the annual return on the value-weighted market portfolio, R_{st} is the annual return on the small stock portfolio, R_{bt} is the monthly return on the large stock portfolio, R_{ht} is the annual return on the high P/E (or P/B) portfolio, R_{lt} is the annual return in the low P/E (or P/B) portfolio, R_{lst} is the annual return in the low SCORE portfolio (SCOREs 0, 1 and 2), R_{hst} is the annual return in the high SCORE portfolio (SCOREs 4, 5 and 6 for P/E sortings) or (SCOREs 3, 4 and 5 for P/B sortings), and e_t is the error term. SCORE is a composite indicator of a number of fundamental and market firm characteristics. For the regressions, we form size and P/E (or P/B) portfolios by independently sorting stocks into two groups by size and then sorting each size-sorted portfolio into three groups based on trailing P/E (or P/B). Annual value-weighted returns for each of the portfolios and $(R_{mt} - R_{ft})$, $(R_{st} - R_{bt})$, $(R_{ht} - R_{lt})$ and $(R_{lst} - R_{hst})$ excess returns are then calculated from May of year (t) to April of year $(t + 1)$. The slope coefficients of these regressions determine the expected risk exposure of a stock portfolio to the market portfolio, firm-size and P/E (or P/B) ratio and SCORE. RMF is the return on the value-weighted market portfolio less risk-free rate, SMB is the return on the small stock portfolio less the return on the large stock portfolio, LMH is the return on the low P/E (or P/B) portfolio less the return in the high P/E (or P/B) portfolio and LSMHS is the return on low SCORE portfolio minus the return of the high SCORE portfolio. Three factor refers to model $(2')$ and augmented three factor refers to model (2). Augmented/score 0 to augmented/score 6 (or 5) refer to running model (2) for each score portfolio separately. Annual value-weighted market portfolio returns and 91-day t-bill returns, as well as the rest of the data are from COMPUSTAT. P-values are in brackets. Significance levels of regression coefficients reported in Panels A and B are based on Newey–West-adjusted t-statistics.

signifying that LSMHS is priced in the stock market.

When running regression (2) for each SCORE portfolio separately, Table 11 shows that, similar to the total sample, the null hypothesis that each intercept is statistically different from zero is rejected at traditional levels of significance. Table 11 Panel A, shows (a) that the factor loadings for the market effect are larger for the lowest SCORE portfolio than the highest SCORE portfolio; and (b) that the factor loadings for the SCORE-based effect decline as we go from the low to the high SCORE portfolios. LSMHS is not significant when running regression (2) for the higher SCORE portfolios. Low SCORE stocks are both more sensitive to the market effect and to the SCORE-based effect. These two findings reinforce each other with regards to the status of SCORE as a risk driven metric.[35,36] The results reported in Table 11, Panel B, are similar even though the SCORE-based effect, while significant and positive for the total sample, is insignificant at traditional levels of significance when model (2) is run individually for each SCORE portfolio. It seems that unlike evidence from Panel A, in Panel B only the market effect is driving the differential performance of low vs high SCORE-based portfolios.

From the findings reported in Table 11, it becomes apparent that sortings based on P/E produce better and more consistent results than when sortings are based on P/B. This is consistent with previous evidence which pointed to a similar conclusion.

5 Further analysis: Out of sample score indicator performance

In this section, we examine whether the SCORE-based methodology employed in this paper also works out of sample, employing three types of out of sample tests:

First, we use the previously detailed cross-section–time series medians methodology to form composite scores for value and growth firms over an out-of-sample time period, May 1, 2011–April 30, 2012.

Second, we use our methodology only on the firms with negative P/E or P/B ratios, which were excluded from the original sample.

Third, we use this paper's methodology only on AMEX stocks, stocks with high business risk and firms that reported extraordinary items the year before, which were also excluded from the data used to test the SCORE-based performance in the paper.

The key findings of the out of sample tests are as follows[37]:

First, while, on average, value stocks returned about the same as growth stocks over the May 1, 2011 to April 30, 2012 period (both experiencing negative annual returns), the relationship of SCORE with stock performance remained intact and consistent with the in-sample findings. Low SCORE value and growth stocks outperform high SCORE value and growth stocks in a statistically significant way.

Second, we find that the paper's methodology also works in forming SCORE-based portfolios with predictive power in the case of negative P/E and P/B firms.[38] However, results are not as strong for negative multiple firms as they are for positive multiple firms.

Finally, we find that the paper's methodology is robust when tests are carried out using only data for AMEX, high business risk firms and firms that report extraordinary items.[39] The negative relationship between SCORE and forward value and growth stock returns is maintained. Results, however, are weaker in this case than

when the above stated firms were excluded from the sample, especially for the P/B sortings.

6 Conclusions

The purpose of this paper is twofold (a) to determine whether there was value premium in our sample of US stocks for the period May 1, 1969–April 30, 2011; and (b) to examine whether an additional screening to the first step of the value investing process could be employed to separate the outperforming value and growth stocks from the underperforming ones. In this regard, we tested whether such an additional screening could predict future stock returns.

In this paper, we documented the following:

We found a consistently strong and pervasive value premium over the sample period.

We showed that there are distinct differences between US exchanges which means that papers that aggregate all US exchanges under one umbrella may dilute findings and bias conclusions.

The stocks of AMEX firms, high business risk firms and firms that report extraordinary items experienced worse returns than the rest of the US stocks in our sample.

We found that P/E based sortings produce better overall results than sortings based on P/B.

We constructed a composite score indicator (SCORE), combining various fundamental and market metrics, which enabled us not only to separate the winners from the losers among value and growth stocks, but also to predict future returns of value and growth stocks. SCORE portfolios gave better results for sortings based on P/E and when we employed a cross-section–time series medians approach. Results remained robust for a time period out of sample, for negative P/E or P/B ratio firms and for the firms that were excluded from SCORE-based performance, namely, AMEX stocks, stocks with high business risk and firms that reported extraordinary items the year before.

Finally, we provided evidence that the return of a portfolio strategy that buys (sells) stocks that rank low (high) in the composite score indicator has significant explanatory power in an asset pricing model framework and that such a strategy earns statistically significant positive returns.

Future research should examine (1) whether the findings reported in this study can be replicated with a sample of global stocks, (2) whether the Low Score Minus High Score factor proxies for a momentum and/or an illiquidity effect in a five-factor model as the composite score indicator is a function of variables that may proxy for momentum and illiquidity, and (3) whether the value premium is a function of both unsystematic and systematic risks and whether, in this context, unsystematic risk is a priced factor in the markets.[40]

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Notes

[1] We verified this by surveying 19 high profile value investors in Canada and in the US.

[2] Finding truly undervalued stocks also prevents value investors from falling into "value traps", namely companies in declining industries, with bad business model and/or bad strategies which may misleadingly appear to be (possibly) undervalued, but whose stock never recovers from price declines.

[3] There have been significant changes to the US exchanges in recent years, which may have reduced the relevance of such segregation going forward. Categorization based on business or industry risk may be

more relevant along these lines, and we investigate this in this paper. However, examining the exchanges separately will help us test the robustness of the paper's methodology.

[4] Most previous studies have used sortings based on the P/B ratio to examine the value premium. This was motivated by the work of Fama and French (1992, 1993, 1995) who showed that a value factor (based on the P/B ratio) and a size factor were the key variables explaining the cross-section of stock returns.

[5] Andrade and Chhaochharia (2012), using P/E rather than P/B, are able to find a value premium among both large and small stocks in developed markets.

[6] Since all data for our sample stocks were available by April, we did not think that it was necessary to wait until the typically employed month of June to sort stocks into value and growth. That is, in this case, sorting in April is more efficient when data are available. Nevertheless, the results (not reported here) were not materially different from the results obtained when data were sorted in June.

[7] Dichev *et al.* (2103), in a survey of CFOs regarding earnings quality, they find that CFOs believe that incurring extraordinary items leads to low-quality earnings.

[8] There is no survivorship bias in the COMPUSTAT data employed in this paper as dead/merged companies are included in our sample.

[9] All firms in our sample have reported financials for fiscal year $(t-1)$ by April of year (t).

[10] As shown in Section 5.2, negative P/E and P/B firms behave differently than positive multiple firms and, as a result, to keep the sample homogeneous and prevent the findings from being diluted and significance tests being affected, the negative multiple firms were excluded.

[11] Excluding stocks priced at $1 or less and later on also controlling for volume to shares outstanding deals with some of the direct and indirect transaction costs discussed in Ali *et al.* (2003).

[12] Andrade and Chhaochharia (2012) uncover a value premium among both large and small stocks in developed markets. We also find that a value premium exist in large stocks, as well as small stocks.

[13] Since mean and median values of key variables are materially different from each other, from now on due to space considerations, we will only report separately median values. However, in such cases, mean values were also calculated and are available upon request.

[14] Barberis and Shleifer (2003) and D'Avolio (2002) have argued that arbitrage may only partially adjust prices down to their appropriate level because of several impediments in arbitrage, such as behavioral/institutional factors. The paper's findings are consistent with an expected decline in the value premium over time (see Phalippou, 2008), which, nevertheless, has not disappeared for the reasons referred to above.

[15] The timing of recessions/recoveries and bear/bull markets is obtained from http://www.thedowtheory.com/bear&recessions.htm. The timing of recessions from this database is consistent with NBER's business cycle dates. However, this database also makes available dates for bull and bear markets. The following years were flagged as bear market years: 1969–70, 1973–74, 1980–82, 1987, 1990, 2000, 2002 and 2008–09. The following years were flagged as recession years: 1970, 1974, 1980–82, 1990, 2001 and 2008.

[16] With regards to the P/B sorting procedure, TURNOVER had to be eventually dropped as not only was it found to be statistically insignificant in the regression analysis reported later, but we also found that the combination of only five variables, CASH, EBITG, DEBT, LIQUIDITY and MARKET CAP, produced a composite indicator with the best forecasting ability. To keep construction of the composite indicator and overall approach simple, we also wanted to avoid encompassing a large number of fundamental and market metrics in the composite indicator.

[17] This was also determined by the survey we referred to in footnote #1.

[18] As AMEX and negative P/E or P/B stocks tend to be quite small (and in many cases to include micro-cap stocks), in relation to the rest of the stocks in the US markets excluding them improves the homogeneity and quality of results and makes the study criticism free as results do not tend to be affected by micro-cap and very low liquidity stocks.

[19] Alternatively, consistent with the way this is discussed in Section 2.2.4, above median inverse turnover firms beat below median inverse turnover firms.

[20] As indicated earlier, the data used in these regressions exclude AMEX stocks, high business risk stocks and stocks that reported extraordinary items in the prior year. In addition, in regression $(1')$, TURNOVER was not found to be significant and had to be dropped from this equation.

[21] We employed the VIF option in the REG SAS procedures to carry out diagnostic tests.

[22] To estimate a fixed effects model, year, industry and exchange dummies were added to regressions (1) and $(1')$.

[23] Fama and French (2006) argue that the "FM regressions give more weight to tiny stocks because they tend to have more extreme values of the explanatory variables and more extreme returns". This should not present a problem in our study as, unlike other studies that carry our extremely fine sortings, we sort into quartiles which should mitigate the problem with extreme values.

[24] The R^2 using the Fama and MacBeth approach is the average of R^2 from the annual regressions. Significance levels reported are based on pooled t-statistics.

[25] Transaction costs could potentially affect regression results (and the composite indicator performance later on in the paper) (see Sharpe, 2006, 198–199). However, ignoring transaction costs could be a limitation only if there are large liquidity and size differences between the value and growth stocks examined. This is not the case in this paper. For example, the median market cap for value vs growth stocks on NASDAQ is \$50 vs \$144 million and on NYSE \$357 vs \$471 million. In the terms of liquidity, the corresponding median numbers are 0.60 vs 0.99 on NASDAQ and 0.41 vs 0.48 on NYSE (AMEX stocks are excluded from this sample). See also footnote #11.

[26] The EBIT GROWTH rate sign is consistent with the momentum hypothesis discussed in Section 2.2.3.

[27] The methodology for constructing the composite indicator under the second approach is consistent with Mohanram (2005). However, unlike Mohanram (2005), and consistent with Athanassakos (2013), rather than using contemporaneous medians for each fundamental or market metric within value or growth firms in the same industry as benchmarks for assigning a good or bad signal for a specific firm-related fundamental or market metric, we use contemporaneous medians for the fundamental and market metrics within value or growth firms irrespective of the industry. This is because (a) good stocks, in general, should have certain positive characteristics independent of the industry they belong to; and (b) truly comparable companies are difficult to find, particularly a significantly large number of such companies, and this may bias values (signals) given to a firm. Moreover, value investors abstract from industry P/E (or P/B) metrics when they search for firms to invest in. However, to test the robustness of findings, we did repeat the analysis segregating data by business risk category (low and medium only, as high business risk stocks are already excluded from this analysis, as reported earlier) and the results were not materially different.

[28] According to the first approach, we calculate only one cross-section–time series median for each firm-specific fundamental variable and based on where each of these variables lies vis a vis the cross-section–time series median, we assign a 0 or 1 value to the firm-specific variable. According to the second approach, we calculate a median every year and, as a result, on an annual basis we assign 0 or 1 value to each firm-specific fundamental variable. The first approach is easier to apply going forward as for every new year in the future the firm-specific historic cross-section–time series overall median for each variable will not have changed much and so one can use these medians as benchmarks to assign values to the fundamental variables going forward and arrive at an overall SCORE for each firm without having to recalculate, on an annual basis, the historical cross-section–time series medians.

[29] Mean and median returns reported in Table 5, Panels A and B, are the mean and median returns of all contemporaneous results over the sample period, and so what is reported in the table may not reflect actual values in any given year.

[30] Median market cap and other financial statistics for stocks in each SCORE portfolio in Table 7 are reported later on in Tables 9 and 10.

[31] Results based on P/B sorting (not reported here) are comparable.

[32] Correlations tests (not reported here) show that SCORE is very significantly negatively related to future returns.

[33] It is worth noting that the number of observations for highest SCORE value and growth stocks increased between 2004 and 2009, whereas that for the smallest SCORE stocks declined to zero. This was simply an indication that markets were richly valued, which culminated with the market collapse of 2008–2009. That is, the SCORE indicator seems to have anticipated the above referred to bear market as it was giving signals that many stocks would have low or negative returns and none would have high returns in the 2004–2009 period.

[34] One may question the true drives of the outperformance of low vs high SCORE stocks given that the low SCORE stocks tend to be small size and low liquidity stocks, whereas the high SCORE stocks tend to be large cap and high liquidity stocks. We tested this theory by sorting value and growth stocks simultaneously by size and liquidity, forming quartiles and looking at the median differences between the small cap/low liquidity and large cap/high liquidity quartiles. Combined size/liquidity differences seem to explain only about

9%–10% of the difference in median returns between low and high SCORE portfolios, which, as shown in Table 7, Panels A and B, have median differences of about 20% and so size/liquidity effects cannot explain the size of the SCORE portfolio differences.

[35] This finding contradicts evidence presented by Athanassakos (2013). Athanassakos (2013), using a sample of non-cross-listed Canadian firms, shows that low SCORE stocks are less sensitive to the market effect and more sensitive to the SCORE-based effect, evidence which is contradictory regarding the status of the SCORE indicator as a risk-driven metric. Canadian non-cross-listed stocks tend to be much smaller and less visible that the sample of stocks examined in this study and this may have led to the differential findings.

[36] The SCORE-based effect could be the reward for bearing unsystematic risk. As Athanassakos (2013) discusses, it is possible that given that value investors invest in more concentrated portfolios and use the concept of the margin of safety to decide on whether a stock is truly undervalued and manage risk, thus putting less emphasis on diversification, they expose themselves to higher unsystematic risk. Based on this, the declining factor loadings of the SCORE-based portfolios, as we go from the low SCORE to the high SCORE portfolios, could suggest declining exposure of portfolios to unsystematic risk. In other words, according to this interpretation, unsystematic risk may be priced in the US markets. Examination of this conjecture is left to future research.

[37] Due to space limitations, results are not reported, but are available upon request.

[38] There are 6,232 unique firms or 22,133 (firm-year) observations with negative P/E ratios and 927 unique firms or 2,246 (firm-year) observations with negative P/B ratios over the sample period. For the negative P/E group, 3,564 unique companies (14,332 observations) are listed on NASDAQ, 838 on AMEX (2,616 observations) and 1,830 on NYSE (5,185 observations). For the negative P/B group, 294 unique firms (834 observations) are listed on NYSE, 134 on AMEX (339 observations) and 499 on NASDAQ (1,083 observations).

[39] There are 1,844 unique companies that are AMEX firms, firms with high business risk and firms that report extraordinary items the year before.

[40] There seems to be an interaction between unsystematic risk and illiquidity and momentum effects that may make difficult a rudimentary attempt to disentangle the effects. Early tests, for example, found no evidence that momentum is being proxied by the Low Score Minus High Score factor, and that this factor remains robust when controlling for momentum, but we will need to examine this in a more rigorous fashion in a subsequent paper.

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