INVESTIGATING THE RISK ARGUMENT FOR THE VALUE PREMIUM: A STOCHASTIC DOMINANCE APPROACH

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ABSTRACT

The value premium remains a puzzle despite considerable research effort in accounting for the higher returns earned by value stocks relative to growth stocks. A rational explanation is that value stocks are more risky than growth stocks. We seek to validate the risk argument in a nonparametric framework with the method of stochastic dominance. This approach avoids the model misspecification problem inherent in traditional CAPM or multifactor risk pricing models. We explore the dominance relationship in good and bad states of the economy and equity market to check if the superior performance of value investing persists in regimes where investors have different risk aversion. We find that value stocks stochastically dominate growth stocks very robustly, implying the implausibility of any risk-based explanation for the value premium puzzle.

JEL Classification: G11, G12, G14

Keywords: Value Premium, Value Investing, Growth Investing, Stochastic Dominance, Market Efficiency, Regime-Switching

INTRODUCTION

Rational investment decision-making leads to the axiom that one must bear higher risk in order to earn higher return. However, there are instances where certain investment strategies consistently outperform others, even after adjusting for differences in traditional risk measures. One such phenomenon is the tendency of value stocks to outperform growth stocks.

Value stocks are stocks with low price-to-earnings ratios (P/E), high book-to-market equity ratios (B/M) or high cash flow-to-price ratios (C/P). These three variables share a commonality – they are measures of a firm's performance with respect to its stock price. A value stock can be defined as one which is priced lower relative to the market average in relation to its performance. Conversely, growth stocks are stocks with are priced higher relative to the market average.

Evidence of superior performance of value stocks over growth stocks has seldom been disputed. However, the search for a theory to explain the underlying cause of the excess returns has seen much debate between supporters of efficient market hypothesis and supporters of behavioral finance. The central argument to the debate is whether the relative riskiness of value stocks over growth stocks is sufficient in explaining the excess returns. Parameterizing risk along the format of CAPM and multifactor models has not been successful in resolving the debate. Misspecification of risks in these models might be a reason why their results are inconclusive.

We seek to analyze the risks in the value premium by using stochastic dominance (SD) techniques. SD uses the entire returns distribution to capture risks and relies only on very general assumptions. We focus on the risk argument for why value strategies outperform growth strategies. The SD tests provide an overview of whether value strategies are more risky than growth strategies, and at the same time sidestepping the model misspecification problem that has plagued previous studies. We also examine the general riskiness of the competing strategies in different states of the economy and market to check whether value strategies are indeed fundamentally more risky.

VALUE VERSUS GROWTH

The overthrow of CAPM begins on a raft of evidence in the 1970s and 1980s. Basu (1977, 1983) finds that after controlling for β, portfolios sorted on their earnings-to-price (E/P) ratios show an ordering of returns that corresponds to the ordering of E/P, i.e., stocks with lower E/P have lower returns on average.

The E/P effect is also confirmed by Fama and French (1992). They find that B/M has strong explanatory power for returns – high B/M portfolios earn higher returns than low B/M portfolios even though there is no significant variation in β across the portfolios.

The strong explanatory power of the B/M ratio is validated by studies done by Chan, Hamao, and Lakonishok (1991), and Lakonishok, Shleifer and Vishny (1994). Chan, Hamao, and Lakonishok (1991) find that the B/M-based value premium is evident in the Japanese stock market, in addition to value premiums based on E/P and C/P. Lakonishok, Shleifer and Vishny (1994) identify C/P as the better value strategy due to its ability to measure market expectations more directly.

Several studies find correlations between the various variables used to sort portfolios. Reinganum (1981) and Basu (1983) find that market equity and E/P are correlated, i.e., small stocks tend to have high E/P. Bhandari (1988) finds that small stocks are usually highly levered. Chan, Hamao, and Lakonishok (1991) point out that market equity and B/M are correlated because both share the same component of market equity. Fama and French (1992) find that leverage and B/M are highly correlated. The correlations between different variables imply that it is possible that the value premium may actually reflect a hidden risk factor that explains returns.

Ball (1978) argues that E/P is actually a catchall proxy for omitted factors in asset-pricing tests. Chan and Chen (1991) argue that the size effect is due to a distressed-firm factor in returns and expected returns. Fama and French (1992) propose that since leverage and B/M are largely driven by the market value of equity, both variables may be proxies for relative distress risk factors of the firms. Petkova and Zhang (2005) sort betas on the expected market risk premium and find that value stocks are indeed more risky than growth stocks. However, the difference in risks is not large enough to explain the difference in returns using the conditional CAPM.

The latent risk factor has been elusive. There is little agreement on its existence or form. If such a risk factor exists, then the rational risk-return relationship still holds true and the forecasting variables like B/M, P/E and C/P are just proxies for risk.

Lakonishok, Shleifer and Vishny (1994) compare the returns distributions of value and growth strategies in 'good' and 'bad' states of the market. They find that value portfolios have higher standard deviations in returns than growth portfolios. But they argue that the higher standard deviations do not translate into greater downside risk when they examine the portfolio returns and βs in up and down markets.

They propose a contrarian model that offers reasons based on irrational investor behavior to explain the value premium: (a) Individual investors over-extrapolate past growth rates of growth stocks even though such growth might not be sustainable in the future. They invest in growth stocks because they believe these are well-run companies, even though they might be overpriced. (b) Institutional investors feel the need to appear prudent and hence preclude firms which have been doing poorly in the past. Competition among funds also means that institutional investors have short horizons and are disinclined to hold value stocks which require a longer payoff period.

Their contrarian model predicts that investors overreact to recent dramatic events (e.g., record earnings) and overprice (growth) stocks which have been enjoying good earnings growth and underprice (value) stocks which have been faring poorly. When these mispricings are corrected, value stocks earn higher returns than growth stocks.

La Porta (1996) supports the overreaction hypothesis. He finds that investment strategies that are contrary to analysts' forecasts earn superior returns because expected future growth rates are too extreme.

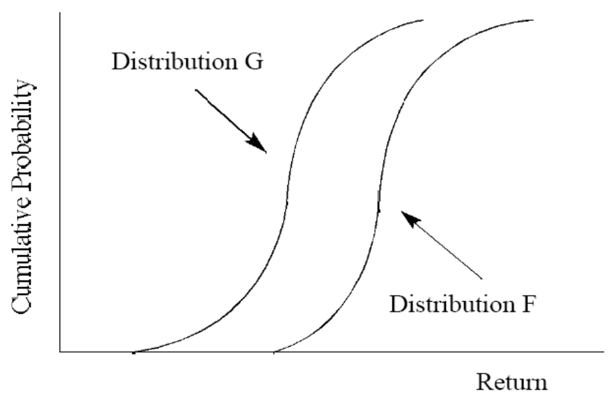
We offer a resolution to the risk-based explanation for the value premium. If there is indeed a latent risk factor embedded in the sorting variables for value and growth portfolios, then we should not observe dominance of value portfolios over growth portfolios in our SD tests. If we do find value portfolios dominating growth portfolios, then the explanation for the value premium lies not in a latent risk factor but likely in behavioral finance.

STOCHASTIC DOMINANCE

The advantage of SD tests over traditional multi-factor asset-pricing models is that it is non-parametric in nature, thus eliminating the possibility of model misspecification. It is free from restrictive assumptions imposed by the parametric models. The SD tests employ rules that are typically expressed as follows: investors (a) prefer more return per dollar invested to less (first-order stochastic dominance FSD); (b) are risk averse (second-order stochastic dominance SSD).

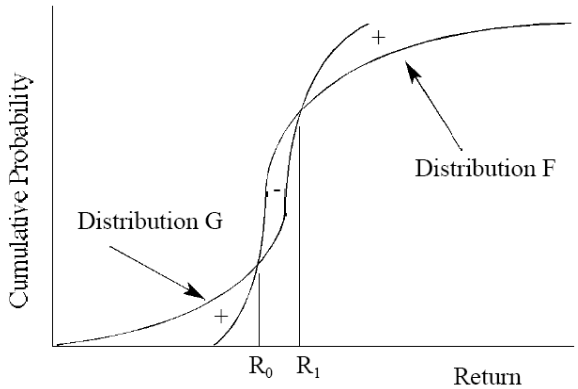
FSD. Figure A shows two cumulative returns distributions representing two different investment choices *F* and *G*. Investment *F* dominates investment *G* if and only if $F(r) \leq G(r)$ for all returns *r* (with at least one strict inequality, i.e., there is at least one point on the distributions where return on *F* is higher than return on *G*).

Figure A. Distribution *F* FSD-Dominates Distribution *G*



SSD. If *F* FSD-dominates *G*, then *F* is also less risky than *G*, i.e., FSD implies SSD. However, it is rare to have a returns distribution (*F*) that is completely to the right of another (*G*). Typically, we observe returns distributions that cross one another. In these cases, SSD can still be established. Figure B shows the cumulative returns distributions *F* and *G* intersect at the points R_0 and R_1. SSD rules state that as long as the net difference in areas under the curves is nonzero, one investment SSD-dominates the other. In this example, the difference in area between distribution *F* and distribution *G* to the left of R_0 is greater than the negative difference between R_0 and R_1. *F* SSD-dominates *G* if and only if $\int[G(t) - F(t)]dt \geq 0$, and there is at least one strict inequality.

Figure B. Distribution F SSD-Dominates Distribution G



The risk aversion entrenched in SSD rules means that we can now determine if value portfolios earn higher returns than growth portfolios because of higher risks. Because SD does not assume a distribution of returns (it uses the empirical distribution) and does not parameterize risks, it is not as limited as the CAPM or traditional multifactor models.

SD rules have been employed in several studies of the value premium. Chou and Liao (1995) conduct a test of the Taiwanese market using SD. They find that low price-to-sales stocks dominate high price-to-sales stocks. The alternative strategy of choosing stocks based on P/E is also found to be equivalent to that based on price-to-sales. They use annual returns and a short period (1981-1991). The small sample (ten annual observations for each portfolio) may undermine the statistical power of the SSD test.

Best, Best and Yoder (2000) find that high B/M (value) portfolios exhibit SSD over low B/M (growth) portfolios. They employ decile-portfolios created from NYSE NYSE, AMEX and NASDAQ nonfinancial firms over 1977-1998. Random portfolios are created from the sample as market proxies. Monthly returns are used, providing only up to 240 observations per portfolio. Their results show that high B/M portfolios SSD-dominate low B/M portfolios and the random portfolios. Value portfolios earn higher returns without bearing higher risks than growth portfolios. Post and van Vliet (2004) critique that the presence of sampling error has been ignored. SSD results are highly sensitive to sampling error because SSD tests take into account the entire sample distribution instead of a finite set of sample moments. Post and van Vliet's (2004) findings pose a question: Is the value premium due to data-snooping, i.e., it is only unique to the particular period of 1960-1990s?

Fama and French (1998) show out-of-sample evidence that the value premium exists in markets around the world. Chan and Lakonishok (2004) update the results to 2001 and demonstrate that it still exists. We believe that the SSD results should be extended to check if the value premium remains an anomaly to the efficient market hypothesis.

We use actual daily returns distributions (10,573 observations in 1963-2004) in our SD tests. As the empirical distribution function is sensitive to sampling error, we need to approximate properties of the sampling distribution. For this purpose, we adopt Davidson and Duclos's (1998) test, which derives properties of the asymptotic sampling distribution through logical analysis. Post (2003) cautions that such an approach can only be applied to compare finite alternatives. The problem set in our study indeed comprises finite choices – whether value portfolios outperform growth portfolios after accounting for risks. The Davidson-Duclos test should provide us with an appropriate answer to whether value portfolios stochastically dominate, to the second order, growth portfolios.

PORTFOLIO CREATION

We use returns data from NYSE, AMEX and NASDAQ from 1963 to 2004 extracted from the Center for Research in Security Prices (CRSP). We also extract accounting data from the CRSP/Compustat Merged Database of industrial annual income statements and balance sheets. Following Fama and French (1992), we exclude data before 1962 on two grounds: (a) book value of common equity is not widely available in Compustat before 1962; (b) Compustat data before 1962 has a serious selection bias towards successful firms. The accounting data for all fiscal yearends in calendar year t-1 is matched with the monthly returns for July of year t to June of year t + 1. Firms with no Compustat data for book equity, earnings and cash flow are excluded from the sample. Firms with negative book equity, earnings and cash flow are also excluded.

B/M is calculated by dividing book equity (BE) of fiscal yearend t-1 (book value of common equity plus balance sheet deferred taxes) by market equity (ME) at end of December of year t-1 (share price times number of shares outstanding). Stocks with negative or zero B/M ratios are excluded. P/E is calculated by dividing ME at end of December of year t-1 by earnings of fiscal yearend t-1 (income before extraordinary items, plus income statement deferred taxes, minus preferred dividends). Zero- or negative-P/E stocks are excluded. C/P is calculated by dividing cash flow of fiscal yearend *t*-1 (earnings plus depreciation) by ME at end of December of year *t*-1. Again, stocks with negative or zero C/P are excluded.

Some studies, e.g., Zarowin (1989), argue that the value premium seen in sorting stocks on B/M, P/E or C/P could in fact be derived from the size effect. Fama and French (1992) show that after controlling for size, the value premium from B/M remains. Nevertheless, we control our portfolios for size to abstract from such suspicion. The stocks are sorted by size given by ME of the company at June of year *t*. Following Fama and French's (1992) methodology, decile breakpoints are determined from the NYSE firms. The decile breakpoints are then aggregated into 30:40:30 where the lowest three deciles become the small-stocks portfolio and the largest three deciles become the big-stocks portfolio.

We create our portfolios from July of year *t* to June of year *t*+1, so as to ensure that all accounting information is available for the sorting of stocks into the respective portfolios. We sort the stocks into quintiles based on B/M, P/E, and C/P. The portfolios are weighted equally, and are rebalanced annually. We compute returns using a buy-and-hold strategy.

BASIC RESULTS

We present preliminary results that confirm the value premium, based on sorting stocks by B/M, P/E and C/P. Tables I, II and III report results of portfolios sorted on B/M, P/E and C/P respectively. Besides reporting portfolio returns over the full sample period from 1963 to 2004, the tables also partition the sample period into eight non-overlapping sub-periods. Monthly returns are used here for portfolio performance comparison.

Over the full sample period, the B/M-sorted value portfolio earns an average monthly return of 0.021 versus the growth portfolio’s 0.0073. This superior performance is repeated in each sub-period, with the gap closing in 1978-1982. The standard deviation of the value portfolio returns over the full sample period is actually lower, at 0.0632, than that of the growth portfolio, at 0.0705. Over the eight sub-periods, the standard deviations of the value portfolio returns are generally lower than those of the growth portfolio, except for two reversals in 1963-1967 and 1973-1977. The Sharpe ratios also paint a similar risk story.

Over the full sample period, the Sharpe ratio for the value portfolio is 0.2607, which compares favorably with the Sharpe ratio of 0.0410 for the growth portfolio. Applying Memmel's (2003) pairwise test of Sharpe ratios, the difference in the Sharpe ratios for the value and growth portfolio is significant with a *t*-stat of 5.46. In all eight sub-periods, the Sharpe ratio is always higher for the value portfolio than for the growth portfolio. However, the difference is only significant in four sub-periods.

P/E-sorted value portfolios also earn higher returns than growth portfolios. Over the full sample period, the value portfolio's average monthly return is 0.0205 and the growth portfolio's is 0.0083. In each sub-period, the value portfolio outperforms the growth portfolio. The standard deviation of the value portfolio returns for the full sample period is 0.0563, which is again lower than the 0.0626 of the growth portfolio. Only in three sub-periods are the standard deviations of the value portfolio returns higher than those of the growth portfolios. The value portfolio has a monthly Sharpe ratio of 0.2849 for the whole sample period as compared to 0.0613 for the growth portfolio. This difference is significant with a *t*-stat of 5.98, and the difference in Sharpe ratios between the value and growth portfolios in the eight sub-periods is significant in four of them. The market portfolio has a lower Sharpe ratio than both the value and growth portfolios, although it has higher Sharpe ratios compared to the growth portfolio in half of the eight sub-periods.

Similar to results from B/M- and P/E-sorted portfolios, value portfolios produce higher returns than growth portfolios when stocks are sorted by C/P. The value portfolio produces 0.0206 per month compared to the growth portfolio's 0.0075 over 1963-2004. The value premium exists in all eight sub-periods. The standard deviations are almost identical for value (0.0578) and growth (0.0579). In half of the sub-periods, value portfolios have larger standard deviations. The value portfolio has a Sharpe ratio of 0.2798 and the growth portfolio has a Sharpe ratio of 0.0515 over the full sample period. This difference in Sharpe ratios is significant with a t-stat of 6.385. The significance remains in five of the eight sub-periods.

The value premium is not unique to only certain time periods, as it is observed in all the eight sub-periods in our study. The value portfolios are not generally more risky than growth portfolios.

Controlling for Size

We also control for the size effect by conducting independent two-way sort for size and each alternative value/growth variable. We then examine the returns on value and growth portfolios within each group of small or big stocks. Table IV reports results for the full sample period. The value premium remains after controlling for size. Take the two-way sort on size and B/M as an illustration. Within small stocks, the value strategy produces monthly return of 0.0205 compared to the 0.0047 for the growth strategy.

While the increase in returns from growth to value is consistently monotonic within small stocks, this monotonicity in returns does not hold strictly within big stocks. In fact, the increase in returns only becomes apparent from the middle quintile of the B/M sort onwards. This is true for the sort on C/P as well, although sorting on P/E does produce a monotonic effect.

Table V reports standard deviations and Sharpe ratios for the double-sorted portfolios. Standard deviations of value portfolios continue to be lower than those of growth portfolios. We also see that small stocks tend to have higher standard deviations. Sharpe ratios again indicate that after adjusting for risk, value portfolios outperform growth portfolios. The differences in Sharpe ratios are significant within small and big stocks.

Overall, the size effect does not appear to confound the value premium in any major way.

SSD Tests

Table VI reports results of preliminary SSD tests. Daily returns are used here for the tests. The numbers in the table are fractions of observations where either the value portfolios SSD-dominate the growth portfolios (under HA_1), or the growth portfolios SSD-dominate the value portfolios (under HA_2). If both HA_1 and HA_2 have positive values, then no dominance occurs. We find that the value portfolios dominate the growth portfolios, across the three sorting variables. The superior performance of value strategies cannot be explained by higher risks.

The dominance is robust across all sub-periods, indicating that the dominance is not unique to any particular time period. Therefore, according to the SSD rules, value strategies are preferred to growth strategies as they offer higher returns at the same or lower risk levels. The results do not support any risk-based explanation for the value premium. Behavioral explanations that rely systematic mispricing of stocks cannot be ruled out.

We also run the SSD tests for portfolios formed on two-way sorts of size and value over the full sample period. These results are reported in Table VII. We find that after controlling for size, the value portfolios continue to SSD-dominate the growth portfolios. However, the degree of dominance is reduced within big stocks relative to small stocks. The superior performance of value strategies does not seem to be driven by the size effect.

CONDITIONAL MARKET RESULTS

Our results so far have shown that value strategies earn higher returns; incur lower risks in terms of standard deviation of returns and Sharpe ratio; and SSD-dominate growth strategies. However, the case for rejecting risk-based explanations of the value premium is still not complete. Lakonishok, Shleifer and Vishny (1994) hypothesize that value stocks are fundamentally riskier than growth stocks if two conditions are met: (a) value stocks must fare poorly against growth stocks in certain states of the world; and (b) these states of the world are bad states where the marginal utility of investors is high, i.e., bear markets or economic recessions. We address their concerns directly by repeating the SSD tests in different states of the economy and market.

We use data from National Bureau of Economic Research (NBER) to separate the sample periods into good and bad states. As a robustness check, we also use Gray's (1996) regime-switching model to identify the two states of the market. The observations for each state are chained together to create a continuous sample, on which the SSD tests are applied.

NBER Classification

Table VIII presents the NBER classification of economic states over 1963-2004. There are more expansion months than contraction months.

Table IX reports results of the SSD tests on value and growth portfolios in different states of the economy. We find that the three types of value portfolios SSD-dominate growth portfolios in expansion months. This is not surprising as the bulk of the daily observations (9,205 out of 10,573) are classified as economic expansion. We expect to see results similar to those from the full sample period. The results from economic contraction are more notable. We find that value portfolios SSD-dominate growth portfolios in economic contraction as well, with even larger fractions of observations showing dominance than in expansion.

We again control for the size effect. Table X reports results from double-sorting on size as well as value in different states of the economy. The dominance of value over growth portfolios across good and bad states is persistent after controlling for size. However, the degree of dominance generally appears to be greater within small stocks than big stocks.

Regime-Switching Classification

Our results point towards value strategies outperforming growth strategies; and the superiority is stronger in bad economic condition than in good economic condition. However, there are doubts whether economic expansion and contraction are accurate proxies for the conditions of the equity market. Connolly and Wang (2003) find that a significant proportion of the observed comovement in returns of the international equity markets is not correlated to news concerning macroeconomic fundamentals.

We employ another method to discern if the market is in a good or bad state to check our NBER-derived results. Regime-switching models, like those proposed by Hamilton (1989) and Gray (1996) suit our purpose. In Gray's (1996) regime-switching model, the regimes are not observed but are identified rather by the likelihood of their occurrence. Hamilton (1989) proposed that the regime probabilities could be used to date market cycles – an indicator of downturn is when the market is more likely to go down than up. We use the CRSP daily value-weighted all-shares index as input for Gray's (1996) model to calculate the day-to-day probabilities of whether the market is in a bad state. We classify the days into either good (probability less than 0.5) or bad (probability more than 0.5) market state.

Table XI presents results of the SSD tests over the good and bad regimes. We find that the three types of value portfolios SSD-dominate growth portfolios in good regimes. The degrees of dominance are higher than those observed in the NBER classification. These results are consistent with the argument that value strategies are actually less risky in bullish market condition. We also find the same direction of dominance in bad regimes.

Controlling for size, the similar results are obtained. Table XII shows that in good states of the market, value portfolios generally SSD-dominate growth portfolios, with the dominance being more pronounced within small stocks. An exception is seen in the B/M-sorted portfolios within big stocks. Here, the reverse – growth dominates value – is observed. We are not able to offer any explanation for this single anomaly, other than attributing it to sampling error. In bad states of the market and across size groups, value portfolios always SSD-dominate growth portfolios. The degrees of dominance are weaker in bad states than in good states of the market.

Our results for market conditions may appear to lend support to suggestions of investor optimism. Gervais and Odean (2001) argue that as investors experience success in the market, overconfidence rises and risk aversion falls. The ensuing investor optimism may lead to higher prices (lower expected returns) for growth (i.e., glamour) stocks. However, the continued dominance of value portfolios over growth portfolios in bad states of the market suggests that the value premium cannot be attributed to reduction in risk aversion due to overconfidence in bull markets.

CONCLUSION

Our study is most similar in spirit to Seyhun's (1993) paper on SD tests for the January effect. Seyhun find that the January returns strongly dominate non-January returns by first-order, second-order or third-order SD and concluded that the January effect could not be attributed to omitted risk factors. Our tests applied to the value premium puzzle yield similar conclusions.

The main results in our study can be presented as follows: First, value portfolios outperform growth portfolios consistently based on returns and simple measures of risk. Second, a non-parametric comparison of risk and returns using SD rules shows that value strategies are superior to growth strategies for risk-averse investors. Third, the superior performance of value strategies over growth strategies is persistent in different sub-periods and in good and even bad states of the market.

We use 42 years of daily returns for the SSD tests. The large sample of observations alleviates concerns about biases stemming from sampling error and data-snooping. In the SSD tests, we are not able to attribute any enhanced riskiness to value investment strategies. Risk cannot explain the value premium, especially in bad states of the market when investors' marginal utility of consumption is high. Our conclusion about the second-order stochastic dominance of value portfolios over growth portfolios removes the plausibility of any risk-based explanation for the value premium puzzle. Future research can be directed towards studying whether systematic mispricing is the source of the abnormal returns.

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Table I. Summary Data of Monthly Returns on B/M Sorting

	Mean (*t*-stat)	Std Dev	Sharpe Ratio	Sig. of Difference in Sharpe Ratio between Value and Growth
Full Sample				
Value	0.0210 (7.47)	0.0632	0.2607	5.46
Growth	0.0073 (2.33)	0.0705	0.0410	
Subperiods				
1963 - 1967				
Value	0.0253 (3.85)	0.0510	0.4312	0.36
Growth	0.0188 (3.15)	0.0462	0.3346	
1968 - 1972				
Value	0.0023 (0.28)	0.0626	-0.0334	0.93
Growth	-0.0055 (-0.63)	0.0676	-0.1450	
1973 - 1977				
Value	0.0290 (2.35)	0.0956	0.2494	2.42
Growth	0.0092 (1.00)	0.0713	0.0578	
1978 - 1982				
Value	0.0262 (3.36)	0.0605	0.2828	1.26
Growth	0.0213 (2.05)	0.0805	0.1524	
1983 - 1987				
Value	0.0146 (2.08)	0.0543	0.1593	3.93
Growth	-0.0045 (-0.52)	0.0684	-0.1517	
1988 - 1992				
Value	0.0211 (3.20)	0.0509	0.3135	1.37
Growth	0.0095 (1.43)	0.0515	0.0893	
1993 - 1998				
Value	0.0214 (5.77)	0.0323	0.6269	3.40
Growth	0.0063 (0.89)	0.0522	0.0410	
1999 - 2004				
Value	0.0272 (3.05)	0.0737	0.2973	2.55
Growth	0.0044 (0.46)	0.0977	0.0243	

Table II. Summary Data of Monthly Returns on P/E Sorting

	Mean (*t*-stat)	Std Dev	Sharpe Ratio	Sig. of Difference in Sharpe Ratio between Value and Growth
Full Sample				
Value	0.0205 (8.17)	0.0563	0.2849	5.98
Growth	0.0083 (2.96)	0.0626	0.0613	
Subperiods				
1963 - 1967				
Value	0.0285 (4.29)	0.0516	0.4889	1.14
Growth	0.0197 (3.14)	0.0487	0.3366	
1968 - 1972				
Value	0.0028 (0.37)	0.0593	-0.0259	1.39
Growth	-0.0082 (-0.89)	0.0716	-0.1746	
1973 - 1977				
Value	0.0270 (2.55)	0.0818	0.2659	2.18
Growth	0.0096 (1.03)	0.0726	0.0621	
1978 - 1982				
Value	0.0290 (3.71)	0.0605	0.3283	1.93
Growth	0.0215 (2.22)	0.0750	0.1665	
1983 - 1987				
Value	0.0166 (2.44)	0.0528	0.2023	4.17
Growth	-0.0020 (-0.25)	0.0622	-0.1260	
1988 - 1992				
Value	0.0203 (3.27)	0.0482	0.3175	2.21
Growth	0.0069 (1.27)	0.0421	0.0484	
1993 - 1998				
Value	0.0172 (3.59)	0.0305	0.3280	1.88
Growth	0.0087 (1.83)	0.0438	0.0970	
1999 - 2004				
Value	0.0228 (3.31)	0.0529	0.3119	2.689
Growth	0.0095 (1.08)	0.0695	0.0811	

Table III. Summary Data of Monthly Returns on C/P Sorting

	Mean (*t*-stat)	Std Dev	Sharpe Ratio	Sig. of Difference in Sharpe Ratio between Value and Growth
Full Sample				
Value	0.0206 (8.00)	0.0578	0.2798	6.39
Growth	0.0075 (2.90)	0.0579	0.0515	
Subperiods				
1963 - 1967				
Value	0.0285 (4.26)	0.0519	0.4857	1.34
Growth	0.0177 (2.85)	0.0481	0.2994	
1968 - 1972				
Value	0.0032 (0.42)	0.0598	-0.0186	1.49
Growth	-0.0086 (-0.94)	0.0704	-0.1829	
1973 - 1977				
Value	0.0290 (2.60)	0.0864	0.2752	2.69
Growth	0.0079 (0.85)	0.0719	0.0386	
1978 - 1982				
Value	0.0286 (3.66)	0.0605	0.3213	2.01
Growth	0.0198 (2.05)	0.0749	0.1449	
1983 - 1987				
Value	0.0161 (2.39)	0.0521	0.1945	4.36
Growth	-0.0008 (-0.11)	0.0559	-0.1192	
1988 - 1992				
Value	0.0197 (3.24)	0.0471	0.3113	1.90
Growth	0.0093 (1.95)	0.0367	0.1176	
1993 - 1998				
Value	0.0174 (4.99)	0.0314	0.3210	2.12
Growth	0.0081 (2.06)	0.0346	0.1050	
1999 - 2004				
Value	0.0227 (3.17)	0.0574	0.3781	2.50
Growth	0.0066 (1.00)	0.0551	0.0790	

Table IV. Monthly Returns for Portfolios sorted on Size and Value, 1963 to 2004

Sorts on B/M and Size

	Value	2	3	4	Growth
Small	0.0205	0.0148	0.0110	0.0081	0.0047
Big	0.0173	0.0144	0.0119	0.0116	0.0119

Sorts on C/P and Size

	Value	2	3	4	Growth
Small	0.0205	0.0146	0.0123	0.0091	0.0060
Big	0.0159	0.0135	0.0120	0.0117	0.0121

Sorts on P/E and Size

	Value	2	3	4	Growth
Small	0.0201	0.0150	0.0116	0.0102	0.0071
Big	0.0169	0.0134	0.0118	0.0118	0.0114

Table V. Summary Statistics for Two-Way Sort on Size and Value, 1963 to 2004

Results are presented for value and growth portfolios, formed by each value sort, within small and big cap stocks. Returns are monthly returns and the Sharpe ratio is given for the monthly returns while the significance of the difference in annual Sharpe ratios between the value and growth portfolios is presented.

Sort on B/M and Size

	Mean (*t-stat*)	**Std Dev**	**Sharpe Ratio**	**Sig. of Difference in Sharpe Ratio between Value and Growth**
Small Value	0.0205 (6.50)	0.0713	0.2204	5.96
Small Growth	0.0047 (1.21)	0.0852	-0.0020	
Big Value	0.0173 (7.07)	0.0549	0.2280	2.46
Big Growth	0.0120 (4.97)	0.0545	0.1328	

Sort on P/E and Size

	Mean (*t-stat*)	**Std Dev**	**Sharpe Ratio**	**Sig. of Difference in Sharpe Ratio between Value and Growth**
Small Value	0.0202 (7.20)	0.0634	0.2431	6.22
Small Growth	0.0070 (2.19)	0.0717	0.0310	
Big Value	0.0168 (7.23)	0.0523	0.2300	2.72
Big Growth	0.0115 (4.79)	0.0540	0.1244	

Sort on C/P and Size

	Mean (*t-stat*)	**Std Dev**	**Sharpe Ratio**	**Sig. of Difference in Sharpe Ratio between Value and Growth**
Small Value	0.0206 (7.06)	0.0659	0.2398	6.62
Small Growth	0.0059 (2.04)	0.0653	0.0180	
Big Value	0.0159 (7.16)	0.0498	0.2230	2.72
Big Growth	0.0122 (4.62)	0.0595	0.1247	

Table VI. Second-Order Stochastic Dominance Tests, 1963 to 2004

In each column, we compare the percentage of observations where either HA_1 (1st portfolio dominates 2nd portfolio) is true or HA_2 (2nd portfolio dominates 1st portfolio) is true. Using the value-growth column as an example, HA_1 is true if value dominates growth while HA_2 is true if growth dominates value. If both HA_1 and HA_2 have positive values, then no dominance occurs.

	Value – Growth, B/M	**Value – Growth, P/E**	**Value – Growth, C/P**
1963 - 2004			
HA_1	0.6	0.6	0.6
HA_2	0.0	0.0	0.0
Sub-Periods			
1963 - 1967			
HA_1	0.6	0.6	0.6
HA_2	0.0	0.0	0.0
1968 - 1972			
HA_1	0.4	0.4	0.5
HA_2	0.0	0.0	0.0
1973 - 1977			
HA_1	0.7	0.7	0.7
HA_2	0.0	0.0	0.0
1978 - 1982			
HA_1	0.3	0.5	0.6
HA_2	0.0	0.0	0.0
1983 - 1987			
HA_1	0.5	0.4	0.4
HA_2	0.0	0.0	0.0
1988 - 1992			
HA_1	0.7	0.6	0.4
HA_2	0.0	0.0	0.2
1993 - 1998			
HA_1	0.5	0.5	0.5
HA_2	0.0	0.0	0.0
1999 - 2004			
HA_1	0.6	0.5	0.5
HA_2	0.0	0.0	0.0

Table VII. Second Order Stochastic Dominance Tests for Two-Way Sorts on Size and Value, 1963 to 2004

Results are presented for value and growth portfolios, formed by each value sort, within small and big cap stocks. In each column, we compare the percentage of observations where either HA_1 (1st portfolio dominates 2nd portfolio) is true or HA_2 (2nd portfolio dominates 1st portfolio) is true.

	Value - Growth
B/M – Small	
HA_1	0.6
HA_2	0.0
B/M – Big	
HA_1	0.4
HA_2	0.0
P/E – Small	
HA_1	0.7
HA_2	0.0
P/E – Big	
HA_1	0.4
HA_2	0.0
C/P – Small	
HA_1	0.6
HA_2	0.0
C/P – Big	
HA_1	0.3
HA_2	0.0

Table VIII. NBER Business Cycle Dates

Contractions or recessions are defined as the time taken in months from the peak to the trough while expansion is defined as the time taken in months from the last trough to the peak. For example, there are 11 months of contraction between December 1969 to November 1970 and 106 months of expansion between February 1961 and December 1969.

Peak	Trough	Contraction	Expansion
	Feb-61		
Dec-69	Nov-70	11	106
Nov-73	Mar-75	16	36
Jan-80	Jul-80	6	58
Jul-81	Nov-82	16	12
Jul-90	Mar-91	8	92
Mar-01	Nov-01	8	120

Table IX. Second Order Stochastic Dominance Results for Good and Bad States, NBER

In each column, we compare the percentage of observations where either HA_1 (1st portfolio dominates 2nd portfolio) is true or HA_2 (2nd portfolio dominates 1st portfolio) is true.

	Value – Growth, Good States	**Value – Growth, Bad States**
B/M		
HA_1	0.6	0.7
HA_2	0.0	0.0
P/E		
HA_1	0.5	0.7
HA_2	0.0	0.0
C/P		
HA_1	0.5	0.7
HA_2	0.0	0.0

Table X. Second Order Stochastic Dominance Results for Two-Way Sorts on Size and Value in Good and Bad States, NBER

Results are presented for value and growth portfolios, formed by each value sort, within small and big cap stocks. In each column, we compare the percentage of observations where either HA_1 (1st portfolio dominates 2nd portfolio) is true or HA_2 (2nd portfolio dominates 1st portfolio) is true.

	Value – Growth, Good States	**Value – Growth, Bad States**
B/M – Small		
HA_1	0.6	0.7
HA_2	0.0	0.0
B/M – Big		
HA_1	0.2	0.1
HA_2	0.0	0.0
P/E – Small		
HA_1	0.6	0.3
HA_2	0.0	0.0
P/E – Big		
HA_1	0.3	0.5
HA_2	0.0	0.0
C/P – Small		
HA_1	0.5	0.6
HA_2	0.0	0.0
C/P – Big		
HA_1	0.3	0.2
HA_2	0.0	0.0

Table XI. Second Order Stochastic Dominance Results for Good and Bad States, Regime-Switching

In each column, we compare the percentage of observations where either HA_1 (1^{st} portfolio dominates 2^{nd} portfolio) is true or HA_2 (2^{nd} portfolio dominates 1^{st} portfolio) is true.

	Value – Growth, Good States	**Value – Growth, Bad States**
B/M		
HA_1	0.9	0.6
HA_2	0.0	0.0
P/E		
HA_1	0.8	0.6
HA_2	0.0	0.0
C/P		
HA_1	0.8	0.6
HA_2	0.0	0.0

Table XII. Second Order Stochastic Dominance Results for Two-Way Sorts on Size and Value in Good and Bad States, Regime-Switching

Results are presented for value and growth portfolios, formed by each value sort, within small and big cap stocks. In each column, we compare the percentage of observations where either HA_1 (1st portfolio dominates 2nd portfolio) is true or HA_2 (2nd portfolio dominates 1st portfolio) is true.

	Value – Growth, Good States	**Value – Growth, Bad States**
B/M - Small		
HA_1	0.8	0.6
HA_2	0.0	0.0
B/M - Big		
HA_1	0.0	0.2
HA_2	0.2	0.0
P/E - Small		
HA_1	0.8	0.7
HA_2	0.0	0.0
P/E - Big		
HA_1	0.5	0.3
HA_2	0.0	0.0
C/P - Small		
HA_1	0.8	0.6
HA_2	0.0	0.0
C/P - Big		
HA_1	0.4	0.3
HA_2	0.0	0.0