The Volatility Effect in Value and Growth Stocks: Evidence from India

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Abstract

The paper studies the strength of low-risk anomaly in value stocks (low price-to earnings ratio stocks) and growth stocks (high price-to-earnings stocks) among the universe of listed stocks in the Indian equity market. It studies stocks listed on National Stock Exchange (NSE) for the period from January 1995 to April 2017. It provides evidence that in the Indian equity market, low risk anomaly and value effect, both exists. The universe of value stocks delivers higher excess returns than the universe of growth stocks. Low risk anomaly enhances the performance of a portfolio consisting of value stocks. It also decreases the negative excess returns delivered by a portfolio of growth stocks. A portfolio consisting of lowest risk value stocks outperforms a portfolio consisting of lowest risk growth stocks as well as the benchmark portfolio. The excess returns are highest for a portfolio of lowest risk value stocks. The worst investment strategy is investing in a portfolio of highest risk growth stocks. The long-short strategy in growth stocks delivers positive excess returns coupled with high standard deviation. The study provides a framework for an implementable strategy for practitioners to enhance investment returns.

JEL Classification: G11, G12, G14, G15
Keywords: low risk anomaly, volatility effect, market efficiency, value effect

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Introduction

The classical theories backed by Capital Asset Pricing Model (CAPM) explain that investment in high-risk assets deliver high returns. But researchers over a period of time have also found a negative relationship between risk and return. Studies of Black, Jensen & Scholes (1972), Fama & MacBeth (1973), Haugen & Heins (1975) presented that the relationship between returns and systematic risk (measured with the beta) was flatter than predicted by CAPM. When controlled for size, the beta was insufficient to explain the returns for the risk adopted (Fama & French, 1992). In 1993, Fama & French improved the CAPM with size and value effects.

Graham's 'value anomaly' or the significant outperformance of low price-to-fundamentals stocks relative to high price-to-fundamentals stocks is well established in the academic and practitioners communities alike. Since Graham's time, academic research has shown that low price-to-fundamentals stocks have historically outperformed the market. It is a well-established fact that value outperforms growth and creates value premium. The value effect is a reward for the adoption of higher risk of financial distress. Some researchers claim that value premium exists due to sample selection bias. While other researchers say that the value effect exists due to mispricing combined with the availability of limited arbitrage.

Bender, Briand, Melas, & Subramaniam (2013) discuss the fundamentals of factor investing. They studied the returns to factor investing and its future and compared factor indices to market cap weighted indices and active management. The factors considered for study were Value, Low Size, Low Volatility, High Yield, Quality and Momentum. Their study states that value factor captures the positive link between stocks that have low prices relative to their fundamental value and deliver returns in excess of the capitalization weighted benchmark. Cochrane (1991, 1996) and Zhang (2005) suggest that contrary to growth firms, value firms have less flexibility to adapt to unfavourable economic environments. Chen Nai-fu & Zhang (1998) report that value stocks are riskier due to their high financial leverage and large uncertainty in future earnings. Value premium may exist because of loss aversion (Barberis & Huang, 2001) and mental accounting bias. Lakonishok, Shleifer, & Vishny (1994) document that value premium may exist due to investors extrapolating past growth into the future, chasing high-flying glamour stocks or overreacting to news. Vayanos & Woolley (2011) propose that value effect may also arise due to gradual asset sales by constrained but rational institutional investors driving price away from fundamental value. But ultimately, low price-to-fundamentals implies higher discount rate.

The book on Quantitative Value Investing Philosophy by Gray & Carlisle (2014) conducted a 'horse race' among various valuation metrics to find out which one of them capture value stocks most efficiently. These metrics were Earnings-to-Market Capitalization, EBITA/ Total Enterprise Value (TEV), Free Cash Flow/ TEV, Gross Profit / TEV and Book-to-Market Value. The authors have chosen Price-to Earnings (PE) metric for this study. Low PE stocks have been defined as value stocks and high PE stocks as growth stocks.

Investments in a portfolio of low-risk stocks have delivered high risk-adjusted as well as absolute returns across global markets. These returns are higher than portfolios of high-risk stocks as well as value-weighted benchmark portfolios. Haugen & Baker (1991), Ang, Hodrick, Xing, & Zhang (2006, 2009), Blitz & Vliet (2007), Clarke, De Silva, & Thorley (2010), Baker, Bradley, & Wurgler (2011), Baker & Haugen (2012), Blitz, Pang, & Vliet (2013) and Frazzini & Pedersen (2014) provide evidence for the same. A recent paper by Russo (2016) finds that high-risk stocks exhibit

higher skewness and higher convexity than low-risk stocks because if the price paid for stocks with higher-than-average skewness and convexity is inflated, their subsequent returns are consequently lower-than-average, at least in risk-adjusted terms. These studies have measured risk through the standard deviation of returns (volatility), systematic risk (beta) or unsystematic risk (idiosyncratic volatility) and more recently through minimum variance and risk parity. There is also evidence of the low volatility effect being stronger than low beta effect. Xi, Rodney, & Garcia-Feijóo (2016) found evidence that average returns to low-volatility portfolios are determined by common variations associated with the idiosyncratic-volatility characteristic rather than factor loadings. These excess returns are more likely driven by market mispricing connected with volatility as a stock characteristic. Baker (2016) finds that despite the large differences in risk of the top 30% high risk stocks and bottom 30% low risk stocks, there has been no statistical difference in return. In fact, the lower-risk portfolio has had a somewhat higher arithmetic average return, and much higher compound returns. In other words, the high equity premium puzzle across asset classes becomes the low equity premium puzzle within asset classes.

In India, work on low-risk investing has been done by Agarwalla, Jacob, Varma, & Vasudevan (2014), Joshipura & Joshipura (2016), Joshipura & Peswani (2017).

Many studies claim that a low volatility effect is only a representation of the value effect. But value stocks earn higher returns because they are risky while low volatility stocks earn higher returns because they are less risky. The two effects have different underlying economic and behavioural rationale. So there is the least possibility of any manifestation of one effect over another. Studies say that both these effects give higher returns. Blitz (2016) finds evidence for the US equity market that low volatility effect is strong and not a manifestation of value effect. Value effect is also strong. Asness, Frazzini, & Pedersen (2014) find that low-risk investing is not driven purely by the value effect. Joshipura & Joshipura (2016) find that the annualized alpha of the top decile volatility portfolio after controlling for value is 4.99% compared to 7.91% without controlling for value effect. The returns are still economically and statistically significant. In the 3 and 4 factor regression coefficient analysis, the loading of HML (VMG) is negative across various market size buckets. The HML (VMG) loading is also negative across various risk measure used to create low-risk portfolios (Joshipura & Peswani, 2017).

So, the authors have combined the two effects and laid down the following objectives for the study:

Primary objectives:
1. To evaluate the presence and strength of low volatility effect in the universe of value stocks.
2. To evaluate the presence and strength of low volatility effect in the universe of growth stocks.

Secondary objectives to aid the above study:
3. To test the existence and significance of low-risk anomaly in the Indian stock market.
4. To evaluate whether value investing or growth investing delivers higher returns in the Indian equity market.

The study establishes the following for the Indian equity market: (a) Returns from a portfolio of low volatility stocks exceed returns from a portfolio of high-volatility stocks as well as equally-weighted benchmark portfolio over the full market cycle on a risk-adjusted basis. These returns are positive, as well as statistically and economically significant. (b) The universe of value stocks delivers higher returns than the universe of growth stocks. The returns from the universe of value stocks are positive while returns from the universe of growth stocks are negative over the full

market cycle on a risk-adjusted basis. (c) All volatility sorted portfolios of the universe of value stocks deliver positive and significant returns beating the equally-weighted benchmark returns. (d) The least-volatility portfolio of growth stocks deliver positive returns but less than the equally-weighted benchmark portfolio (e) A portfolio of least-risk value stocks delivers higher returns than a portfolio of high-risk value stocks. (f) The worst strategy of investing in the Indian equity market is investing in a portfolio of high-risk growth stocks. (g) Though the long-short strategy in growth stocks delivers highest returns, it is accompanied by high standard deviation.

The paper is organized as follows. Section I discusses data and methodology. Section II discusses results. Section III discusses the limitations and future scope of the paper. Section IV provides the conclusion to the paper.

Data and Methodology

According to World Federation of Exchanges (WFE), in 2015, the National Stock Exchange (NSE) was the leading stock exchange in India. It is the fourth largest in the world by equity trading volume. NSE India had a market capitalization of $1881.61 billion[1] and an average daily turnover of $3,281.85 million as in April 2017. The number of stocks listed on NSE was 1831 in April 2017. NSE holds a leadership position across asset classes in the Indian and global exchange sectors. This demonstrates the robustness and liquidity of the exchange. The period of study is from January 1995 to April 2017. The study includes data from all past and present stock constituents of NSE India. The authors collected data from Capitaline database.

The authors collected monthly data on stock prices[2], volume, market capitalization, and PE ratio.

The total number of stocks vary from period to period due to listing / de-listing of stocks on the exchange. This universe consisted of approximately 900 stocks on an average.

The monthly log-return for all stocks listed on NSE for the period under study was calculated. The stock volatility for each month was calculated using the past 36 months excess log return of stocks. Then equally-weighted quintile portfolios were constructed in monthly iteration from January 1998 to April 2017. Overall, 232 months of portfolios were studied. However, before constructing the portfolios, non-profitable and glamour stocks were eliminated from the sample[3].

Initially, to study the existence of low-risk anomaly in the Indian market, low to high volatility sorted quintile portfolios were constructed. These portfolios were analysed to observe the existence / non-existence of low volatility anomaly. Later, for each month, stocks were sorted on the basis of their Price to Earnings ratio (PE). Median PE of a particular month was used as a break-point. Using this break-point, stocks were divided into two buckets - Low PE stocks and High PE stocks. The equally-weighted market returns (EWI) of low PE and high PE stocks were calculated separately for the full market cycle under study.

Further, quintile portfolios were constructed sorting on volatility of the Low PE stocks bucket and High PE stocks bucket separately. P1 quintile portfolio of every iteration consists of low-risk stocks. P5 quintile portfolio consists of highest risk stocks.

For the resulting time series, the average annualized equally-weighted excess returns, the standard deviation of these returns, Sharpe ratio, CAPM style alpha and ex-post beta were calculated. All stocks listed on NSE were considered as a proxy to the market portfolio (EWI).

Using the following classic one-factor regression, CAPM alpha was calculated:

$$Rp, t - Rf, t = \alpha p + \beta p, m \ (Rm, t - Rf, t) + \varepsilon p, t \quad (1)$$

where Rp,t, Rf,t , Rm,t and Ɛp,t are the return on the portfolio p, risk-free rate, the return of the market portfolio and idiosyncratic volatility respectively in time t. The alpha of the portfolio is represented by αp.

Main Results

A. Analysis of Volatility sorted portfolios

Table I exhibits results of quintile portfolios of the entire universe sorted on volatility. The excess return for P1 (lowest volatility quintile portfolio) is higher (8.32%) than P5 (-2.46%) and market portfolio (5.64%). There is a monotonic increase in the standard deviation from P1 (22.94%) to P5 (44.37%). The Sharpe ratio reduces from P1 (0.36) to P5 (-0.06). The ex-post beta for P1 is the lowest (0.68). The CAPM alpha for P1 (4.28%) is marginally lower than that of P2 (4.37%) and

both are statistically significant. Though the excess returns of P2 are greater than that of P1, it comes with higher risk (measured by standard deviation and the ex-post beta of the portfolio). The gain by investing long in a portfolio of low volatility stocks and shorting a portfolio of high volatility stocks (long-short strategy) is 11.03%. These results clearly display the negative relationship between volatility and risk-adjusted returns. It proves the existence of low-risk anomaly in the Indian equity market.

Table I: Quintile portfolios based on historical volatility (Annualized Results) for the all the stocks listed on NSE

Table I reports univariate analysis for the resultant time series of volatility sorted quintile portfolios constructed for all the stocks listed on NSE. The table reports annualized excess returns, standard deviation, Sharpe ratio, ex-post beta and CAPM style alpha with their t-value.

Historical Volatility sorted Po rtfolios							
	P1	P2	P3	P4	P5	P1-P5	EWI
Excess Returns	8.32%	9.65%	6.75%	6.17%	-2.46%	11.03%	5.64%
Std. Deviation	22.94%	29.44%	33.22%	37.11%	44.37%	26.39%	32.66%
Sharpe Ratio	0.36	0.33	0.20	0.17	-0.06	0.42	0.17
Ex-post beta	0.68	0.89	1.01	1.13	1.31	-0.63	
Alpha	4.28%	4.37%	1.02%	-0.19%	-9.66%	13.94%	
t-value	3.28	3.75	0.92	-0.18	-3.43	3.65	

Source: Authors' research findings

B. Analysis of Value (Low PE) stocks and Growth (High PE) stocks

Table II displays the equally-weighted excess returns of value stocks and growth stocks. The universe of growth stocks delivers negative excess returns. The universe of value stocks delivers exceptionally high excess returns. From this, it is clearly evident that in the Indian stock market, value stocks outperform growth stocks. The standard deviation is higher for the bucket of high PE stocks than for the bucket of low PE stocks. This

provides evidence of the existence of value premium in the Indian equity market[4].

Table II: Risk adjusted returns analysis of the universe of Value Stocks and the universe of Growth Stocks

Table II reports annualized excess returns, standard deviation and Sharpe ratio for equally-weighted excess returns of value stocks and growth stocks created from all the listed stocks on NSE for the period from January 1998 to April 2017

	Low PE EWI	High PE EWI
Excess Returns	13.95%	-2.17%
Std. Deviation	34.10%	31.78%
Sharpe Ratio	0.409	-0.068

Source: Authors' research findings

C. Volatility sorted Portfolios of Value and Growth stocks

The study screened and eliminated stocks with zero PE ratio from the sample. It also dropped stocks with extreme positive or negative returns. This helped eliminate glamour stocks which deliver extremely high or low returns due to the hype created about them in the market. Thus the paper retained and studied only profitable stocks.

Table III Panel A displays the returns from portfolios consisting of value stocks sorted on volatility. It is clear that low risk investing enhances the performance of value stock portfolios. Not only P1 but all the portfolios deliver positive excess returns. The returns are higher than the equally-weighted benchmark returns. The CAPM alpha is economically as well as statistically significant. The ex-post beta of the portfolios is increasing from P1 to P5. Thus, *low-risk value investing* is an exceptionally good investment strategy. Moreover, the strategy is implementable in practice to earn higher returns.

Table III Panel B displays the returns from volatility sorted portfolios consisting of growth stocks. Excess return of P1 is positive but it has a negative CAPM alpha. P5 of growth stocks deliver negative excess returns. These returns have statistically significant negative CAPM alpha. The long-short strategy delivers high excess returns of 18.04% with statistically significant CAPM alpha of 20.7%. The worst strategy would be to invest in high-risk growth stocks which deliver huge negative excess returns of -12.88%.

Table III: Quintile portfolios based on historical volatility (Annualized Results) of the bucket of Value Stocks and the bucket of Growth Stocks

Table III reports univariate analysis for the resultant time series of volatility sorted quintile portfolios constructed for Low PE stocks and High PE stocks separately. The table reports annualized excess returns, standard deviation, Sharpe ratio, ex-post beta and CAPM style alpha with their t-value.

VALUE STOCKS							
Panel A: Low PE Historical Volatility sorted Portfolios							
	P1	P2	P3	P4	P5	P1-P5	EWI
Excess Returns	14.58%	18.20%	13.18%	11.83%	11.47%	2.81%	5.64%
Std. Deviation	26.58%	31.39%	34.58%	37.94%	43.93%	22.90%	32.66%
Sharpe Ratio	0.55	0.58	0.38	0.31	0.26	0.12	0.17
Ex-post beta	0.79	0.93	1.03	1.14	1.29	-0.51	
Alpha	9.37%	11.71%	6.76%	4.96%	3.79%	5.58%	
t-value	5.82	6.86	3.94	3.09	1.39	1.56	

Source: Authors' research findings

GROWTH STOCKS							
Panel B: High PE Historical Volatility sorted Portfolios							
	P1	P2	P3	P4	P5	P1-P5	EWI
Excess Returns	3.03%	2.39%	-0.49%	-2.56%	-12.88%	18.04%	5.64%
Std. Deviation	20.57%	27.94%	32.81%	37.10%	46.60%	31.91%	32.66%
Sharpe Ratio	0.15	0.09	-0.02	-0.07	0.15	0.57	0.17
Beta	0.59	0.83	0.98	1.11	1.32	-0.73	
Alpha	-0.25%	-2.19%	-5.89%	-8.70%	-20.95%	20.70%	
t-value	-0.15	-1.39	-3.89	-5.09	-5.14	4.27	

Source: Authors' research findings

The above results prove that low risk anomaly exists in both the universes of value and growth stocks. The investment returns in value stocks can be enhanced by investing in low risk value stocks. The negative returns from investing in growth stocks can be marginalized by investing in a portfolio of low risk growth stocks.

Limitations and Potential Future Study

The study investigates the presence and strength of low volatility in value and growth stocks creating equally-weighted portfolios. In future, one can use a different weighting scheme like value-weighted scheme to test the results. This will further check the robustness of the results. Stock level analysis can be conducted to understand the characteristics of stocks which are picked by a low-risk investment strategy in the universe of value stocks and in the universe of growth stocks to deliver high risk adjusted returns. The objective of the approach adopted in the paper is to devise a strategy that can deliver higher risk adjusted returns than the benchmark market returns while reducing the risk of investing. The paper plainly segregates the stocks into the universe of value stocks and the universe of growth stocks and does not calculate the HML factor. It does not consider the size factor which is incorporated in defining the HML factor. Future study can use the HML factor.

Further, the study eliminates stocks with PE ratio less than zero. So the study considers only stocks that deliver positive earnings. This is not the case while defining the HML factor. Future study can include these stocks in the sample.

Conclusion

To conclude, low-risk anomaly persists in the Indian stock market for the period from January 1998 to April 2017. The returns from a portfolio of low-risk stocks exceed not only the returns from a portfolio of high-risk stocks but also equally weighted benchmark returns over a full cycle period. In the Indian market, investing in value stocks delivers positive excess returns. Investing in growth stocks delivers negative returns. Value investing coupled with low-risk anomaly gives exceptionally high returns. A portfolio of lowest volatility growth stocks delivers positive returns. But these returns are statistically insignificant. Also, these positive returns have negative CAPM alpha. All volatility sorted value stock portfolios deliver positive returns. These returns are economically and statistically significant too. They also beat equally-weighted benchmark market returns. The long-short strategy in growth stocks delivers very high excess returns. But these returns have high standard deviation. The worst strategy of investing in the Indian equity market is in a portfolio of high-risk growth

stocks. The strategies discussed in this paper are implementable. Individuals and institutional investors can earn significantly high returns on their investments in the Indian equity market using these investment strategies.

Footnotes:

[1] $1 = Rs.65.39

[2] All stock price data is adjusted for corporate action- Section I Data and Methodology

[3] Criteria for eliminating stocks from the sample: (a) Stocks with less than 12 monthly returns, (b) stocks that did not have a return in the month following the portfolio construction month (37th month) (c) stocks with more than +1000% excess returns (d) stocks with less than -100% excess returns (e) stocks with zero or no PE ratio.

[4] Only positive PE ratio stocks are considered for the study. We have eliminated stocks with very high or very low excess returns

Appendix I

Table IV: Descriptive Statistics of all the stocks listed on NSE

Table IV gives the monthly data of Median PE, Total Market Cap of all the stocks listed on NSE for a period from January 1998 to April 2017

Month	Median PE	Total market cap in million dollars	Month	Median PE	Total market cap in million dollars	Month	Median PE	Total market cap in million dollars
199801	5	54326	200407	9	129028	201101	14	944995
199802	5	48224	200408	9	142202	201102	13	883871
199803	5	52668	200409	10	145371	201103	12	848553
199804	5	55678	200410	11	156298	201104	12	923087
199805	6	60547	200411	10	159704	201105	13	927576
199806	6	60356	200412	12	176419	201106	13	900190
199807	5	50172	200501	14	191927	201107	13	904737
199808	5	48848	200502	13	189088	201108	12	875212
199809	5	46559	200503	14	196060	201109	11	804704
199810	5	49081	200504	13	191774	201110	11	795696
199811	5	45446	200505	14	191419	201111	11	819939
199812	5	45076	200506	16	208913	201112	10	777466
199901	5	48945	200507	16	218695	201201	9	734474
199902	6	52985	200508	16	235383	201202	11	836051
199903	6	53285	200509	18	258110	201203	12	878959
199904	6	57188	200510	18	278487	201204	11	863583
199905	6	51841	200511	15	253999	201205	12	874564
199906	6	58066	200512	17	297985	201206	11	823362
199907	7	61080	200601	18	319950	201207	12	873681
199908	7	69287	200602	18	329590	201208	11	841109

Month	Median PE	Total market cap in million dollars	Month	Median PE	Total market cap in million dollars	Month	Median PE	Total market cap in million dollars
199909	9	76537	200603	18	340593	201209	11	843298
199910	9	80220	200604	19	375867	201210	12	913044
199911	9	77573	200605	20	401104	201211	12	915377
199912	9	82383	200606	17	346874	201212	13	953422
200001	10	93916	200607	15	338149	201301	13	970521
200002	9	103017	200608	13	339391	201302	13	987303
200003	8	91941	200609	15	372884	201303	11	924115
200004	7	101461	200610	15	397496	201304	11	906903
200005	7	77163	200611	15	419718	201305	12	947745
200006	7	71550	200612	15	442062	201306	11	955591
200007	7	80625	200701	16	445348	201307	11	917417
200008	6	75103	200702	16	463418	201308	10	892577
200009	6	79836	200703	14	427028	201309	10	858210
200010	6	71179	200704	14	447321	201310	10	903137
200011	6	67582	200705	14	484757	201311	11	961447
200012	6	71828	200706	15	513424	201312	11	952145
200101	6	71242	200707	16	523766	201401	12	992475
200102	6	81043	200708	15	551856	201402	12	963435
200103	6	77610	200709	15	546293	201403	12	986250
200104	5	63459	200710	16	620828	201404	13	1061798
200105	5	63653	200711	16	721012	201405	15	1033003
200106	5	67808	200712	17	739708	201406	18	1161697
200107	5	63270	200801	21	819009	201407	20	1247387
200108	5	62157	200802	15	675085	201408	18	1278168
200109	5	61396	200803	15	683153	201409	19	1315117
200110	4	52969	200804	13	608138	201410	20	1333466
200111	5	56289	200805	14	669751	201411	20	1361967
200112	6	62518	200806	14	630535	201412	20	1400758
200201	6	63208	200807	11	515544	201501	21	1382437
200202	6	64168	200808	11	569352	201502	21	1415174
200203	6	70891	200809	11	579503	201503	21	1431928
200204	6	73145	200810	9	505386	201504	20	1386647
200205	8	74394	200811	6	370877	201505	22	1362437
200206	7	71227	200812	5	349254	201506	22	1400118

The Volatility Effect in Value and Growth Stocks: Evidence from India

Month	Median PE	Total market cap in million dollars	Month	Median PE	Total market cap in million dollars	Month	Median PE	Total market cap in million dollars
200207	8	74747	200901	6	382424	201507	22	1393799
200208	7	69244	200902	6	370992	201508	22	1441379
200209	7	72633	200903	5	360488	201509	20	1348688
200210	6	67972	200904	6	402053	201510	20	1354611
200211	6	69368	200905	8	479514	201511	21	1364551
200212	6	74216	200906	12	648041	201512	22	1358201
200301	7	77075	200907	12	632787	201601	23	1371818
200302	6	74848	200908	12	689338	201602	21	1275937
200303	6	76405	200909	13	705455	201603	18	1173990
200304	5	70362	200910	14	760561	201604	20	1297670
200305	6	69643	200911	13	712482	201605	21	1319319
200306	7	80793	200912	13	767554	201606	21	1354085
200307	8	90057	201001	15	803406	201607	23	1399642
200308	8	95440	201002	14	769926	201608	22	1497408
200309	9	110330	201003	13	767953	201609	22	1533092
200310	9	114820	201004	14	804711	201610	22	1521520
200311	9	123444	201005	14	814462	201611	24	1532258
200312	10	130432	201006	13	789153	201612	21	1462770
200401	13	155882	201007	14	826064	201701	21	1447912
200402	10	148495	201008	14	829078	201702	23	1536050
200403	9	147063	201009	15	851358	201703	23	1609004
200404	9	147633	201010	16	943750	201704	25	1663650
200405	10	154568	201011	16	955001			
200406	9	125170	201012	14	915219			

Source: Authors' research findings

Table V: Descriptive Statistics of Value Stocks (Low PE stocks)

Table V gives the monthly data of Median PE and Total Market Cap of the universe of value stocks

for a period from January 1998 to April 2017

Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars
199801	3	4	200407	5	17	201101	9	51
199802	3	4	200408	5	18	201102	8	47
199803	3	4	200409	6	21	201103	7	40
199804	3	4	200410	7	24	201104	7	39
199805	4	5	200411	6	24	201105	8	45
199806	4	5	200412	8	29	201106	7	42
199807	3	4	200501	9	33	201107	7	41
199808	3	4	200502	8	32	201108	7	41
199809	3	4	200503	9	36	201109	6	34
199810	3	4	200504	9	34	201110	6	36
199811	3	4	200505	9	40	201111	7	38
199812	3	4	200506	10	49	201112	6	33
199901	3	4	200507	10	48	201201	5	29
199902	3	5	200508	10	51	201202	6	35
199903	3	5	200509	12	62	201203	7	38
199904	3	5	200510	11	54	201204	6	33
199905	3	5	200511	10	42	201205	7	37
199906	3	5	200512	10	47	201206	6	35
199907	4	5	200601	11	47	201207	7	37
199908	4	6	200602	11	47	201208	6	36
199909	5	7	200603	11	46	201209	6	34
199910	5	7	200604	11	45	201210	7	36
199911	5	8	200605	12	53	201211	7	39
199912	4	8	200606	11	44	201212	7	41
200001	5	8	200607	9	36	201301	7	39
200002	4	7	200608	8	33	201302	7	39
200003	4	7	200609	9	39	201303	6	34
200004	4	7	200610	10	39	201304	5	29
200005	4	7	200611	10	45	201305	6	32
200006	4	7	200612	9	43	201306	6	30

Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars
200007	4	7	200701	10	42	201307	6	30
200008	3	7	200702	9	47	201308	5	27
200009	3	7	200703	9	39	201309	5	28
200010	3	7	200704	8	37	201310	5	29
200011	3	7	200705	9	43	201311	6	37
200012	3	7	200706	9	42	201312	7	38
200101	3	7	200707	9	41	201401	6	36
200102	3	7	200708	9	49	201402	6	35
200103	3	6	200709	9	51	201403	7	35
200104	3	6	200710	10	57	201404	7	35
200105	3	6	200711	10	51	201405	8	46
200106	3	6	200712	10	53	201406	9	57
200107	3	6	200801	13	76	201407	11	70
200108	3	6	200802	10	53	201408	10	66
200109	3	6	200803	9	51	201409	10	69
200110	2	6	200804	8	37	201410	11	82
200111	3	6	200805	9	50	201411	11	83
200112	3	8	200806	8	45	201412	11	80
200201	3	7	200807	7	38	201501	11	76
200202	3	7	200808	7	37	201502	11	77
200203	3	7	200809	7	36	201503	11	75
200204	3	8	200810	5	26	201504	11	68
200205	4	9	200811	4	20	201505	12	84
200206	4	10	200812	3	16	201506	12	85
200207	5	14	200901	3	19	201507	12	77
200208	4	11	200902	3	19	201508	13	94
200209	4	12	200903	3	17	201509	11	78
200210	4	11	200904	3	16	201510	12	78
200211	4	9	200905	4	24	201511	12	86
200212	4	11	200906	7	37	201512	13	98
200301	4	11	200907	7	34	201601	14	106
200302	4	11	200908	7	37	201602	12	93
200303	4	12	200909	8	45	201603	10	71

Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars
200304	3	10	200910	8	49	201604	12	78
200305	4	12	200911	7	45	201605	13	100
200306	4	14	200912	8	45	201606	13	92
200307	5	15	201001	9	51	201607	14	102
200308	5	19	201002	8	48	201608	13	101
200309	6	19	201003	8	49	201609	13	94
200310	5	18	201004	8	51	201610	14	97
200311	5	17	201005	9	54	201611	15	126
200312	6	21	201006	8	51	201612	14	110
200401	8	30	201007	9	53	201701	13	109
200402	6	18	201008	9	53	201702	14	122
200403	6	16	201009	9	52	201703	15	128
200404	5	15	201010	9	57	201704	15	133
200405	6	19	201011	9	57			
200406	5	17	201012	9	50			

Source: Authors' research findings

Table VI: Descriptive Statistics of Growth Stocks (High PE stocks)

Table V gives the monthly data of Median PE and Total Market Cap of the universe of Growth stocks for a period from January 1998 to April 2017

Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars
199801	11	19	200407	14	63	201101	25	235
199802	10	20	200408	14	71	201102	23	198
199803	10	20	200409	16	78	201103	21	187
199804	12	22	200410	17	78	201104	23	212
199805	13	27	200411	17	82	201105	24	208
199806	13	29	200412	19	90	201106	23	199
199807	10	21	200501	21	105	201107	23	188
199808	10	22	200502	21	99	201108	23	208
199809	10	19	200503	22	95	201109	20	196
199810	11	22	200504	22	87	201110	20	180

Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars
199811	10	20	200505	21	91	201111	21	187
199812	10	19	200506	24	88	201112	18	174
199901	11	20	200507	24	86	201201	16	155
199902	12	22	200508	24	107	201202	21	171
199903	13	23	200509	28	117	201203	22	203
199904	14	27	200510	27	128	201204	21	199
199905	12	25	200511	23	129	201205	23	192
199906	13	31	200512	26	147	201206	22	171
199907	15	33	200601	27	163	201207	23	171
199908	16	36	200602	27	166	201208	21	175
199909	20	42	200603	27	177	201209	21	171
199910	21	42	200604	30	201	201210	22	189
199911	20	41	200605	32	208	201211	22	159
199912	20	45	200606	28	174	201212	23	173
200001	23	45	200607	24	162	201301	24	187
200002	21	54	200608	21	169	201302	23	175
200003	20	48	200609	23	182	201303	20	160
200004	17	39	200610	25	203	201304	19	162
200005	15	29	200611	24	189	201305	22	174
200006	14	31	200612	25	192	201306	22	182
200007	14	32	200701	27	197	201307	21	165
200008	12	31	200702	27	199	201308	19	155
200009	12	31	200703	24	196	201309	19	151
200010	11	30	200704	23	197	201310	20	161
200011	10	28	200705	24	173	201311	21	169
200012	11	32	200706	26	184	201312	22	172
200101	12	34	200707	27	199	201401	23	198
200102	13	36	200708	25	203	201402	22	171
200103	12	36	200709	26	192	201403	23	176
200104	9	29	200710	28	208	201404	25	200
200105	10	28	200711	28	241	201405	28	188
200106	11	31	200712	30	244	201406	33	217
200107	10	26	200801	36	274	201407	36	234

Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars	Month	Median PE	Median Market Cap in Million Dollars
200108	9	23	200802	28	221	201408	31	236
200109	9	22	200803	27	217	201409	33	235
200110	8	19	200804	23	191	201410	35	236
200111	9	22	200805	26	189	201411	35	257
200112	11	27	200806	25	170	201412	36	263
200201	11	25	200807	20	127	201501	37	284
200202	11	29	200808	19	154	201502	38	293
200203	12	33	200809	19	156	201503	38	304
200204	12	37	200810	16	124	201504	38	329
200205	15	41	200811	11	79	201505	41	255
200206	14	38	200812	10	63	201506	41	253
200207	16	36	200901	11	77	201507	41	259
200208	13	31	200902	11	67	201508	41	278
200209	13	36	200903	11	65	201509	37	282
200210	12	32	200904	11	77	201510	38	318
200211	11	32	200905	16	75	201511	38	304
200212	12	33	200906	22	122	201512	39	282
200301	12	38	200907	22	121	201601	41	280
200302	11	36	200908	22	152	201602	36	259
200303	11	35	200909	24	159	201603	31	222
200304	9	31	200910	26	170	201604	34	255
200305	11	30	200911	24	165	201605	37	205
200306	12	36	200912	25	177	201606	37	240
200307	14	41	201001	27	191	201607	41	235
200308	14	41	201002	25	167	201608	38	271
200309	16	48	201003	25	165	201609	39	288
200310	16	50	201004	26	172	201610	40	289
200311	15	60	201005	26	171	201611	42	279
200312	17	65	201006	24	157	201612	38	260
200401	21	73	201007	26	167	201701	37	267
200402	16	73	201008	25	182	201702	40	269
200403	15	74	201009	25	193	201703	41	276
200404	15	72	201010	28	201	201704	43	294
200405	16	71	201011	27	232			

Source: Authors' research findings

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