The Relationship between Dividend Payout and Price to Earnings

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Abstract

Using a large database of all S&P 1500 index firms spanning the 88-quarter period from 1995 through 2016, we document that current period dividend payout is significantly and positively correlated with next period Price-to-Earnings ratio (PE) for high market cap firms and manufacturing firms, and significantly negatively correlated for high book-to-market firms. Market cap (firm size), book-to-market ratio (a proxy for market perception of growth potential) and industry matter for determining PE levels as a function of payout levels. However, once the PE levels are determined, current period dividend payout change is significantly and negatively associated with next period PE change. We find evidence supporting an argument that an increase in current period payout signals reduced investment opportunities and increased risk that reduce future PE ratios. Thus, modeling determinants of PE must take into account industry, size, risk and market perception of growth potential for a firm.

Keywords: Price-to-Earnings ratio, PE ratio, dividend payout ratio, industry, market cap, firm size, book-to-market ratio, growth opportunities, firm risk.

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1. Introduction

Standard text book models show that the Price-to-Earnings ratio (PE), $\frac{P_0}{EPS_0} = PE = \frac{(\text{Payout Ratio})(1+g_n)}{k_e - g_e}$, increases as the payout ratio increases for any given growth rate, PE decreases as risk increases, and PE increases as the growth rate increases (see Appendix A). Investors focus on PE ratios, classifying into high and low PE stocks. Hough (2011), for example, claims that low PE stocks outperformed high PE stocks in the 2000's. We examine whether any such standard model holds across the cross section of firms.

Extant literature has studied both PE ratios and dividend payouts extensively. Risk matters. Henne, Ostrowski and Reichling (2009) argue that stock performance generally improves with increasing dividend yield, but this result is actually based on risk reduction rather than higher return, in the German market. Ferson (2008) mentions that the argument that a shock to expected return on equity, ceteris paribus, changes the asset value may overstate the effect to the extent that a shock that changes the required return also changes the expected future cash flows. Growth matters. Ang and Zhang (2011) find that growth opportunities account for approximately 95% of the variation and 80% of the level of PE ratios. Riahi-Belkaoui and Picur (2001) allege that firms with high investment opportunities are "PE valued". Profitability matters. Benartzi, Michaely, and Thaler (1997) and Grullon, Michaely, and Swaminathan (2002) find no evidence that dividend changes predict abnormal increases in earnings. Penman (1996) fails to find that the current return on equity is a good indicator of PE ratio. Our goal in this paper is to use a large panel of firms to check the determinants of PE ratio levels and changes, in particular the current period dividend payout levels and changes.

We start with examining the determinants of PE levels, and find, in univariate tests, that industry matters. High-tech and healthcare firms have higher PE ratios, on average, and manufacturing firms the lowest, broadly reflecting future growth opportunities. Market capitalization (which is a proxy for firm size) and book-to-market ratio (which is a proxy for (the reverse of) growth options) matter. The higher the market capitalization, the higher the PE, showing the market prices in market dominance, and the lower the book-to-market ratio the higher the PE, reflecting future growth opportunities.

In multivariate regressions, after controlling for industry and time fixed effects, we find that current period dividend payout is significantly and positively related to next period PE. Results are significant when we use current earnings or trailing earnings. When we run

regressions on groups of firms divided by industries, market cap, book-to-market ratio and recession and non-recession years, we find that results are more complicated. For Consumer and High Tech industries, the correlation between current period payout and next period PE tends to be significantly negative, while it is significantly positive for Manufacturing and other industries. In general, we find a positive relationship between current period payout and future PE for high market cap firms. So, a simple dividend discount model is perhaps too simple to use across all industry segments, market capitalization, book-to-market ratios, and other measures of firm risk.

When we examine changes, the change in PE ratio is significantly and negatively associated with prior changes in payout. This negative relationship not only appears overall, but also in almost every industry and type of companies: all of the significant associations between current period change in payout and future change in PE ratio are negative. We examine the impact of payout changes on future risk, using the following regression specification, and find that there is indeed a significant and positive relationship. Thus, given PE levels, an increase in current period payout signals reduced positive growth opportunities in future and increased risk, and hence results in a decrease in next period PE.

2. Data and Descriptive Statistics

We use all S&P 1500 firms' (including S&P 500, S&P Mid Cap 400 and S&P Small Cap 600) data from the Compustat Quarterly from 1995 through 2016, entailing 88 quarters and 132,000 observations in all.

We define book equity (BE) as total shareholders' equity plus deferred taxes and investment tax credit (item TXDITCQ) minus the book value of preferred stock (item PSTKQ). We prefer the shareholders' equity numbers (SEQQ). In case this data are not available, we calculate shareholders' equity as sum of common and preferred equity (items CEQQ and PSTKQ). If neither of the two are available, we define shareholders' equity as the differences of total assets and total liabilities (items ATQ and LTQ). Trailing earnings is the average net income of the past four quarters. We use 5 industry groups defined by Ken French, which are Consumer, Manufacturing, High Technology, Healthcare and Other
(see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

We also segregate years by recession and non-recession years. The definition of recession years is taken from the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) based on the behavior of various indicators of economic activity (see

http://www.nber.org/cycles/cyclesmain.html). The full list of variables used is shown in Appendix B.

3. Univariate Results

Figure 1 and Figure 2, respectively, show the time series plots of quarterly average dividend payout and quarterly average PE overall, as well as by industries, market capitalization and book-to-market categories, where the recession quarters are 2001 Q2 - 2001 Q4 and 2008 Q1 - 2009 Q2, as determined by NBER, are shaded. Panel A of Figure 1 shows that dividend payout ratio tends to spike up during recession periods. Panel B shows that manufacturing firm payouts tend to be higher, Panel C shows the higher the market cap the greater the dividend payout, while the final panel shows that the higher the book to market ratio, the higher the payout. This is confirmed by the pairwise differences in Table 1. Manufacturing firms have significantly higher payout that other firms that have significantly higher payouts, on average, than consumer firms. Healthcare and high-tech firms have the lowest payouts on average, perhaps reflecting their future growth potential. The middle panel shows the higher the market capitalization the higher the payout reflecting firm maturity, while the last panel shows that the higher the book to market ratio the higher the payout reflecting lack of growth potential. So, in summary, manufacturing firms payout more, larger firms payout more, and firms with lower future growth potential payout more, on average.

Panel A of Figure 2 shows that PE ratios, on average, tend to be lower during recessions because of price depressions. There is no clear pattern for PE ratios emerging when we look by industries, although healthcare stocks in recent years tend to have higher PE ratios. However, Panel C shows that low market cap firms (small firms) generally tend to have lower PE ratios, while Panel D shows that the higher the book to market ratio, the lower the PE ratio, reflecting the fact that the lower the future growth prospects the lower the PE ratio. This is corroborated by the pairwise differences among the groups of firms by industries, market capitalization and book to market in Table 2. High tech and healthcare firms do tend to have higher PE ratios, and manufacturing the least. The higher the market cap the higher the PE, and the lower the book to market ratio the higher the PE.

The takeaway is that payout and PE ratios move in opposite directions when we compare by broad industry categories, in the same direction when we examine by market cap (firm size), and in the opposite direction when we examine by book to market ratio (firm growth). Overall, a

cursory examination of panels A of Figures 1 and 2 show that payout and PE ratios tend to move in opposite directions.

4. Multivariate Results

Table 3 examines the determinants of the PE ratio, using the 2 variants of the following regression:

(1) $$\boldsymbol{P/E\ Ratio_{t+1} = \beta_1 \times Dividend\ Payout_t + \beta_2 \times Recession_t + \beta_3 \times Volatility_t + \beta_4 \times log(Market\ Cap)_t + \beta_5 \times Book\ to\ Market_t + \beta_6 \times Beta_t + \beta_7 \times Industry_t + \beta_8 \times Year_t + \varepsilon}$$

where $Book\ to\ Market_t$ is a proxy for the inverse of growth options and $Beta_t$ is the market beta calculated by running regressions between individual returns and market returns by moving windows. We also control for year and industry fixed effects. In specification 1, we use price and EPS as of time (t+1), and in specification 2, we use price as of time (t+1) and EPS as of time t, lagged earnings computed as the average earnings of the past 4 quarters.

We find that current period dividend payout is positively and significantly related to next period PE (at 1% significance level) after controlling for year and industry fixed effects and firm beta. Contrary to univariate results, PE ratio is significantly lower for higher market cap firms, after controlling for other determinants. In line with the univariate results, PE ratio is significantly lower for higher book to market firms, because of lower perceived growth opportunities. These results are significant whether we use current earnings or trailing earnings.

When we run regressions by groups divided by industries, market cap, book to market ratio and recession years, we find that results are more complicated. Table 4 reports regression results run separately over 90 groups overall, made up of 5 industry groups, 3 groups of market capitalization, 3 groups of book to market values, and whether or not recession period. Only the specifications for which payout ratio is significant in explaining future PE at 5% or 1% levels are shown. Panel A shows significant negative relations, and Panel B significant positive relations.

For Consumer industry and High Technology industry, the correlation between payout and PE tends to be significantly negative, while it is significantly positive for Manufacturing and Other industries. In general, the positive relation between payout and future PE is for high market cap firms. There are no discernable relations for when the relation between payout and PE is positive or negative with regard to book-to-market and recession or expansion years, although in most of the regressions, book to market ratio has a significantly negative correlation with future PE.

The results are somewhat similar when we use trailing earnings instead of current earnings, in Table 5. For Consumer and High Tech industries, the correlation between payout and future PE tends to be significantly negative, while it is significantly positive for Manufacturing and other industries. In general, we find positive relationship between payout and future PE for high market cap firms and for low book-to-market firms.

To directly examine the impact of changes on changes, we regress change in PE on change in payout. We have seen that the correlation between payout and PE levels tend to be significantly positive for high market cap firms and manufacturing firms, and tends to be negative for high book to market firms. Therefore, the market cap, book-to-market ratio and whether a firm is in the manufacturing sector or not matters for determining PE levels as a function of payout levels and we control for this using the following 4 different specifications of the following regression equation, where $\Delta \boldsymbol{Dividend\ Payout_t}$ is the difference between dividend payout at t and t-1 and $\boldsymbol{\Delta P/E\ Ratio_{t+1}}$ is the difference in PE ratio between times t+1 and t.

$$
\begin{aligned}
(2)\ \boldsymbol{\Delta P/E\ Ratio_{t+1}} &= \boldsymbol{\beta_1} \times \Delta \boldsymbol{Dividend\ Payout_t} + \boldsymbol{\beta_2} \times \boldsymbol{Recession_t} + \boldsymbol{\beta_3} \times \boldsymbol{Volatility_t} + \boldsymbol{\beta_4} \\
&\times \boldsymbol{LogMarket\ Cap_t} + \boldsymbol{\beta_5} \times \boldsymbol{Book\ to\ Market_t} \\
&+ \boldsymbol{\beta_6} \times \boldsymbol{Beta_t} + \boldsymbol{\beta_7} \times \Delta \boldsymbol{Dividend\ Payout_t} \times \boldsymbol{LogMarket\ Cap_t} + \boldsymbol{\beta_8} \\
&\times \Delta \boldsymbol{Dividend\ Payout_t} \times \boldsymbol{LogMarket\ Cap_t} \times \boldsymbol{Book\ to\ Market_t} + \boldsymbol{\beta_9} \\
&\times \Delta \boldsymbol{Dividend\ Payout_t} \times \boldsymbol{LogMarket\ Cap_t} \times \boldsymbol{Book\ to\ Market_t} \times \boldsymbol{Manufacturing} \\
&+ \boldsymbol{\beta_{10}} \times \boldsymbol{Industry_t} + \boldsymbol{\beta_{11}} \times \boldsymbol{Year_t} + \boldsymbol{\varepsilon}
\end{aligned}
$$

Table 6 shows that, irrespective of the specification used, next period PE change is significantly and *negatively* associated with current period dividend payout change. The previous results have shown that, on average, dividend payout level is significantly and positively related to PE level. But once the levels are determined, any change in payout negatively affects future changes in PE. As before, we run the regression specification separately over 90 groups, made up of 5 industry groups, 3 groups of market capitalization, 3 groups of book to market values, and whether or not recession period. Only the specifications for which $\Delta Dividend\ Payout_t$ is significant at the 5% and 1% levels are shown in Table 7. We find that the above documented negative relation is robust: it not only in the overall sample, but also in almost every industry and firm type subsample.

Finally, we regress change in volatility in the next period on change in payout, to check the impact of current period payout on future risk, using the following regression specification:

$$(3)\ \Delta Volatility_{t+1} = \beta_0 + \beta_1 \times \Delta Dividend\ Payout_t + \beta_2 \times Market\ Cap_t + \beta_3 \times Book\ to\ Market_t + \beta_4 \times Beta_t + \varepsilon$$

and find that there is indeed a significant and positive relationship (Table 8). Thus increased payout in the current period signals increased risk in future (perhaps due to reduced growth opportunities) and, and hence the future PE decreases.

In summary, current period dividend payout change is significantly and negatively associated with future PE change likely because an increase in current period payout signals reduced investment opportunities which reduces future PE. Moreover, the relation between payout and PE levels and between payout changes and PE changes depends on industry, firm size, perceived growth opportunities (proxied in this paper by book to market ratios), and other measures of firm risk.

5. Conclusion

Using a large database of all S&P 1500 index firms spanning the 88-quarter period from 1995 through 2016, we document that in terms of dividend payout, manufacturing firms payout more, large firms payout more, and firms with lower future growth potential payout more, on average. In terms of PE ratios, in univariate tests, we find that high tech and healthcare firms have higher PE ratios, on average, and manufacturing firms the least, perhaps reflecting their future growth potential. The higher the market capitalization, the higher the PE ratio; and the lower the book to market ratio the higher the PE ratio. So, payout and PE ratios move in opposite directions when we compare by industry, in the same direction when we examine by market cap, and in the opposite direction when we examine by book to market ratio, consistent with a perceived growth potential story. In multivariate regressions, we find that current period dividend payout is positively and significantly related to next period PE (at 1% significance level) after controlling of the year and industry effects. After controlling for other factors, future PE ratio is significantly and negatively associated with market capitalization and higher book to market ratio. Results are consistently significant when we use current earnings or trailing earnings.

After we run regressions according to groups divided by industries, market cap, book to market ratio and recession years, we find that for consumer and high technology industries, the correlation between current period payout and next period PE tends to be significantly negative,

while it is significantly positive for manufacturing and other industries. In general, for high market cap firms, the relation between payout and future PE is positive.

When we examine changes, future PE change is significantly and negatively associated with current period change in payout. We also find that current period payout change is associated with future increased risk. This implies that future PE decreases consistent with increased risk due to perceived lack of growth options stories. Any model of the determinants of PE is complicated, and should take into account industry, size, risk and market perception of future growth for a firm.

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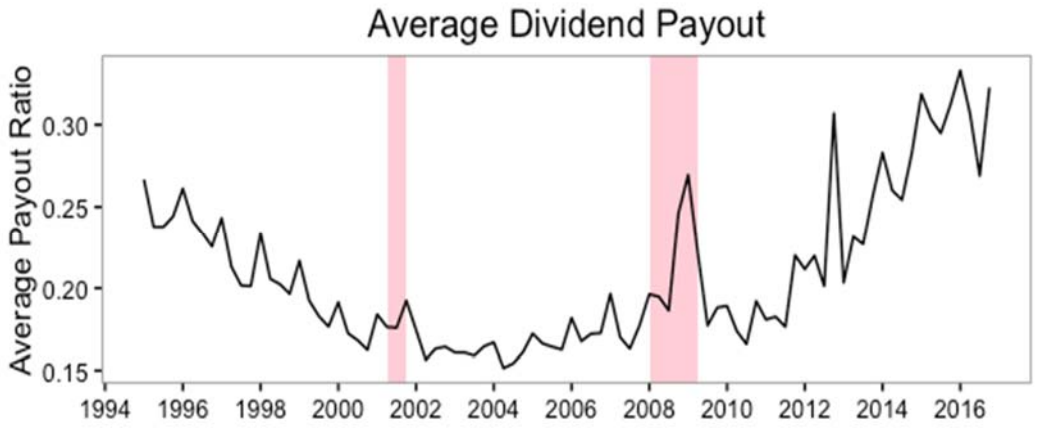
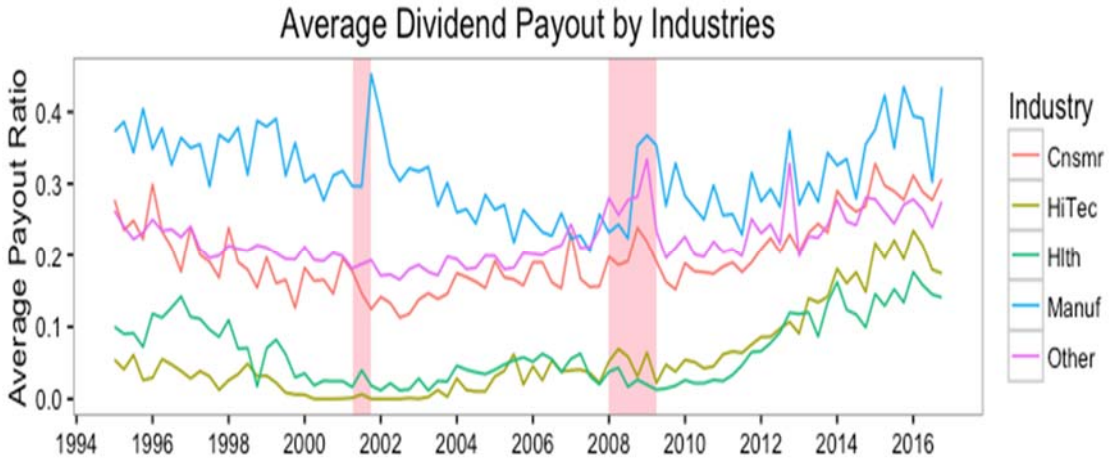
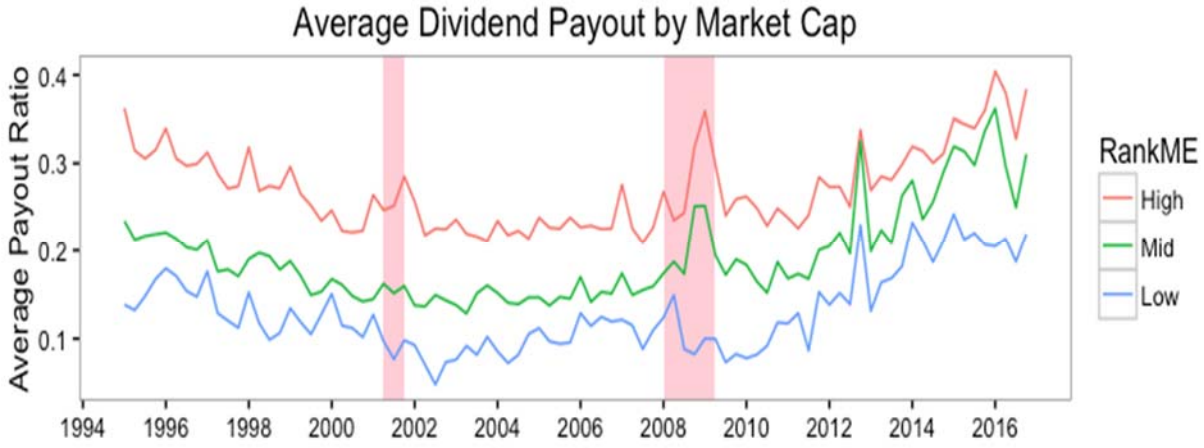
Figure 1
Dividend Payout

The top Panel shows the quarter-by-quarter average dividend payout ratio defined as average of quarterly cash dividend divided by quarterly net income, for all quarters from 1995 through 2016 where the recession quarters are 2001 Q2 - 2001 Q4 and 2008 Q1 - 2009 Q2 as determined by NBER, are shaded. The second panel shows the average payout ratio quarter-by-quarter for the 5 industry groups. The third panel shows the average payout ratio quarter by quarter by three groups by firms' market capitalization. The last panel shows the average payout ratio quarter by quarter by three groups by firms' book to market value. All variables are defined in Appendix B.






Average Dividend Payout by Market Cap
Average Payout Ratio
0.4
0.3
0.2
0.1
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
RankME
High
Mid
Low

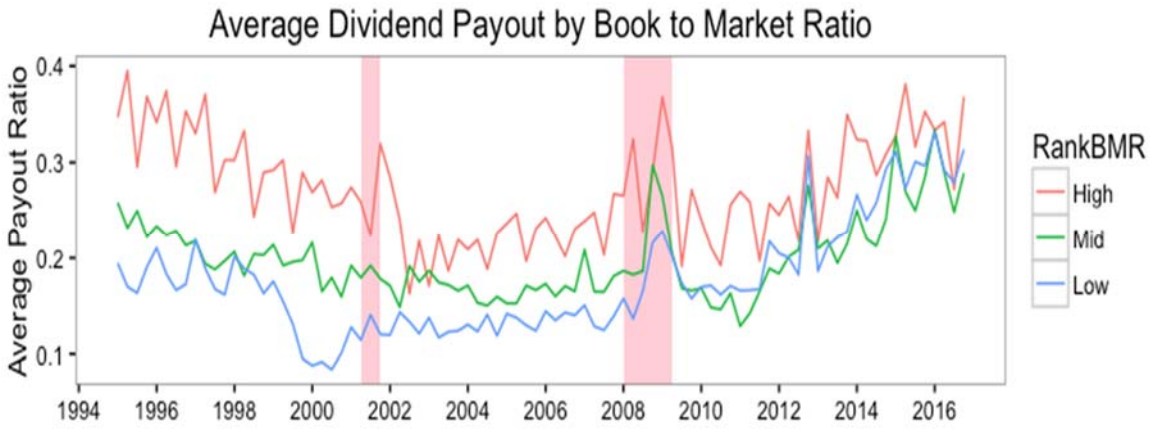
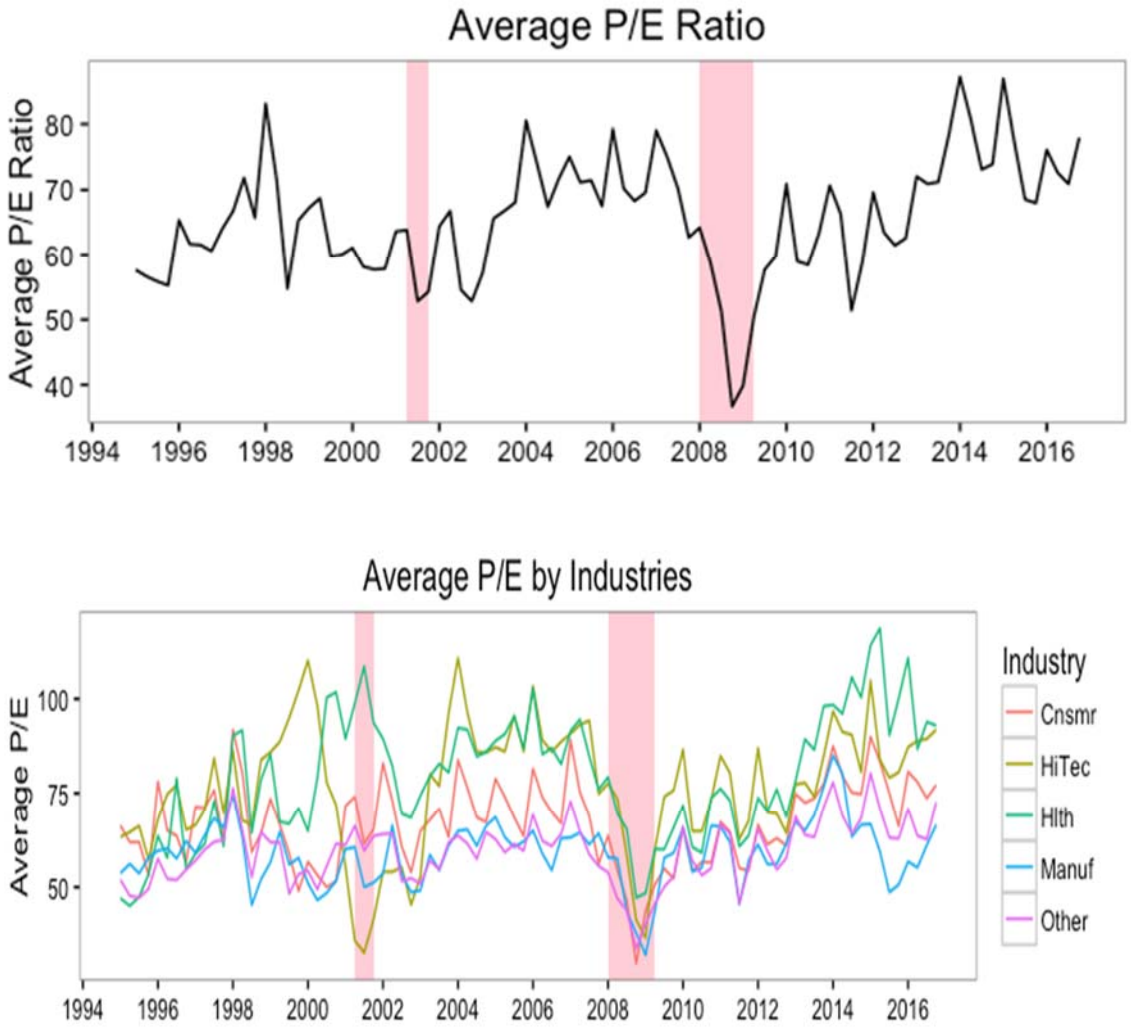
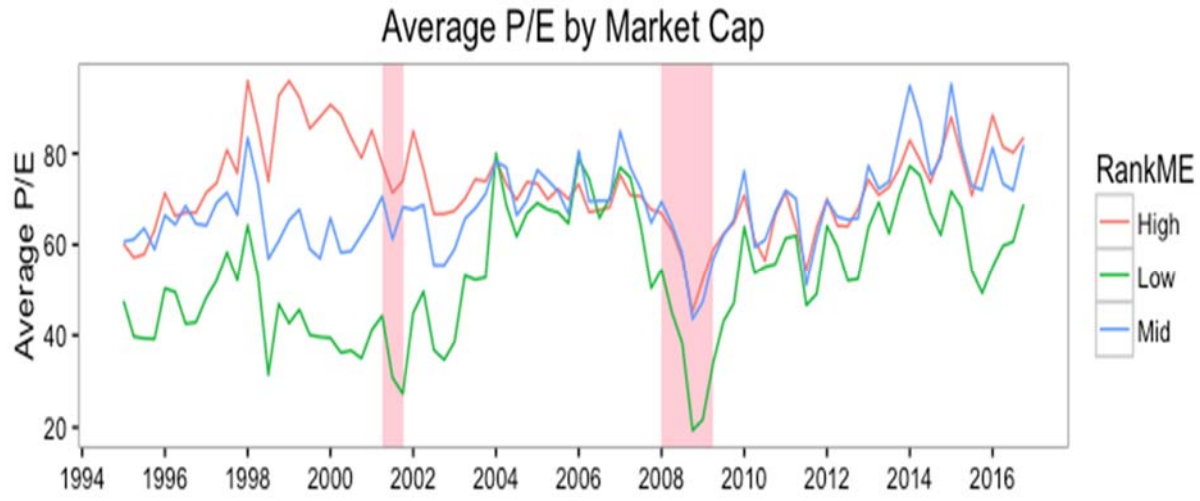

Average Dividend Payout by Book to Market Ratio
Average Payout Ratio
0.4
0.3
0.2
0.1
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
RankBMR
High
Mid
Low

Figure 2
PE Ratio

The top Panel shows the quarter-by-quarter average PE ratio defined as average of quarterly stock price divided by quarterly EPS for all quarters from 1995 through 2016 where the recession quarters are 2001 Q2 - 2001 Q4 and 2008 Q1 - 2009 Q2 as determined by NBER, are shaded. The second panel shows the average payout ratio quarter-by-quarter for 5 industry groups. The third panel shows the average payout ratio quarter by quarter by three groups by firms' market capitalization. The last panel shows the average payout ratio quarter by quarter by three groups by firms' book to market value. All variables are defined in Appendix B.




Average P/E by Market Cap
Average P/E
80
60
40
20
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
RankME
High
Low
Mid


Average P/E by Book to Market Ratio
Average P/E
120
90
60
30
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
RankBMR
High
Mid
Low

Table 1
Dividend Payout

The top panel shows the differences in mean Payout ratios for 5 Fama-French industry groups. The middle panel shows the differences in mean Payout ratios for three groups of market capitalization. The bottom panel shows the differences in mean Payout ratios for three groups of book to market value. All variables are defined in Appendix B.

Average Dividend Payout by Industries

Mean(X)	Mean(Y)	Mean(X-Y)	t-stat	df	p-value
Manuf = 0.31	Other = 0.22	0.09	40.4	50337	< 2.2e-16
Other = 0.22	Cnsmr = 0.20	0.02	11.6	48357	< 2.2e-16
Cnsmr = 0.20	Hlth = 0.06	0.14	71.4	25381	< 2.2e-16
Hlth = 0.06	HiTec = 0.06	0.00	0.12	13760	0.90

Average dividend payout by Market Cap

Mean(X)	Mean(Y)	Mean(X-Y)	t-stat	df	p-value
High MVE = 0.27	Mid MVE = 0.19	0.08	45.7	72370	< 2.2e-16
Mid MVE = 0.19	Low MVE = 0.13	0.06	34.8	34.771	< 2.2e-16

Average dividend payout by Book to Market

Mean(X)	Mean(Y)	Mean(X-Y)	t-stat	df	p-value
High BM = 0.27	Mid BM = 0.19	0.08	36.6	56125	< 2.2e-16
Mid BM = 0.19	Low BM = 0.17	0.02	12.7	71775	< 2.2e-16

Table 2
PE Ratio

The top panel shows the differences in mean PE for 5 Fama-French industry groups. The middle panel shows the differences in mean PE ratios for three groups of market capitalization. The bottom panel shows the mean differences in mean PE ratios for three groups of book to market. All variables are defined in Appendix B.

Average PE by Industry

Mean(X)	Mean(Y)	Mean(X-Y)	t-stat	df	p-value
Hlth = 78.03	HiTec = 76.13	1.90	2.51	20282	0.01
HiTec = 76.13	Cnsmr = 66.22	9.91	17.34	30784	< 2.2e-16
Cnsmr = 66.22	Other = 59.80	6.42	19.11	43835	< 2.2e-16
Other = 59.80	Manuf = 59.38	0.42	1.41	54063	0.16

Average PE by Market Cap

Mean(X)	Mean(Y)	Mean(X-Y)	t-stat	df	p-value
High MVE = 71.91	Mid MVE = 68.25	3.66	12.75	72783	< 2.2e-16
Mid MVE = 68.25	Low MVE = 52.41	15.84	34.77	34.771	< 2.2e-16

Average PE by Book to Market Ratio

Mean(X)	Mean(Y)	Mean(X-Y)	t-stat	df	p-value
High BM = 44.47	Mid BM = 65.65	-21.19	-71.15	67201	< 2.2e-16
Mid BM = 65.65	Low BM = 85.40	-19.75	-68.65	69341	< 2.2e-16

Table 3
Dividend Payout and PE Ratio

This table reports the regression coefficients and the associated heteroscedasticity consistent t-statistics (along with adjusted R^2) of 2 specifications of:

$$\boldsymbol{P/E\ Ratio_{t+1} = \beta_1 \times Dividend\ Payout_t + \beta_2 \times Recession_t + \beta_3 \times Volatility_t + \beta_4 \times LogMarket\ Cap_t + \beta_5 \times Book\ to\ Market_t + \beta_6 \times Beta_t + \beta_7 \times Industry_t + \beta_8 \times Year_t + \varepsilon}$$

All variables are defined in Appendix B.

	$P/E\ Ratio_{t+1}$	$P/E\ Ratio_{t+1}$ (trailing earnings)
$Dividend\ Payout_t$	2.74 ***	4.72 ***
	(4.46)	(8.69)
Recession	-1.382	-4.05 ***
	(-1.43)	(-4.73)
Volatility	-22.74	38.96.
	(-0.93)	(1.79)
Log(Market Cap)	-0.48 ***	-1.04 ***
	(-4.35)	(-10.70)
Book to Market	-34.43 ***	-35.66 ***
	(-70.80)	(-83.03)
Beta	3.69 ***	4.14 ***
	(7.95)	(10.03)
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Adjusted R^2	0.78	0.84

*, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Table 4
Dividend Payout and PE Ratio by Groups

This table reports regression coefficients and the associated heteroscedasticity consistent t-statistics (along with adjusted R^2) of

$$\boldsymbol{P/E\ Ratio_{t+1}} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1} \times \boldsymbol{Dividend\ Payout_t} + \boldsymbol{\beta_2} \times \boldsymbol{Volatility_t} + \boldsymbol{\beta_3} \times Log\boldsymbol{Market\ Cap_t} + \boldsymbol{\beta_4} \times \boldsymbol{Book\ to\ Market_t} + \boldsymbol{\beta_5} \times \boldsymbol{Beta_t} + \varepsilon$$

run separately over 90 groups overall, made up of 5 industry groups, 3 groups of market capitalization, 3 groups of book to market values, and whether recession period. Only the specifications for which Dividend Payout is significant at 5% or 1% levels are shown. Panel A shows significant negative relations, and Panel B significant positive. All variables are defined in Appendix B.

Panel A

Industry	Rank MVE	Rank BM	REC	Dividend Payout	Volatility	LogMarket Cap	Book to Market	Beta	Adjusted R^2
Cnsmr	High	Low	0	-11.0 ***	429.9 ***	2.2 ***	-55.3 ***	9.4 ***	0.06
				(-4.4)	(4.6)	(3.3)	(-10.1)	(5.0)	
Cnsmr	Mid	Low	0	-21.2 ***	-44.9	6.2 ***	-40.6 ***	1.7	0.03
				(-5.5)	(-0.3)	(3.7)	(-5.2)	(0.7)	
HiTec	High	High	0	-49.7***	-272.1	8.6 ***	-14.9	6.1	0.10
				(-5.5)	(-0.9)	(4.1)	(-1.4)	(0.8)	
HiTec	High	Low	0	-17.2 ***	376.1 ***	-1.0	-34.5 ***	13.1 ***	0.07
				(-4.8)	(3.8)	(-1.3)	(-4.3)	(5.3)	
HiTec	High	Mid	0	-24.5 ***	-298.7 *	0.6	-84.4 ***	6.09	0.07
				(-4.5)	(-1.8)	(0.5)	(-6.9)	(1.5)	
Other	High	Low	0	-10.9 ***	13.1	-1.7 *	-88.4 ***	5.7 **	0.09
				(-3.5)	(0.1)	(-2.4)	(-14.0)	(2.8)	

Panel B

Industry	Rank MVE	Rank BM	REC	Dividend Payout	Volatility	LogMarket Cap	Book to Market	Beta	Adjusted R^2
Manuf	High	Mid	0	21.3 ***	77.7	-1.8 *	-35.3 ***	0.3	0.02
				(6.2)	(0.6)	(-2.0)	(-4.6)	(0.1)	
Manuf	High	Mid	1	35.0 **	639.8	-7.8 *	-12.2	-18.8 *	0.04
				(2.7)	(1.5)	(-1.9)	(-0.4)	(-1.9)	
Manuf	Mid	Low	0	11.7 **	-85.7	4.3 **	33.5 ***	2.8	0.03
				(3.0)	(-0.6)	(2.7)	(4.4)	(1.3)	
Manuf	Mid	Mid	0	7.4 **	-67.7	4.0 **	-24.2 ***	-0.1	0.01
				(2.5)	(-0.7)	(3.1)	(-3.8)	(-0.1)	
Other	High	High	0	12.8 ***	221.9 *	1.4 *	-7.8 **	-5.0 **	0.02
				(4.6)	(2.4)	(2.1)	(-3.0)	(-2.6)	
Other	Low	High	0	10.0 ***	-257.2 **	1.8	-26.4 ***	8.3 ***	0.06
				(3.6)	(-2.7)	(1.3)	(-8.6)	(5.0)	
Other	Low	Low	0	19.4 ***	100.2	14.2 ***	16.7 *	-3.3	0.04
				(3.9)	(0.5)	(5.0)	(1.6)	(-1.1)	
Other	Mid	High	0	15.1 ***	148.0 *	5.6 ***	-15.0 ***	2.6	0.03
				(6.0)	(1.8)	(4.9)	(-5.6)	(1.6)	

*, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Table 5
Dividend Payout and PE Ratio by Groups: Using Trailing Earnings

This table reports regression coefficients and associated heteroscedasticity consistent t-statistics (along with adjusted R^2) of

$$\boldsymbol{P/E\ Ratio_{t+1} = \beta_0 + \beta_1 \times Dividend\ Payout_t + \beta_2 \times Volatility_t + \beta_3 \times Market\ Cap_t + \beta_4 \times Book\ to\ Market_t + \beta_5 \times Beta_t + \varepsilon}$$

run separately over 90 groups overall, made up of 5 industry groups, 3 groups of market capitalization, 3 groups of book to market values, and whether recession period. Only the specifications for which Dividend Payout is significant at 5% or 1% levels are shown. Panel A shows significant negative relations, and Panel B significant positive. The earnings here are trailing earnings. All variables are defined in Appendix B.

Panel A

Industry	Rank MVE	Rank BM	REC	Dividend Payout	Volatility	LogMarket Cap	Book to Market	Beta	Adjusted R^2
Cnsmr	High	Low	0	-7.4 ***	503.6 ***	0.8	-60.4 ***	9.2 ***	0.08
				(-3.5)	(6.4)	(1.5)	(-12.9)	(5.7)	
Cnsmr	High	Low	1	-32.8 ***	547.4 *	6.5 **	-24.9 *	-18.4 ***	0.10
				(-5.0)	(2.2)	(2.9)	(-1.9)	(-3.3)	
Cnsmr	Mid	Low	0	-15.2 ***	162.0 *	1.6	-55.3 ***	0.9	0.05
				(-4.8)	(1.7)	(1.1)	(-8.4)	(0.5)	
HiTec	High	Low	0	-16.9 ***	854.9 ***	-0.4	-36.9 ***	12.7 ***	0.13
				(-5.0)	(9.0)	(-0.6)	(-4.9)	(5.4)	
HiTec	High	Low	1	-30.1 **	1107.8 *	8.7 *	-17.4	-8.1	0.06
				(-2.9)	(2.4)	(2.5)	(-0.7)	(-0.6)	
HiTec	High	Mid	0	-20.0 ***	-67.1	0.3	-100.1 ***	4.8	0.08
				(-3.7)	(-0.4)	(0.2)	(-8.5)	(1.2)	
Hlth	High	Low	1	-47.5 **	1404.6 ***	1.6	-211.6 ***	-36.1 ***	0.32
				(-3.2)	(3.7)	(0.5)	(-8.4)	(-3.3)	
Hlth	Mid	Low	0	-24.3 ***	-482.6 ***	5.1 *	-149.2 ***	2.8	0.13
				(-3.4)	(-3.3)	(2.1)	(-10.0)	(0.7)	

Panel B

Industry	Rank MVE	Rank BM	REC	Dividend Payout	Volatility	LogMarket Cap	Book to Market	Beta	Adjusted R^2
Cnsmr	High	High	0	16.2 **	261.4	-1.4	-27.6 ***	-16.6 ***	0.07
				(3.0)	(1.3)	(-0.9)	(-4.1)	(-4.1)	
Cnsmr	High	High	1	143.0 ***	454.7	5.2	-69.7	-39.0	0.30
				(4.2)	(0.3)	(0.4)	(-1.5)	(-1.4)	
Cnsmr	Mid	Mid	0	8.5 ***	-368.6 ***	0.6	-37.8 ***	6.1 ***	0.05
				(3.5)	(-4.7)	(0.5)	(-6.9)	(4.0)	
Hlth	Mid	Mid	0	20.8 **	-279.3 *	0.6	-77.0 ***	1.0	0.07
				(2.6)	(-1.8)	(0.2)	(-6.2)	(0.27)	
Manuf	High	High	0	23.8 ***	95.3	-0.1	-25.6 ***	1.7	0.07
				(9.5)	(0.8)	(-0.1)	(-8.8)	(0.9)	
Manuf	High	Low	1	38.1 ***	356.8 *	0.2	-34.0 *	-24.1 ***	0.15
				(4.5)	(1.6)	(0.1)	(-2.0)	(-3.7)	
Manuf	High	Mid	0	24.0 ***	235.8 *	-2.7 ***	-45.4 ***	1.3	0.04
				(7.5)	(2.1)	(-3.3)	(-6.4)	(0.7)	
Manuf	High	Mid	1	32.5 ***	534.9 *	-3.0	-49.6 **	-8.8	0.07
				(4.2)	(2.1)	(-1.2)	(-3.2)	(-1.5)	
Manuf	Mid	High	0	12.0 ***	-270.2 **	5.5 ***	-18.7 ***	6.1 ***	0.06
				(5.3)	(-3.1)	(4.8)	(-6.9)	(3.9)	
Manuf	Mid	Mid	1	29.3 ***	113.6	-13.6 **	-59.0 ***	-4.1	0.08
				(3.9)	(0.5)	(-2.8)	(-4.0)	(-0.6)	
Other	High	High	0	21.3 ***	337.9 ***	1.0 *	-0.8	-7.6 ***	0.04
				(8.1)	(4.0)	(1.6)	(-0.3)	(-4.2)	
Other	High	Mid	0	11.1 ***	312.5 ***	-0.6	-61.0 ***	-4.7 **	0.06
				(4.5)	(4.3)	(-1.1)	(-12.8)	(-3.0)	
Other	High	Mid	1	22.7 **	-446.3 *	-0.6	-52.3 **	3.1	0.09
				(2.62)	(-1.8)	(-0.2)	(-3.1)	(0.4)	
Other	Low	High	0	14.6 ***	-249.5 **	-1.5	-23.1 ***	7.9 ***	0.06
				(5.8)	(-2.9)	(-1.2)	(-8.2)	(5.3)	
Other	Low	Low	0	20.4 ***	78.1	16.0 ***	29.9 ***	-3.6	0.08
				(4.7)	(0.5)	(6.4)	(3.4)	(-1.3)	
Other	Mid	High	0	22.3 ***	227.0 **	4.3 ***	-13.6 ***	0.03	0.05
				(9.9)	(3.1)	(4.2)	(-5.6)	(0.0)	

*, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Table 6
Change in Dividend Payout and Change in PE Ratio

This table reports regression coefficients and the associated heteroscedasticity consistent t-statistics (along with adjusted R^2) of 4 different specifications of:

$$\boldsymbol{\Delta P/E\ Ratio_{t+1} = \beta_1 \times \Delta Dividend\ Payout_t + \beta_2 \times Recession_t + \beta_3 \times Volatility_t + \beta_4 \times LogMarket\ Cap_t + \beta_5 \times Book\ to\ Market_t + \beta_6 \times Beta_t + \beta_7 \times \Delta Dividend\ Payout_t \times LogMarket\ Cap_t + \beta_8 \times \Delta Dividend\ Payout_t \times LogMarket\ Cap_t \times Book\ to\ Market_t + \beta_9 \times \Delta Dividend\ Payout_t \times LogMarket\ Cap_t \times Book\ to\ Market_t \times Manufacturing + \beta_{10} \times Industry_t + \beta_{11} \times Year_t + \varepsilon.}$$

All variables are defined in Appendix B.

	$\boldsymbol{\Delta P/E\ Ratio_{t+1}}$	$\boldsymbol{\Delta P/E\ Ratio_{t+1}}$	$\boldsymbol{\Delta P/E\ Ratio_{t+1}}$	$\boldsymbol{\Delta P/E\ Ratio_{t+1}}$
ΔDividend Payout$_t$	-69.91 *** (-20.81)	-51.30 ** (-2.74)	-73.33 *** (-11.44)	-51.48 ** (-2.75)
Recession$_t$	-1.90 (-1.76)	-1.87 (-1.76)	-1.87 (-1.76)	-1.87 (-1.76)
Volatility$_t$	-119.95 *** (-4.63)	-118.37 *** (-4.58)	-118.58 *** (-4.59)	-118.45 *** (-4.59)
Log(Market Cap$_t$)	-0.06 (-0.52)	-0.11 (-0.93)	-0.11 (-0.95)	-0.11 (-0.93)
Book to Market$_t$	1.63 ** (2.97)	1.56 ** (2.86)	1.55 ** (2.83)	1.56 ** (2.87)
Beta$_t$	0.45 (0.90)	0.35 (0.72)	0.36 (0.73)	0.35 (0.71)
ΔDividend Payout$_t$ $\times$ Log(Market Cap$_t$)		-2.01 (-0.90)		
ΔDividend Payout$_t$ $\times$ Log(Market Cap$_t$) $\times$ Book to Market$_t$			1.32 (0.99)	
ΔDividend Payout$_t$ $\times$ Log(Market Cap$_t$) $\times$ Manufacturing				-1.68 (-0.73)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.02	0.01	0.01	0.01

*, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Table 7
Change in Dividend Payout and Change in PE Ratio by Groups

This table reports the regression coefficients and associated heteroscedasticity consistent t-statistics (along with adjusted R^2) of

$$\boldsymbol{\Delta P/E\ Ratio_{t+1} = \beta_0 + \beta_1 \times \Delta Dividend\ Payout_t + \beta_2 \times Volatility_t + \beta_3 \times LogMarket\ Cap_t + \beta_4 \times Book\ to\ Market_t + \beta_5 \times Beta_t + \varepsilon}$$

run separately over 90 groups overall, made up of 5 industry groups, 3 groups of market capitalization, 3 groups of book to market values, and whether or not recession period. Only the specifications for which ΔDividend Payout is significant at the 5% and 1% levels are shown. All variables are defined in Appendix B.

Industry	Rank MVE	Rank BM	REC	ΔDividend Payout	Volatility	LogMarket Cap	Book to Market	Beta	Adjusted R^2
Cnsmr	High	Low	0	-77.8 ***	-152.3	1.5 *	9.8	-4.9 *	0.02
				(-6.2)	(-1.4)	(1.8)	(1.5)	(-2.1)	
Cnsmr	High	Mid	0	-86.6 ***	-62.0	0.1	19.0 *	-1.2	0.02
				(-4.3)	(-0.4)	(0.1)	(1.7)	(-0.3)	
Cnsmr	Low	Mid	0	-69.5 **	-105.7	-0.3	18.1 *	1.3	0.01
				(-3.0)	(-0.7)	(-0.1)	(1.7)	(0.5)	
Cnsmr	Mid	Low	0	-100.8 ***	35.9	-0.3	11.2	0.8	0.01
				(-4.6)	(0.3)	(-0.2)	(1.2)	(0.3)	
Cnsmr	Mid	Mid	0	-67.7 ***	-172.9	0.5	11.1	2.8	0.01
				(-3.6)	(-1.4)	(0.3)	(1.2)	(1.1)	
HiTec	High	Low	0	-67.6 **	-173.8 *	-1.3 *	23.8 **	-1.6	0.01
				(-3.2)	(-1.8)	(-1.6)	(3.0)	(-0.6)	
HiTec	High	Mid	0	-70.2**	11.5	1.6	-5.9	1.7	0.01
				(-2.9)	(0.1)	(1.4)	(-0.5)	(0.4)	
HiTec	Low	Low	0	-126.6 **	-207.4	1.9	21.7	-4.5	0.01
				(-2.8)	(-1.2)	(0.5)	(1.2)	(-1.4)	
Hlth	High	Low	0	-126.8 ***	-128.9	0.7	13.2	0.1	0.02
				(-5.5)	(-0.9)	(0.8)	(1.3)	(0.02)	
Hlth	Mid	Mid	1	-343.4 **	320.0	18.3	-12.4	-6.8	0.11
				(-2.9)	(0.5)	(1.5)	(-0.4)	(-0.3)	
Manuf	High	High	0	-81.0 ***	-144.9	-2.3 *	4.5	6.0 *	0.03
				(-5.2)	(-0.7)	(-1.7)	(0.7)	(1.8)	
Manuf	High	Low	0	-66.3 ***	-353.5 ***	0.3	16.5 *	3.8 *	0.02
				(-5.2)	(-3.9)	(0.4)	(2.2)	(2.1)	
Manuf	High	Mid	0	-65.5 ***	-230.9 *	-0.5	18.1 *	1.7	0.02
				(-4.2)	(-1.6)	(-0.6)	(2.0)	(0.8)	
Manuf	Low	Mid	0	-93.6 ***	-56.4	-2.3	11.0	0.712	0.02
				(-4.6)	(-0.4)	(-1.2)	(1.1)	(0.3)	
Manuf	Mid	High	0	-114.3 ***	125.9	-2.9	1.3	1.2	0.03
				(-5.7)	(0.7)	(-1.2)	(0.2)	(0.4)	
Manuf	Mid	Low	0	-50.5 **	-355.0 **	-1.4	7.9	0.71	0.01
				(-2.6)	(-2.7)	(-0.8)	(0.9)	(0.3)	
Manuf	Mid	Mid	0	-72.0 ***	-25.3	-0.02	21.5 **	2.0	0.02
				(-5.1)	(-0.2)	(-0.0)	(3.1)	(1.2)	
Other	High	High	0	-60.7 ***	-55.0	-0.5	-2.0	3.0	0.02
				(-5.9)	(-0.6)	(-0.8)	(-0.8)	(1.6)	

Other	High	Low	0	-83.4 ***	-156.9	-0.8	6.7	-0.1	0.02
				(-5.2)	(-1.5)	(-1.1)	(1.0)	(-0.0)	
Other	High	Mid	0	-71.6 ***	-98.1	-0.6	15.5 **	0.6	0.02
				(-6.0)	(-1.3)	(-1.1)	(3.1)	(0.4)	
Other	Low	High	0	-70.9 ***	-28.2	1.1	-5.0	0.2	0.01
				(-5.1)	(-0.3)	(0.7)	(-1.5)	(0.1)	
Other	Mid	High	0	-53.9 ***	-78.8	0.4	5.2 *	-3.0 *	0.01
				(-4.6)	(-0.9)	(0.4)	(1.8)	(-1.8)	
Other	Mid	Low	0	-81.7 ***	-140.9	-1.8	-1.3	-0.5	0.01
				(-3.6)	(-1.2)	(-0.9)	(-0.1)	(-0.2)	
Other	Mid	Mid	0	-50.6 ***	-174.7 *	-1.2	12.8 *	1.0	0.01
				(-3.5)	(-2.3)	(-1.1)	(2.5)	(0.7)	

*, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Table 8
Change in Dividend Payout and Change in Volatility

This table reports the regression coefficients and the associated heteroscedasticity consistent t-statistics (along with adjusted R^2) of:

$$\Delta Volatility_{t+1} = \beta_0 + \beta_1 \times \Delta Dividend\ Payout_t + \beta_2 \times LogMarket\ Cap_t + \beta_3 \times Book\ to\ Market_t + \beta_4 \times Beta_t + \varepsilon$$

All variables are defined in Appendix B.

	$\Delta Volatility_{t+1}$
ΔDividend Payout$_t$	0.001*** (4.0)
Log(Market Cap$_t$)	0.001*** (4.6)
Book to Market$_t$	-0.001 (-1.4)
Beta$_t$	-0.001*** (-22.2)
Adjusted R^2	0.08

*, **, and *** denote significant at the 10%, 5% and 1% level respectively.

Appendix A
Dividend Payout and PE Ratio

A basic derivation (see, for example, Professor A. Damodaran's online teaching notes http://pages.stern.nyu.edu/~adamodar/New_Home_Page/invfables/peratio.htm) shows that if the PE ratio is stated in terms of expected earnings in the next time period, then

$$\frac{P_0}{EPS_1} = \text{Forward PE} = \frac{\text{Payout Ratio}}{k_e - g_n}$$

So, PE ratio is an increasing function of the payout ratio and the growth rate and a decreasing function of firm risk. We can state the payout ratio as a function of the expected growth rate and return on equity.

$$\text{Payout ratio} = 1 - \frac{\text{Expected growth rate}}{\text{Return on equity}} = 1 - \frac{g_n}{ROE_n}$$

Substituting back into the equation above,

$$\frac{P_0}{EPS_1} = \text{Forward PE} = \frac{1 - \frac{g_n}{ROE_n}}{k_e - g_n}$$

The price-earnings ratio for a high growth firm can also be related to fundamentals. In the special case of the two-stage dividend discount model, this relationship can be made explicit fairly simply. When a firm is expected to be in high growth for the next n years and stable growth thereafter, the dividend discount model can be written as follows:

$$P_0 = \frac{(EPS_0)(\text{Payout Ratio})(1+g)\left(1 - \frac{(1+g)^n}{(1+k_{e,hg})^n}\right)}{k_{e,hg} - g} + \frac{(EPS_0)(\text{Payout Ratio}_n)(1+g)^n(1+g_n)}{(k_{e,st} - g_n)(1+k_{e,hg})^n}$$

where,

EPS_0 = Earnings per share in year 0 (Current year)

g = Growth rate in the first n years

$k_{e,hg}$ = Cost of equity in high growth period

$k_{e,st}$ = Cost of equity in stable growth period

Payout = Payout ratio in the first n years

g_n = Growth rate after n years forever (Stable growth rate)

Payout Ratio_n = Payout ratio after n years for the stable firm

Divide both sides of the equation by EPS_0:

$$\frac{P_0}{EPS_0} = \frac{\text{Payout Ratio} * (1+g) * \left(1 - \frac{(1+g)^n}{(1+k_{e,hg})^n}\right)}{k_{e,hg} - g} + \frac{\text{Payout Ratio}_n * (1+g)^n * (1+g_n)}{(k_{e,st} - g_n)(1+k_{e,hg})^n}$$

Here again, we can substitute in the fundamental equation for payout ratios.

$$\frac{P_0}{EPS_0} = \frac{\left(1 - \frac{g}{ROE_{hg}}\right)(1+g)\left(1 - \frac{(1+g)^n}{(1+k_{e,hg})^n}\right)}{k_{e,hg} - g} + \frac{\left(1 - \frac{g_n}{ROE_{st}}\right)(1+g)^n(1+g_n)}{(k_{e,st} - g_n)(1+k_{e,hg})^n}$$

where ROE_{hg} is the return on equity in the high growth period and ROE_{st} is the return on equity, from which the implications arise.

Appendix B
Variables Descriptions

Variable	Description	Formula/ Source
IBADJQ	Income Before Extraordinary Items - Adjusted for Common Stock Equivalents	Compustat
NIQ	Net Income (Loss)	Compustat
ATQ	Assets - Total	Compustat
CEQQ	Common/Ordinary Equity - Total	Compustat
LTQ	Liabilities - Total	Compustat
PSTKQ	Preferred/Preference Stock (Capital) – Total	Compustat
SEQQ	Stockholders Equity Quarterly	Compustat
TXDITCQ	Deferred Taxes and Investment Tax Credit	Compustat
DVY	Cash Dividends	Compustat
DVPSPQ	Dividends per Share– Quarter	Compustat
PRCCQ	Price Close – Quarter	Compustat
CSHOQ	Common Shares Outstanding	Compustat
BEQ	Book Value of Equity	= SEQQ + TXDITCQ - PSTKQ, If SEQQ missing, SEQQ = CEQQ + PSTKQ, If also missing, SEQQ = ATQ - LTQ
DIV	Cash Dividend	= max(Delta(DVY), DVPSPQ * CSHOQ)
Volatility	Past Volatility	Previous one year of the DATADATE of stock return standard deviation
Beta	Daily past Beta	Previous one year daily beta by running: RET – RF = alpha + beta * MKTRF
EPS0	Earnings per Share	= NIQ / CSHOQ
EPSt	Trailing EPS	= avg(NIQ) / CSHOQ for past four quarters
PE0	Price/Earnings Ratio	= PRCCQ / EPS0
PEt	Price/Trailing Earnings Ratio	= PRCCQ / EPSt
Dividend Payout	Dividend Payout Ratio	= DIV / IBADJQ if IBADJQ > 0
PE01	P/E Ratio for t+1	= lead(PE0)
PE02	P/E Ratio for t+2	= lead(PE01)
PEt1	Trailing P/E Ratio for t+1	= lead(PEt0)
PEt2	Trailing P/E Ratio for t+2	= lead(PEt1)

DPR_1	Dividend Payout for t-1	= lag(DPR)
Industry	Fama French 5 Industry C classfication	Cnsmr, HiTec, Hlth, Manuf, Other
MVE	Market Value of Equity	= PRCCQ * CSHOQ
BMR	Book to Market Ratio	= BEQ / MVE
Rank MVE	Ranking by MVE	Divide each quarter's MVE into 3 equal groups: "High", "Mid", "Low"
Rank BMR	Ranking by BMR	Divide each quarter's BMR into 3 equal groups: "High", "Mid", "Low"