Investigating Rising Dividend Investment Techniques: Evidence From Backtesting

by

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(Under the Direction of Jeffry M. Netter)

Abstract

This study uses backtesting to investigate how a variety of rising dividend strategies would have performed in the recent past. The backtest generates three main findings. First, every one of the rising dividend strategies had greater abnormal returns than the same strategies without the rising dividend criteria. Second, I discover a strategy that consistently produces the best abnormal returns across all tests generating an alpha of 4.5%. Third, I discover evidence that rising dividend strategies produce superior dividend returns when compared to stocks of the same yield. However, simply using a high dividend yield requirement generates better dividend returns than portfolios that include a rising dividend criteria. Overall, I find that the abnormal returns of rising dividend strategies are intricately connected with firm operating profitability.

Index words: Backtest, Dividend, Dividend Growth, Investment, Rising Dividend, Strategy

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0.1 Introduction

A company is said to have rising dividends if it has a strong history of growing its dividend per share. Rising dividend strategies assume that these companies will continue to grow their dividends into the near future. This idea is similar to that of momentum where assets with a history of price or earnings increases tend to continue seeing price or earnings increases. Rising dividend investors believe that their strategies offer an opportunity to receive superior returns in both capital gains and in dividend yields.

The idea is that if a company's dividends increase after you have already purchased their stock, then you will get a better dividend yield than if the dividends had remained constant. This provides capital gains as the price of the stock increases based off of the Gordon Growth Model (Gordon & Shapiro, 1956): $P_0 = \frac{D_1}{r-g}$. Here, P_0 is the current price of the stock, D_1 is the dividend to be paid one period from now, r is your required rate of return, and g is the growth rate of the dividend. We can calculate the capital gains as the change in price between year 0 and year 1 divided by the current price:

$$Capital\ gain = [P_1 - P_0]/P_0$$

$$Capital\ gain = P_1/P_0 - 1$$

$$Capital\ gain = \frac{D_2}{r-g} / \frac{D_1}{r-g} - 1$$

$$Capital\ gain = \frac{D_1(1+g)}{r-g} * \frac{r-g}{D_1} - 1$$

$$Capital\ gain = 1 + g - 1$$

$$Capital\ gain = g$$

As can be seen above, the Gordon Growth Model predicts that the capital gains of a stock are equal to the growth rate of the dividend. This is fundamental to the rising dividend strategy because higher capital gains can be achieved through a high growth rate in the dividend.

Another benefit touted by rising dividend investors is that rising dividends are indicative of a company's stability and its commitment to the investor, which makes the investment more attractive. After all, continually growing a company's dividend for extended periods of time must be supported by earnings. In contrast with this, there has been much written about dividend policy and how capital budgeting affects it (Garrett, n.d.). Some people believe that dividends should only be paid out when a company has run out of investment opportunities that are likely to generate returns in excess of the cost of equity. This would suggest that increasing dividend payouts actually signal a lack of growth opportunities. If however rising dividends do in fact reflect a company's stability and its commitment to investors, then this is part of why rising dividend companies may offer attractive investments.

The methods used to find rising dividend stocks vary across the investing world. One example of a rising dividend criteria is found in the Goldman Sachs rising dividend growth fund (Shaver, 2014) , which requires companies to have a 10% average annual dividend growth over the past ten years. This rule, which they call a "10/10 rule" works off of the assumption that increases in past dividend returns are indicative of future dividend growth.

Most companies use other criteria in combination with their rising dividend strategy. For example, the T. Rowe Price Dividend Growth Fund (Marquardt, 2013) also looks for companies that have annual earnings growth of over 8%. This strategy combines a momentum strategy with a rising dividend strategy. The idea behind this is that dividend growth stems from growth in earnings, and without earnings growth, continuing to raise the dividend becomes unsustainable. Although the exact strategies vary from fund to

fund, the one thing that almost all rising dividend strategies have in common is a requirement of consistent past dividend growth.

Typically, rising dividend strategies are used as a filter that narrows down a list of stocks into a smaller group that has desirable traits. This means that rising dividend strategies are not typically the only component of an investment strategy. Usually, they are just a first step, which is followed by a more in depth analysis of the companies before investment decisions are made. However, in order to have value, the rising dividend filters must find stocks that have some sort of desirable return generating qualities. These return generating qualities can take two forms. First, the stocks could be generating abnormal returns that are not explained by known risk factors. Second the stocks could have an association with known risk premiums, which would allow rising dividend investors to generate greater returns by increasing their exposure to specific types of risk.

This paper seeks to analyze how well different rising dividend criteria would have performed in the recent past. By investigating many versions of the strategy, I aim to uncover the mechanisms through which rising dividend strategies help generate returns.

0.2 Methodology and Data

This study seeks to discover which rising dividend strategies yield the highest abnormal returns. In order to do this I originally investigate twelve rising dividend strategies that consist of a combination of one of four dividend growth requirements, and one of three dividend yield requirements. These requirements are:

Table 1: Investment Criteria

Dividend growth Requirements:	Dividend Yield Requirements:
5 years of 10%+ dividend growth	Stock has a dividend
3 years of 10%+ dividend growth	Dividend yield must be greater than 2%
1 year of 10%+ dividend growth	Dividend yield must be less than 2%
No dividend growth requirement	

In order to measure abnormal returns, I used backtesting to see how the twelve portfolios would have performed in the past. I ran this process using Amibroker, a software with advanced backtesting capabilities. The data all come from Norgate data, which keeps track of key financial figures for a large number of stocks. Norgate also keeps track of when stocks are added to and removed from indices, and when stocks are de-listed. This will prove important for eliminating survivorship bias, as stocks that are removed from the S&P 500 are more likely to have had bad returns. Ignoring these stocks would bias results in the positive direction. Norgate data integrates well with Amibroker, which allows me to incorporate dividend data into my trading rules, and allows me eliminate survivorship bias.

This study focuses entirely on stocks that are in the S&P 500. Only focusing on these stocks does have some drawbacks in terms of generalizing any findings. First, the S&P 500 consists of only mid and large

cap stocks, so the findings of this paper will not necessarily apply to small firms. Second, the index also only has stocks that have their headquarters in the US, so the findings of this paper will not necessarily apply to non-US firms. There are a few more conditions that are required for membership in the S&P 500 that would affect the generalizing of findings in this paper. To keep things simple, it is easiest to say that this paper applies to any stock at the time it is on the S&P 500. Traders will commonly use the S&P 500 as a starting point when looking for new investments, so limiting the population in this way does have practical applications, and it also helps to eliminate survivorship bias within the backtest.

In order to have practical applicability, the backtest must be based on trading rules that only use information that would have been available at the time of the trade. I use the following buy and sell rules:

1. A stock will be bought at closing value if all the following criteria are met:
    (a) The stock is currently on the S&P 500.
    (b) The stock meets the selected dividend growth requirement for the portfolio.
    (c) The stock meets the selected yield requirement for the portfolio.
    (d) It is the last trading day of the month.
2. If the stock is de-listing, or changing its ticker, then it is sold on the last possible trading day for that ticker.
3. Otherwise the stocks will all be sold at closing value on the last trading day of the next month.

Each month all stocks that meet the criteria are purchased at the closing price of the last trading day of the month. The stocks are all held until the last trading day of the next month, at which point they are all sold. If a stock is going to de-list or change its ticker, then it is sold on the last possible trading day for that

ticker. This is done to prevent issues within the backtest where open positions prevent the sale of these equities at the end of the month. This likely does not affect results because the number of trades that happen due to this rule are less than .2% of all trades. The stocks are purchased in equal weights creating a total portfolio value of $100,000 consisting entirely of stocks at the beginning of the test. Purchasing the stocks in equal weights does put more weight into smaller stocks than a market cap weighted approach like the S&P 500. This is appropriate to do however because this study investigates how the rising dividend criteria affects returns, so weighting the stocks evenly allows me to investigate how the returns change on average, regardless of the size of a stock's market cap.

In order to measure dividend growth, I calculate the compound annual growth rate of the dividend per share across the number of years in the portfolio's criteria. The compound annual growth rate in the dividend is calculated using the following formula:

$$Dividend\,CAGR = (\frac{LTM_t}{LTM_{t-yr}})^{\frac{1}{yr}} - 1$$

where LTM_t is the trailing 12 month dividend payout per share on the last day of the current trading month, and LTM_{t-yr} is the trailing 12 month dividend payout per share on the last trading day of the month, yr years before. Here, yr is the number of years for the portfolio's dividend growth requirement.

I chose to include the last 24 years of data because Norgate only has data on dividends starting in the year 1990, which made including any years before the end of 1995 impossible because the trading rules require six years of lag data on dividends to work (this is still enough to include two full market cycles).

I ran the test for every year for the past 24 years in order to get an understanding of how the portfolio would have performed, using three methods to gauge performance. First, I compare the portfolio's returns

to an S&P 500 comparison portfolio, which purchases all S&P 500 stocks in even weights. This allows me to compare how the portfolios perform compared to the entire population from which they were created. Second, I assess each the portfolio's risk adjusted performance using the Fama-French 3 Factor model. Finally, I compare each portfolio's dividend yields to the to a benchmark that uses the same strategy without any dividend growth requirements. By assessing the strategies in these ways I attempt to get a comprehensive picture of the which rising dividend strategies have the best abnormal returns.

0.3 Findings

0.3.1 S&P 500 Comparison

In order to measure abnormal returns, my first approach regresses each portfolio's returns on an S&P 500 comparison portfolio net of the risk free rate. The S&P 500 comparison portfolio also purchased and sold stocks on the last trading day of each month, and purchased all of the S&P 500 stocks in even weights. Regressing on this portfolio is better than regressing on the S&P 500's actual returns because the S&P 500 uses a market cap weighting approach, so its returns are not as good of a representation of the average returns of the entire population of stocks.

Although the equally weighted benchmark is more appropriate here, these results are robust to using a valuated portfolio as a benchmark as we will see in the Fama French three factor model later on. This model assumes a functional form that is a 1-factor excess return model with the S&P 500 comparison portfolio as a benchmark:

$$(R_{Pt} - R_{Ft}) = \alpha + \beta_{SC}(R_{SCt} - R_{Ft}) + \epsilon_t$$

Where R_{Pt} is the portfolio return in year t, R_{Ft} is the risk free rate in year t, and R_{SCt} is the return of the S&P 500 comparison portfolio in year t.

I ran this regression for all 12 portfolios. The abnormal returns across all of the portfolios are summarized in table 2. Interestingly, all three of the dividend growth requirements improved abnormal returns across all yield requirements when compared to the portfolios without a dividend growth requirement.

Table 2: Abnormal Returns Using S&P 500 Comparison Portfolio

	No Rising Div Requirement	1 Year of Rising Divs	3 Years of Rising Divs	5 Years of Rising Divs
Has a Yield	0.221	1.200	1.032	1.353
	(0.942)	(0.861)	(0.783)	(0.848)
Yield>2%	1.664	2.956*	2.117	2.925*
	(1.133)	(1.535)	(1.557)	(1.605)
Yield<2%	-0.536	-0.129	0.181	0.221
	(0.808)	(1.052)	(0.945)	(0.942)

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This trend suggests that adding a rising dividend requirement may improve abnormal returns across all yields, supporting the viability of rising dividend strategies.

Despite this fact, the only portfolios with abnormal returns that are significant at the 90% level are the portfolios with a 2%+ yield requirement and a 1 year or 5 year dividend growth requirement. This may indicate that the rising dividend strategy works best when paired with a 2%+ yield requirement.

This also indicates that the 5 year and 1 year dividend growth requirements have a stronger effect than the 3 year requirement. This may be happening due to random chance, or it could be because the 5 year and 1 year requirements are creating abnormal returns for different reasons that are not captured by the 3 year dividend growth requirement.

The 1 year dividend growth requirement means that a stock has raised its dividend by at least ten percent over the last year. This indicates recent growth in the dividend, which can be an indicator of a company having short term success, which could indicate that they will continue to see success going forward. The 1 year requirement does not say anything about long term success however.

The 5 year dividend growth requirement requires a company to have a geometric average dividend growth above 10% for the last five years. This indicates consistent long term growth in the dividend, which is likely created out of consistent long term success. This doesn't necessarily require that a company has been doing well recently because a large dividend raise four or five years earlier could make up for low dividend raises in recent years.

The 3 Year dividend growth requirement however is likely somewhere in between these two measures, and does not capture the long term growth or the recent growth as well. To illustrate why the 3 year rule isn't as good of an indicator of consistent growth as the 5 year rule, consider a stock that only grows is dividend for one year, and keeps their dividend constant in the other years. For this stock to meet the 3 year dividend growth criteria, it would have to grow its dividend at least 33.1% in the year where the dividend grew. In contrast, for one year to account for enough dividend growth under the 5 year version of the rule, the dividend would have to grow above 61% in one year. This means that the five year version of the dividend growth rule is much less likely to be met by stocks who only raise their dividend's once than the three year rule, which shows why the three year rule is not as good of an indicator of long term consistent growth. Similarly, the three year dividend growth rule also is not as good of an indicator of recent growth as the 1 year rule because all of the dividend growth could have happened three years ago, which would not be an indicator of recent success.

If the 5 year dividend growth rule generates abnormal returns by being an indicator of long term consistent dividend growth, and the 1 year dividend growth rule generates abnormal returns by representing recent dividend growth, then creating a portfolio that uses both trading rules should improve abnormal returns. In order to test this theory, I created three portfolios that all used the 5 year and 1 year dividend

Table 3: 5 Year and 1 Year Together

	5YR and 1YR Dividend CAGR
Has a Yield	1.862*
	(1.009)
Yield>2%	4.003**
	(1.828)
Yield<2%	0.442
	(1.081)
Standard errors in parentheses	
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$	

growth requirements paired with the yield requirements. The abnormal returns from these portfolios are summarized in table 3.

For all dividend yield levels, using the 5 year and 1 year rule together generates greater abnormal returns than the portfolios that use only one dividend growth requirement. This indicates that the two dividend growth rules likely generate abnormal returns for different reasons, which is why using both rules generates even better and more significant returns.

When the dividend yield is greater than two percent, combining the five year dividend growth requirement and the 1 year dividend growth requirement creates an abnormal return of about 4%, which is significant at the 95% confidence level. This is larger, and more significant than the portfolios that used just the 5 year rule or the 1 year rule coupled with a yield greater than 2%.

When there isn't a dividend yield requirement, using the 5 year and 1 year requirements create returns that are smaller, but still significant at the 90% confidence level. This indicates that pairing the 5 year and

1 year dividend growth requirements with a required yield greater than 2% is the best way to implement the rising dividend strategy.

Although backtesting in the way is a form of data mining, there are reasons why these abnormal returns exist as I will explain in the fifth section of this paper.

0.3.2 Fama-French Three Factor Comparison

Comparing the fifteen portfolios to the S&P comparison portfolio is a good indicator of which portfolios yield abnormal returns compared to the entire population of stocks. However, this does rule out the possibility that the returns are generated through association with risk premiums that are already known. Specifically, the portfolios may be associated with the value premium because they all consist of dividend paying stocks, which typically are value stocks. Also, the portfolios may be seeing abnormal returns because the stocks that are growing their dividends are more likely to be mid sized instead of being large cap stocks.

In order to account for these factors, I will use the Fama-French three factor model to control for the macro level changes in returns for the size and value premiums (Fama & French, 1993). This model assumes three risk factors that can be sources of additional returns, and assumes the functional form:

$$\begin{aligned}(R_{Pt} - R_{Ft}) = \alpha &+ \beta_{MKT}(R_{Mt} - R_{Ft}) \\ &+ \beta_{SMB} SMB_t \\ &+ \beta_{HML} HML_t + \epsilon_t\end{aligned}$$

Table 4: Abnormal Returns Using Fama-French 3 Factor Model

	No Rising Div Requirement	1 Year of Rising Divs	3 Years of Rising Divs	5 Years of Rising Divs	5YR & 1YR Rising Divs
Has a Yield	1.189	1.860*	1.695*	1.947*	2.468**
	(0.963)	(1.029)	(1.001)	(0.990)	(1.050)
Yield>2%	2.314*	3.587**	2.699*	3.450**	4.505***
	(1.319)	(1.576)	(1.565)	(1.561)	(1.719)
Yield<2%	0.080	0.573	0.916	0.895	1.128
	(1.013)	(1.114)	(1.087)	(1.064)	(1.088)

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The abnormal returns for each of the 15 portfolios can be seen in table 4. Using the Fama-French three factor model, we see a lot of the same results as with the S&P 500 comparison portfolio. The main difference between the two models is that the abnormal returns are larger, and more significant with the Fama-French model. The portfolio that uses the 1 year and 5 year dividend growth rules even has an abnormal return over 4.5% under the fama-french model, which is significant at the 99% confidence level.

The rising dividend strategies still seem to work best when paired with a required yield above 2%. Again, we see that having a dividend growth requirement yields better abnormal returns than the portfolios without a dividend growth requirement for all versions of the rising dividend criteria. For all yield ranges, the combination of the five year and one year dividend growth rules produces the best results. This again supports the idea that the five year rule finds consistent long term dividend growers, and the one year dividend growth rule finds companies who have seen recent success. Also, this model uses a valuated benchmark for the market portfolio, which indicates that the results are robust to using this type of benchmark.

0.3.3 Dividend Comparison

Rising dividend investors claim that rising dividend strategies lead to superior dividend returns. The idea is that companies with strong dividend growth will provide higher dividend yields than their last twelve month dividend yields would indicate. In order to examine this claim, we cannot compare directly to the S&P 500 because it contains stocks that do not pay dividends. This would obviously make our model more likely to have superior results when compared to the S&P 500 because our portfolio would consist entirely of dividend paying stocks.

In order to investigate the usefulness of rising dividend strategies in generating dividend returns, the portfolios must be compared to how they would have performed without the rising dividend criteria. For example, for the portfolios that requires a yield greater than 2% along with a rising dividend criteria, the best comparison portfolio is the portfolio that only requires a yield greater than 2%. By designing the benchmark in this way, I am effectively testing how much the rising dividend component changes dividend returns compared to the same strategy without the rising dividend criteria.

Table 5: Monthly Dividend Yield Comparison

	Benchmark Dividend Yield	1 Year of Rising Divs	3 Years of Rising Divs	5 Years of Rising Divs	5YR & 1YR Rising Divs
Has a Yield	0.188	0.160	0.165	0.168	0.158
		(-17.23)	(-15.24)	(-11.52)	(-15.66)
Yield>2%	0.282	0.252	0.256	0.257	0.245
		(-9.15)	(-9.14)	(-7.97)	(-8.86)
Yield<2%	0.103	0.108^{***}	0.107^{***}	0.108^{***}	0.109^{***}
		(5.30)	(4.57)	(4.44)	(3.89)

t-Statistics in parentheses

$^{*}\ p < 0.1, ^{**}\ p < 0.05, ^{***}\ p < 0.01$

Table 5 shows the average monthly dividend yield for each of the portfolios. It also contains the t-stats from a one-tailed t-test that compares each portfolio to its dividend benchmark. The leftmost column "Benchmark Dividend Yield" contains the benchmark portfolios. The other portfolios are compared to the benchmark at the beginning of their row.

The t-test checks whether each portfolio has a higher dividend yield than its benchmark, so negative t-stats indicate that the portfolio had lower dividends. Surprisingly, the portfolios that use a rising dividend criteria under-perform the benchmark for the portfolios that have a yield, and for the portfolios that require a yield above 2%. This may be occurring because stocks that have growing dividends are more likely to have lower dividend yields. This would exclude a lot of the high yield stocks that bring up the average dividend yield for the portfolios that don't include rising dividend criteria.

The case is the opposite for the portfolios that require a yield under 2% however. These portfolios generate superior dividend returns that are significant at the 99% level. There are two main explanations for why this trend may exist.

First, its possible that the rising dividend stocks do tend to generate larger dividend returns than their backward looking yields would suggest. Now that the benchmark has a maximum yield, the backward looking yields of the rising dividend stocks are likely about the same as the yields of the stocks that don't meet the rising dividend criteria. This prevents the high yield stocks from skewing up dividend returns within the benchmark. This means the additional dividend returns come entirely from dividend growth on top of the yields that are already expected. This could suggest that there is a grain of truth behind the claim that rising dividend stocks lead to superior yields.

The second explanation for this trend is that rising dividend stocks could tend to have higher yields than non-rising dividend stocks when the yield is below 2%. This is unlikely, but is one of the issues with

running a t-test on the portfolio returns. The test doesn't compare the dividend returns of stocks that have the same backward looking yields. Instead, it just looks at the average dividend yields as a whole. This means that if the portfolios and their benchmarks tend to have different backward looking yields, it can skew results.

In a more practical sense though this issue isn't very important to an investor. In reality, it is most likely true that a stock that has been growing its dividend is more likely to keep growing it than a stock that has kept the same dividend over the same time frame. If those two stocks have the same backward looking yield, then the rising dividend stock will almost certainly have a higher expected future yield just because it has a chance to keep growing the dividend. The issue with this however is that rising dividend stocks may have smaller backwards looking yields than the average stock. An investor who is looking to make dividend returns would be better off investing in high yield stocks and ignoring the rising dividend criteria all together. This is supported by the fact that the best dividend returns came from the benchmark that just required the yield be above 2%.

0.4 Performance in Recent Years

Over the last 24 years, some of the rising dividend strategies would have seen significant abnormal returns. In order to see if the strategies would still generate these returns, I re-created all the tables from earlier using just the last ten years of returns.

Table 6: Abnormal Returns Using S&P Comparison: Last 10 Years

	No Rising Div Requirement	1 Year of Rising Divs	3 Years of Rising Divs	5 Years of Rising Divs	5YR & 1YR Rising Divs
Has a Yield	0.345	0.808	0.927	1.053	2.042**
	(0.343)	(0.708)	(0.682)	(0.732)	(0.973)
Yield>2%	2.614**	2.885**	2.005	2.297**	2.714*
	(1.002)	(1.346)	(1.276)	(1.150)	(1.556)
Yield<2%	-1.926	-0.760	-0.057	-0.430	1.000
	(0.746)	(0.992)	(0.982)	(1.052)	(1.168)

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Abnormal Returns Using Fama-French: Last 10 Years

	No Rising Div Requirement	1 Year of Rising Divs	3 Years of Rising Divs	5 Years of Rising Divs	5YR & 1YR Rising Divs
Has a Yield	0.707	0.738	1.081	1.362*	2.040**
	(0.742)	(0.826)	(0.796)	(0.801)	(1.019)
Yield>2%	3.057**	3.164**	2.553*	3.088**	3.203*
	(1.234)	(1.454)	(1.349)	(1.214)	(1.637)
Yield<2%	-1.671	-1.146	-0.337	-0.579	0.584
	(0.956)	(1.017)	(1.012)	(1.066)	(1.137)

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Running the same tests using only the last ten years worth of data does show some slight changes in the trends we saw over the last 24 years. The most notable change is that the portfolios that include a

dividend growth criteria that also have a required yield above 2% do not show as large of an improvement in abnormal returns as with the regression that includes all 24 years. This could suggest that dividend growth is no longer as good of an indicator of abnormal returns for stocks with yields above 2%.

This has to be taken with a grain of salt though because narrowing down the regressions to only the last ten years puts the number of observations down to 120 when there were 288 observations in the 24 year regression. Also, including only the last ten years means that there are no observations from times of recession. It is possible that the benefit of rising dividend strategies comes from times of recession, so bear markets, we no longer see the abnormal returns. by excluding

Interestingly enough though, the portfolios that have a yield less than 2% have maintained the same trends as the 24 year model. These portfolios still show a decent improvement from including a dividend growth criteria. Also, the combination of the 5 year and 1 year dividend growth rules still generates the best improvements compared to the portfolios without dividend growth criteria.

The differences in trends may be due to random chance alone, but they may also be the result of a change in market conditions that came following the 2008 recession. Either way, the portfolio that generates the largest abnormal returns has not changed by looking at only the last 10 years. The portfolio that uses the 1 year and 5 year dividend growth rules coupled with a yield above 2% generates the largest abnormal returns in all 4 versions of the analysis except for the 10 year S&P 500 comparison, where it is only marginally outperformed by the portfolio that uses just the 1 year dividend growth rule coupled with a yield greater than 2%.

This suggests that the 1 year and 5 year dividend growth rules coupled with a dividend yield above 2% is the most likely to produce the highest abnormal returns out of the fifteen portfolios.

0.5 Characteristics of the Optimal Portfolio

Now that we know which of the fifteen portfolios produces the largest abnormal returns, the question becomes how does it produce these returns, and what characteristics does the portfolio have? Table 8 shows the full results of the Fama-French 3 Factor regression for the optimal portfolio.

Table 8: Optimal Portfolio Fama French Regression

	5YR and 1YR and YLD$>$ 2%
β_{MKT}	0.934***
	(0.033)
β_{SMB}	-0.212***
	(0.046)
β_{HML}	0.631***
	(0.045)
Constant	0.442***
	(0.142)
R^2	0.762

Standard errors in parentheses
$^{*}\ p < 0.1, ^{**}\ p < 0.05, ^{***}\ p < 0.01$

All three regression coefficients and the intercept are non-zero and significant at the 99% level. The β_{MKT} is also lower than 1 at a 95% confidence level. This paints an interesting picture of the optimal rising dividend strategy and the types of stocks that it purchases.

First, the portfolio has a market beta that is less than 1 with 95% confidence. This indicates that on average, the portfolio takes on less market risk than average. Second, the portfolio has a β_{SMB} that is negative with greater than 99% confidence. This means that the portfolio actually has a negative correlation with the size premium, which indicates that it consists of primarily large cap stocks. This means that the

expected returns are actually reduced because large cap stocks tend to under-perform small cap stocks. Third, the β_{HML} coefficient is positive with a confidence level well above 99%. This indicates that the portfolio tends to purchase value stocks, and receives some additional returns because of this. This makes sense because the stocks that the optimal portfolio buys are all dividend paying stocks with above 2% yields.

There are a few reasons why this portfolio may be generating such large abnormal returns. First, the abnormal returns may be created through a mechanism similar to momentum(Daniel & Titman, 2000). Momentum is the tendency of past winners to continue winning. The optimal rising dividend portfolio picks past winners in two main ways. First, it requires five years of consistent dividend growth. Growing a dividend consistently for five years can be supported in two main ways. First, it could be supported by having a low dividend to begin with. If a company only paid out a dividend of a few cents five years ago, then growing the dividend 10% every year for five years would be easy to support. This is likely not the case though because the optimal portfolio requires a dividend yield larger than 2%, which means that the dividend has to be larger than 2% of the share price. The second way to support dividend growth is through earnings. Companies who have strong enough returns on equity can support growing their dividends by continually generating more net income. The five year dividend growth rule likely chooses these types of stocks when paired with a required yield above 2%, which is the first way that the optimal portfolio chooses past "winners".

The second way that the optimal portfolio chooses past winners is the 1 year dividend growth rule. This rule selects stocks that have grown their dividends 10% in the last year. By incorporating this rule, the portfolio prevents the purchase of stocks who raised their dividends a lot several years ago, but have not seen much success recently. By using the 1 year and 5 year dividend growth rules along with a required

yield above 2%, the optimal portfolio is essentially buying stocks that have seen both long term and short term success. This creates a portfolio that generates abnormal returns through momentum, as the past winners go on to generate superior returns into the near future.

The second reason why the portfolio may be generating abnormal returns is through omitted variable bias. The Fama-French regression controls for the macro level indicators of the market, size, and value premiums. This does a good job accounting for some of the factors that affect the movements of different types of stocks on average across the market, but does not account for firm level factors. There may be firm level factors that affect returns which are heavily associated with the stocks in the optimal portfolio. By excluding these factors, the abnormal returns may appear to be higher than they actually are.

There also may be other macro level factors that are associated with the portfolio and its returns as well. For example there are the two additional Fama-French factors that control for firms that invest aggressively and for firms that have large operating profitabilities. In order to investigate whether the Fama-French 5 Factor model is more appropriate for predicting returns, I regressed the optimal portfolio's returns net of the risk free rate onto the 5 Factor model. The results can be found in table 9:

There are a few changes with the way this model predicts the returns of the optimal rising dividend portfolio. First, the coefficients for β_{SMB} and β_{CMA} are no longer significant. This means that the portfolio doesn't display any association with the size or conservative investment premiums. It is worth noting however that the Fama French 5 Factor model faces issues where the CMA and RMW factors make the SMB factor insignificant because they are closely associated, which may be why these factors are insignificant.

Second, the β_{RMW} is positive and significant at the 99% confidence level. This indicates that the optimal portfolio has a strong positive association with the market level movements of firms with high

Table 9: Optimal Portfolio Fama French 5 Factor Model

	5YR and 1YR and YLD> 2%
β_{MKT}	1.038***
	(0.036)
β_{SMB}	-0.073
	(0.048)
β_{HML}	0.462***
	(0.061)
β_{RMW}	0.433***
	(0.066)
β_{CMA}	0.083
	(0.087)
Constant	0.129
	(0.139)
R^2	0.793

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

operating profits. This indicates that the portfolio may be making some of its returns through selecting stocks that have robust operating profitabilities. This makes sense because the companies that can achieve strong dividend growth through earnings likely have strong operating profitabilities. The model also has almost completely lost its abnormal return, which means that the portfolio's tendency to pick companies with high operating profitabilities may be a source of the abnormal returns seen under the three factor model. It is worth noting however that the R^2 value of this model is only slightly better than the three factor model despite adding 2 new terms. This suggests that the 5 Factor model does about the same as the 3 Factor model for predicting returns, so its hard to tell which model is appropriate.

When regressing the 5 Factor model on the other rising dividend portfolios, the story is the same. The abnormal returns go away, and the portfolios show strong associations with the operating profitability premium. This suggests that rising dividend strategies likely generate their returns by picking companies that have robust operating profitabilities.

0.6 Conclusion

Across all of the models used in this study, there is one trend that best supports the viability of rising dividend strategies: The portfolios that used a rising dividend requirement outperformed their benchmarks for every single version of the rising dividend strategy, and for all yield levels. This indicates that rising dividend strategies do in fact have a tendency to improve abnormal returns. These returns disappear however when using the five factor Fama French model. This is due to a strong association between the rising dividend portfolios and the market level movements of companies with high operating profitabilities. This suggests that one explanation for the abnormal returns is that the rising dividend filters select stocks with high operating profitabilities.

The second interesting trend comes from a comparison of the dividends across the fifteen portfolios. The strategies that used a rising dividend criteria actually saw less dividend returns when coupled with a yield requirement above 2%. This trend is likely the result of a tendency of rising dividend stocks to have lower yields than their non-rising dividend counterparts.

When looking at the portfolios that used a yield requirement of less than 2%, the opposite trend appears. The rising dividend portfolios all saw improved dividend returns. This is occurring because the 2% yield ceiling makes the backward looking yields between the rising dividend and non-rising dividend stocks approximately the same. This makes the comparison occur for stocks that have approximately the same last twelve month yields. Then, going forward, the rising dividend stocks are more likely to grow their dividends than the stocks that don't have a history of dividend growth, so the actual dividend yields increase for the rising dividend stocks.

This provides weak evidence that rising dividend stocks have improved dividend returns when compared to stocks that have the same backward looking yield. However, if your goal is to generate dividend income, you may be better off simply looking for high yield stocks instead. In fact, out of the fifteen test portfolios, the one that only required a yield above 2% created the best dividend returns.

The third trend that is consistent across almost all of the tests is that one portfolio generated the best abnormal returns: The portfolio that used the 5 year and 1 year dividend growth rules coupled with a required yield above two percent. This portfolio was only outperformed once by another portfolio in all of the tests, and even then, it was only outperformed by a very small amount. This finding has the best practical applications because it demonstrates an investment strategy that can be used in the real world to generate abnormal returns.

This strategy not only showed the strongest abnormal returns out of all fifteen strategies, but it also showed resilience to a variety of tests and controls. It continued to generate the best returns when looking at just the last 10 years, which indicates that the strategy still has functionality despite the ever changing world of finance. There are two explanations for why this strategy likely generates these returns. First, it may do so by using dividend growth as a measure of a stock's past success. By incorporating rules that require long term, and also recent success, the portfolio generates abnormal returns through a momentum-like technique. Second, the abnormal returns may come from an the portfolio's association with the market level movements of companies with high operating profitabilities, suggests that the strategy is acting as a filter that selects stocks with high operating profitabilities.

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