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Review Article

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Dividend Policy, Growth, and the Valuation of Shares — Revisted (With Addendum)

John D. Van Sant*

University of California at Berkeley

***Corresponding Author**
John D. Van Sant, University of California at Berkeley.

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Abstract

In the first draft of this paper published by SSRN in September, 2025, I argued that the market would place a higher value on the shares of a corporation that retained all its earnings if that corporation began paying dividends. I offered circumstantial evidence for this proposition but no actual examples. In this paper I present in an addendum empirical evidence that the market places a higher value on the shares of corporations with equal earning power but which pay dividends, with the valuation rising with an increase in the payout ratio. Other than this paragraph in the abstract and the Addendum, this paper is unchanged from the original.

Two studies demonstrate that corporate earnings grow directly and positively with the rate at which corporations retain their earnings. One study analyses the relation between historical retention and growth rates of the S&P 500 index, the other is a longitudinal study which examines the retention and growth rates of individual corporations during the period from 2004 through 2024. This second study also shows the deciles of corporate stocks sorted by retention rates will have approximately the same mean price-to-earnings levels. The market values the high volatility stocks of companies with high retention levels and high growth rates equally with the low volatility stocks of companies with low retention and low growth rates. The data imply that during the 2004-2024 period the market valued a dollar of dividends more than a dollar of earnings, contrary to the "dividend irrelevancy" conjecture of Miller and Modigliani. This paper also demonstrates how studies which find earnings growing slower after high retention levels and faster after low retention levels are the result of earnings falling in recessions and growing rapidly thereafter. G11, G12, G14, G17, and G23.

1. Introduction

In their study, Arnott and Asness assert that when corporations in the aggregate pay out a high percentage of their earnings as dividends, their subsequent earnings grow faster than they grow after paying out a small percentage. The goal of this paper is to point out the error in the method of analysis used by Arnott and Asness and to demonstrate that in fact corporate retention ratios and growth rates are highly and positively correlated.

Part 1 briefly reviews the pertinent literature. Parts 2 and 3 describe and critique the Arnott and Asness study. Part4 presents the author's study and comments on the significance of the findings. Part 5 presents ancillary findings. Part 6 concludes.

Myron J. Gordon's formula for the present value of a share of corporate stock may well be the tool most employed by professionals and the public alike to evaluate a stock's worth. Gordon analogized a share of stock to a perpetual bond, substituting the dividend for the coupon, the demanded, or expected, return for the interest rate, and adding a growth function. The result is usually seen in the form

$$P = \frac{d_1}{k - g}$$

where P is price, d_1 is next year's dividend, g is the future yearly growth rate and k is the return demanded by the investor. In his writings (1956, 1959 and 1962) Gordon conceived of earnings growth as the product of a corporation's earnings retention rate b and the rate of return on the investment of its retained earnings r. Thus,

$$P = \frac{d_1}{k - r\,b}$$

In Gordon's model, the corporation does not use outside financing and has no net debt . Consequently, growth results solely from the product of retained earnings and the rate of return on investment. Although probably not an essential element of his model, Gordon believed that the discount rate k was "an increasing function of the expected rate of growth in the dividend." The market discounts distant, and thus less certain, dividends at a greater rate than near ones. A corporation can therefore reduce the rate at which its shares are discounted (and thus increase their price) by paying out as dividends a larger share of its earnings.

In their now famous essay, "Dividend Policy, Growth, and the Valuation of Shares," Merton H. Miller and Franco Modigliani (1961) disagreed with Gordon, arguing that in a rational market, the manner in which earnings are divided between dividends and reinvested funds should not affect the corporation stock price.

"(A) change in dividend policy, given an investment policy, implies a change only in the distribution of the total return in any period as between dividends and capital gains. If investors behave rationally, such a change cannot affect market valuations. Indeed, if they valued shares according to the Gordon approach and thus paid a premium for higher payout ratios, then holders of the low payout shares should actually realize consistently higher returns on their investment over any stated interval of time."

"The.. relation between earnings per share and dividends plus capital gains also means that there will be a systematic relation between retained earnings and capital gains. The "marginal" relation is easy to see and is always precisely one for one regardless of growth or financial policy. That is, taking a dollar away from dividends and adding it to retained earnings (all other things equal) means an increase in capital gains of one dollar (or a reduction in capital loss of one dollar.)"

Miller and Modigliani qualified their general statement of dividends- capital gains equality by noting that if the return on investment achieved by a corporation exceeded the rate of investment attained by the market generally, then capital gains would exceed retained earnings. Such companies are "growth companies." The reverse is true for "non-growth companies." Although Miller and Modigliani's argument takes place in the context of their basic assumptions, including perfect capital markets, rational behavior by investors, and perfect certainty, they assert at the conclusion of their article that their thesis also holds in the real world of uncertainty.

Notwithstanding their disagreements over the details of stock valuation, both Gordon and Miller and Modigliani agreed on the basic proposition that a corporation's retention policy does not affect its rate of return on investment. A company which decided to save more of its earnings should not suffer a decline in the investment return on those savings. Consequently, retention policy and growth are directly related, regardless of a corporation's return on investment (unless, of course, the investment rate is negative).

Considering how central to stock valuation is the relation between retained earnings and growth, it is surprising how few studies have looked into the relationship. In his celebrated paper "Higgledy Piggledy Growth" l.M.D. Little found no statistically significant relationship between the growth of (British) companies' earnings over periods spanning one to four years and subsequent growth over one to six years. As an incidental finding, he could not find a relationship between retention rate ("plowback") and future earnings growth. He and A.C. Rayner reviewed and amplified his analysis in "Higgledy Piggledy Growth" Again. The authors regressed the earnings growth of over 500 companies between 1951 and 1961 against size and retention rates. In more than half the regressions, the coefficient of the retention variable had the wrong sign, and the regression explained about one quarter of one percent of the total variation. They conceded, however that their conclusions were "tentative" and the "relation has not been exhaustively tested."

Baumol, Heim, Malkiel and Quandt (1970) used the Little and Ryaner study as a springboard to examine the factors influencing the growth of American companies. They studied the experience of approximately 600 companies between 1949 and 1962. They included in their regressions not only earnings retention rates, but changes in shares issued, new debt and preferred stock, plus a risk factor. They cumulated the various independent variables over "base periods" from two to six years in length and then regressed thèse cumulations against earnings changes over subsequent periods of equal length, but lagged in time from the initial base period by from two to seven years. They found that retained earnings did have a positive and a direct effect on earnings growth, but less than new equity capital and debt. lt is possible, they concluded, that corporations issue new shares or borrow only when the prospective investment is expected to yield more than those investments into which they typically place retained earnings. On the other hand, maybe only those companies expected to experience large earnings increases have easy access to (or are willing to go to) the equity markets for new financing. The authors leave the reader with thèse questions:
"Is it true that earnings retention serves the interests of the shareholder? Are managements relatively careless in the use of funds that are not subject to the strictest form of market discipline? Do managements retain earnings first and then look for something to do with them afterwards'?"

2. Review of Arnott and Asness

Writing some 32 years after Baumol, Heim, Malkiel and Quandt, Robert Arnott and Clifford Asness answered the above questions with a firm "yes." Arnott and Asness regressed year-end dividend-earnings ratios of the S&P 500 Index (and its predecessors) from 1871 through 1991 against the subsequent 10 years earnings growth rate of the index's earnings deflated by the U.S.

Consumer Price Index. They found that growth varied directly with the dividend - price ratio (but inversely to the retention rate) during the periods 1871-2001, 1871-1945 and 1946-2001, with significant coefficients for both the intercept and for the dividend-earnings independent variable. The 1946-2001 regression span demonstrated an especially strong relationship. For the regression equation

EG 10 = a + b (PR),

where EG 10 = the subsequent ten-year earnings growth rate from 1946 through 1991, and (PR) = the preceding year's pay out rate, they achieved these regression co-efficients:

a	b	Adjusted R^2
-11.6%	.25 PR	54.6%
(7.2)	(8.6)	

(t - statistics in parenthesis)

Nearly equally strong results were retained when payout ratios were regressed against subsequent five-year earnings periods.

If valid, Arnott and Asness' conclusions are even more significant than Rayner and Little's findings 40 years earlier. The theoretical basis of the dividend- discount model would be overthrown, and of course, contrary to Miller and Modigliani, dividend payments would become very relevant indeed. The vast majority of publicly traded American companies pay no dividends at all (see Fama and French 2001) and would therefore seem to be engaged in highly self damaging behavior.

The study of Arnott and Asness has been replicated worldwide using substantially the same methodology: in Australia: Flint, Tan and Tian (2020), in South Africia: Willows and West (2020), in Indonesia: Susanto and Tirok (2013), in the United Kingdom: Vivian (2005), in the Netherlands: Peeden (2011) and in the U.S.: Zhou, Ping, and Roland (2006). But a rare contrary finding in Indonesia: Halim (2024).

Arnott and Asness offer four potential explanations for the inverse relationship between retention ratios and future real earnings growth:

1. High payout ratios indicate managerial confidence based on public and private information and the stability and growth of future earnings. A low payout ratio indicates the opposite,
2. Corporations retain too much earnings as a result of the manager's desire to build empires,
3. Sticky dividends combined with mean reversion in more volatile earnings (citing Lintner 1956),
4. Error in their data or experimental design.

While they appear to favor the second explanation, they acknowledge that to establish it as the explanation (or the first one as well) is well beyond the scope of their article. However, they expend a great deal of effort to show that their results are not the product of sticky dividends plus mean reversion of earnings or experimental error. For the reasons set out in the next section of this paper, the author argues that Arnott and Asness's findings can be, and are, fully explained by the phenomenon of a relatively smooth dividend stream divided periodically by a highly volatile earning stream.

3. Mean Reversion

This paper will show that corporate earnings grow directly and positively with the retention of earnings, yet Arnott and Asness and others have demonstrated that, from a given point in time, earnings grow faster when corporate retention rates are low, slower when retention rates are high. How can these two apparently contradictory outcomes ba reconciled? Exhibit 1 on the next page explains how this can happen. Exhibit 1 graphs the course of earnings and dividends of the S&P 500 index from 1997 through 2025 (estimated). The top line traces the earnings path, the second line dividends. The scale is semi-logorithmic in order to fit the data on one page. The bottom of the exhibit records the yearly level of the dividend-earnings ratio.

Regression relationships are usually driven by the extreme values in the data. The five years when the dividend-earnings ratios reached their highest levels are 2001 (63.8%), 2002 (58.2%), 2008 (190.8%), 2016 (51.1%), and 2020 (61.9%). In the five years after each of these levels, earnings grew at the yearly rate of 27%, 19.1%, 46.4%, 15.9% and 61.9% respectively. The dividend-earnings ratios are at their lowest in 2000 (32.5%), 2005 (31.8%), 2006 (30.5%), 2010 (29.40%"), and 2016 (30.4%). The five-year earnings growth rates after each of these years are 6.9%, 6.7%, 2.3%, 1.7%, and 15.61%, respectively. The geometric mean earnings growth rate over the full 28-year period is 6.66% per year. Viewed econometrically, when the five-year growth rates are regressed against the yearly dividend-earnings ratios, this equation results:

5-year earnings growth rate = -3.82 +.263 div/earn ratio R^2 .50
(4.65)

The story is much the same over the previous 28 years. The peak dividend- earnings ratio years are 1970 (69.8%), 1986 (57.2%), 1991 (76.2%), 1992 (89.9%), and 1993 (57.5%). Over the five years following each of these years, earnings grew at the rate of 9.4%, 2%, 19.3%, 15.55%, and 11.55%, respectively. The five low dividend years are 1975 (37.5%), 1979 (37.6%), 1995 (34.8%), 1996 (38.5%), and 1996 (38%), after which earnings grew over the next five years at the rate of 13.1%, 2.3%, 8%, -8.6%, and -6.8%, respectively. Regression of five-year growth rate against dividend-earnings ratios results in this equation:

5 year earnings growth rate = -6.02 + .266 div/earn ratio R^2.17
(2.33)

These data and regression results are all exactly as reported and predicted by Arnott and Asness. But the reader will notice on Exhibit 1 that nearly all the high dividend- earnings ratio years are recession or post-recession years —2001, 2002, 2008 and 2020.

The same is true in the previous 28-year sample: 1970, 1991,

1992, 1963. From the full 56-year period, only 1986 and 2016 are not recession years. Of the ten-low dividend- earnings ratio years from both periods, only 1975 occurs during a recession. During these two time spans earnings fell sharply during recessions but dividends fell less, or not at all. Then post-recession, earnings rebounded and resumed their prior growth rate. The lowest dividend-earnings ratio years tend to take place in the late stages of the earnings recovery, often just before another recession. There is no need to divine the thinking and motives of corporate managers to understand the different growth rates of earnings following high and low dividend-earnings ratio years. Recessions and recoveries completely account for them.

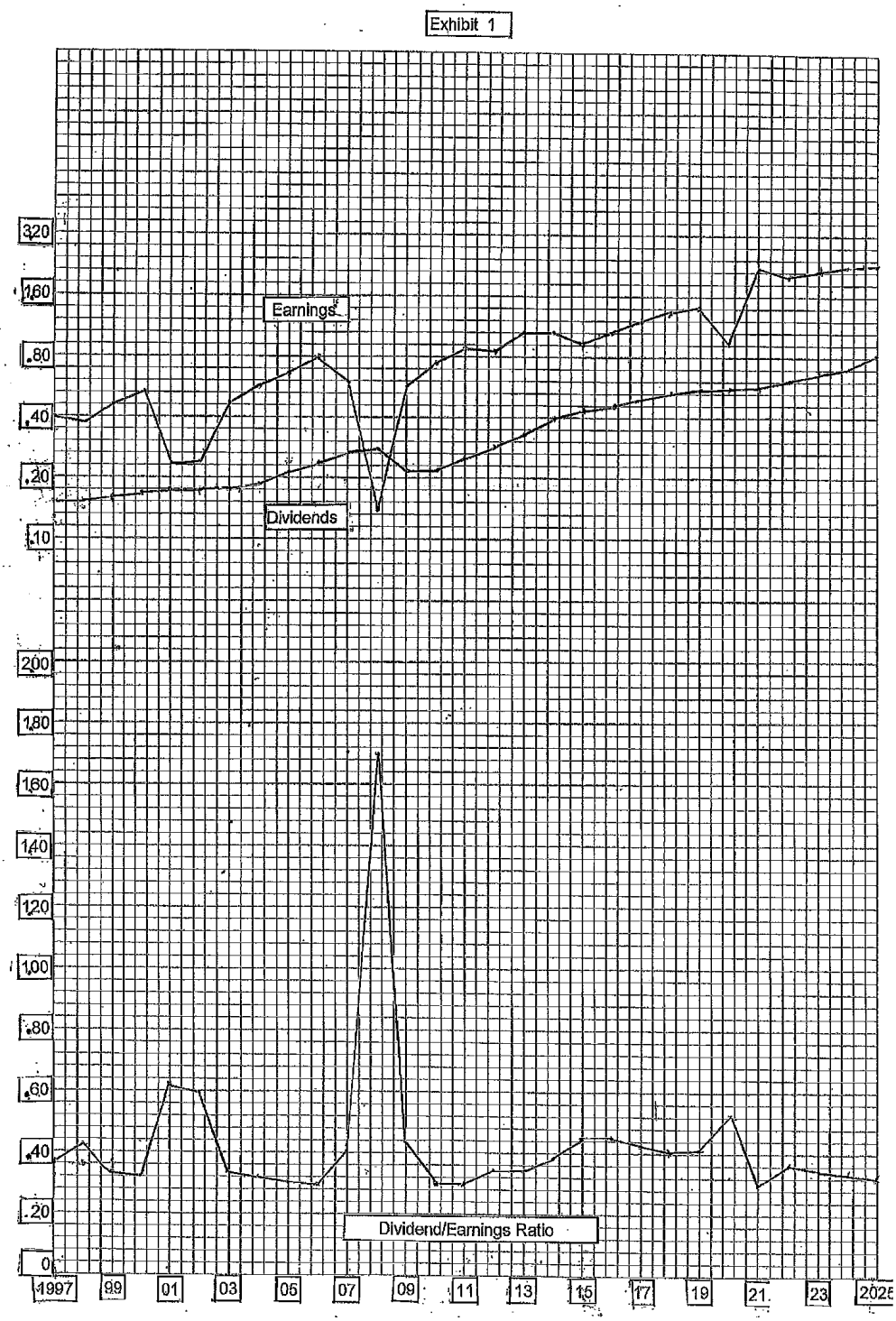


Figure 1: Exhibit1

4. Retained Earnings Ratios And Earnings Growth Rates

4.1. Standard and Poors 500 Index

In this study I form 19 year moving averages of the retained earnings-to-earnings ratios of the S&P 500 index, starting with the first segment running from 1871 through 1890 and the last from 2004 through 2023. I pair each segment with the rate at which real earnings grew during that period. (The data are from Robert Shiller's website.) First, I take eight consecutive, independent 19-year segments, together with their matching earnings growth rates, and list them chronologically. The results are posted in Table 1. The positive relationship between retention rates and earnings growth rates is there, but, understandably, it's pretty weak. The relationship begins to emerge, however, if the second four segments are compared with the first four. The retention rates in the first four segments average 32.5% and the growth rates 1.04% per year. The second four segment's retention rates average 53.15% and the growth rates 2.38%.

In the second part of this study I sort the 19-year segment data into ten deciles, with 13 or 14 segments in each decile. The sorting is by retention ratios, with the segments with the lowest retention ratios together with their matching earnings growth rates, in the first decile. I then average the retention rates and growth rates of each decile. Table 2 records the results of this ranking process. Now the direct and positive relationship between retention ratios and earnings growth rates emerges unambiguously. Viewed econometrically, a regression of the 10 averaged earnings growth rates against their average retention rates yields an R^2 of .69. The results of this study are especially telling because the data set is the same one used by Arnott and Asness.

4.2. Individual Stock Study

In the second study, I recorded the yearly earnings, average dividend-to-earnings ratios, year-end prices, and average price-earnings ratios of 512 corporations over the period 2005 through 2024. The data source consists of various issues of the Value Line survey. The Value Line publication covers approximately 1600 companies. From this array I selected companies that had a continuous record of operation throughout the 20-year span. I eliminated companies which experienced deficits, as dividend-earnings ratios could not be calculated for those years. This criterion eliminated all the real estate investment trust companies. I further eliminated the companies which Value Line rated 4 or 5 for financial safety (the least safe), as those companies' payout decisions would be biased by survivability concerns. Otherwise the stocks of all companies were included.

I sorted the stocks into ten deciles ranked by their average retention ratios. 71 of the companies retained all their earnings throughout the 20-year period. The geometric average growth rate of the earnings of these companies averaged 14.12% per year, so I removed 18 of these companies whose earnings growth rates also averaged 14.12% and placed them in the second decile. The results of the sort are recorded in Table 3. The earnings growth rates decline steadily and monotonically as the retention rates decline. Regressing the real earnings growth rates of the 10 deciles against their matching retention ratios yields an R^2 of .95 with the retention rate variable having a t-stat of 12.74. Performing the same regression using the entire 512 stock array gives an R^2 of .33 and a t-stat of 15.85. Combined with the results of the S&P 500 study, the evidence of a direct and positive causal relationship between corporate earnings retention rates and earnings growth is conclusive and unassailable.

Table 1

YEAR	19MA re/e	Mean^e19
1890	32.4	0.78
1909	32.5	3.91
1928	22.9	0.31
1947	42.1	-0.83
1966	45.7	2.45
1985	52.3	-1.22
2004	52.4	4.48
2023	61.9	3.82

Table 2

Decile	Mean re/e	Mean^e19
1	224	82
2	244	82
3	279	68
4	320	89
5	320	97
6	374	100
7	431	336
8	467	302
9	550	188
10	616	385

				Table 3				
	1	2	3	4	5	6	7	8
Decile	re/e	g e	price ^	stockreturn	d/e	std dev	p/e	Sharpe r.
1	100	14.12	13.88	13.88	0	35.8	22.63	52.4
2	95.9	13.1	13.24	13.49	4.1	36.3	22.06	57.9
3	85.8	11.43	12.04	12.94	14.2	31.7	18.04	57.5
4	78	10.95	9.94	11.24	22	32.8	19.03	51.8
5	73.7	9.54	9.08	10.65	26.3	29.1	18.27	54.7
6	69.3	8.66	8.06	9.7	30.7	31.4	19.61	50.7
7	61.3	7.05	6.36	8.35	39.7	28.8	18.54	49.8
8	56.5	6.95	6.96	9.28	43.5	25.5	18.91	51.3
9	48.3	5.64	5.67	8.51	51.7	23.9	19.67	51.1
10	29.4	4.49	3.74	7.98	70.6	22.3	20.56	51.5

				Table 4				
Decile	re/e	e growth%	g e %	g real e	% real g e	price ^	realprice^	%real p ^
1	100	14.12	100	11.56	100	13.88	11.32	100
2	95.9	13.1	92.8	10.54	92.8	13.24	10.68	94.3
3	85.8	11.42	80.9	8.86	76.6	12.04	8.94	79
4	78	10.95	77.6	8.29	71.7	9.94	7.34	64.8
5	73.7	9.54	67.6	6.98	60.4	9.08	6.49	56.3
6	69.3	8.66	61.3	6.1	52.8	8.06	5.45	48.1
7	61.3	7.05	50	4.49	38.8	6.36	3.74	33
8	56.5	6.95	49.2	4.39	38	6.96	4.28	37.8
9	48.3	5.64	39.9	3.08	26.6	5.67	2.94	26
10	29.4	4.49	31.8	1.93	16.7	3.84	1.28	11.3

5. Ancillary Findings of 2004-2024 Study

1. Returns decline with the decline in the retained earnings-to-earnings ratios. Table 3 records by decile the average of the key company financial factors. Columns 2,3 and 4 show how earnings growth, price changes and returns all decline in lockstep with the decline in retained earnings. As these three factors decline, dividend payouts rise, but not sufficiently fast to offset the decline in price changes.

2. All deciles have substantially the same average price-earnings ratios. There is some individual variation in the p/e averages, but the average of the first five deciles matches almost perfectly the average p/e's of the second five. These p/e's are matched by nearly equal Sharpe ratios throughout the range of deciles. (This ratio is a simplified version of Sharpe's ratio, consisting of a stock's mean arithmetic return divided by the standard deviation of the stock's year-to-year price changes. The risk-free rate is not deducted from the stock return average in the numerator.) Average standard deviations decline with returns, consistent with the Capital Asset Pricing Model. The decline in the standard deviations reflect the market's recognition of the increase in dividends as cash-in-hand, which supports the stock price during recessions and periods of general market turmoil. This phenomenon is often called the "bird-in-the-hand" effect. Decile standard deviations, earnings and price changes all decline together at the same rate, with the negative effect of declining earnings and price changes offset by the positive effect of rising dividend payouts and declining volatility. Of these factors the two strongest predictors of decile p/e levels are price change and retained earnings/ earnings levels. Regressing each decile's mean p/e against their mean price changes and retained earnings/ earnings ratios yields this equation, fitted values and residuals:

p/e = 19.889 + 1.3736 change (nominal) price -.177 re/e R^2 .44 Equation 1
(1.226) (1.621)

	Predicted p/e	Residuals
1.	21.26	1.37
2.	21.051	1.01
3.	20.311	-2.271
4.	19.686	-.656
5.	19.279	-1.009
6.	18.629	.98
7.	17.778	.762
8.	19.864	-.954
9.	19.502	.168
10.	19.961	.599

As you would expect, the tendency is for the actual values above 20 to be reduced and those below 19 to be increased.

The steadiness of the p/e ratio across the deciles suggests that Miller and Modigliani's dividend irrelevancy conjecture, that the market values a dollar of retained earnings equally with a dollar of dividends, is confirmed empirically. A closer look at the data, however reveals reasons to conclude that the market values dividends more than retained earnings.

The companies in the lower deciles exhibit steadily declining internal investment returns. Table 4 compares the average retention rates in each decile with the rate of growth of earnings in both nominal and real terms. (The geometric mean change in the C.P.I. during this period was 2.56% per year) Nominal earnings decline directly and very closely with the decline in retention rates. Presumably, it is this near equivalency between perceived growth rates and retention ratios, together with the corresponding dividend increases, which the market is responding to in awarding equal p/e ratios. But note that the decline in real earnings growth rates proceeds much faster than the decline in retention rates. By decile 10, in contrast to their mean retention rate of 29.4%, these stocks have experienced a real mean yearly growth rate of only 1.93%, 17.1% of decile 1's 11.56% growth rate in real earnings. Decile 10's real earnings growth rate is just over one-half of its corresponding retention and nominal earnings growth rates. Even worse is the decline in decile 10's real mean price change, which is only 1.28 % per year, just 11.3% of the real price growth rate of the decile 1 stocks. (See Table 4) What the real earnings growth rates reveal is that the stocks in the bottom deciles cannot become "growth stocks" simply by retaining their earnings. Clorox, for example, with a mean retention ratio of 28.2% and a real earnings growth rate of 1.96% cannot become a Teledyne with a 100% retention rate and a real earnings growth rate of 12.28%. Miller and Modigliani make this very point:

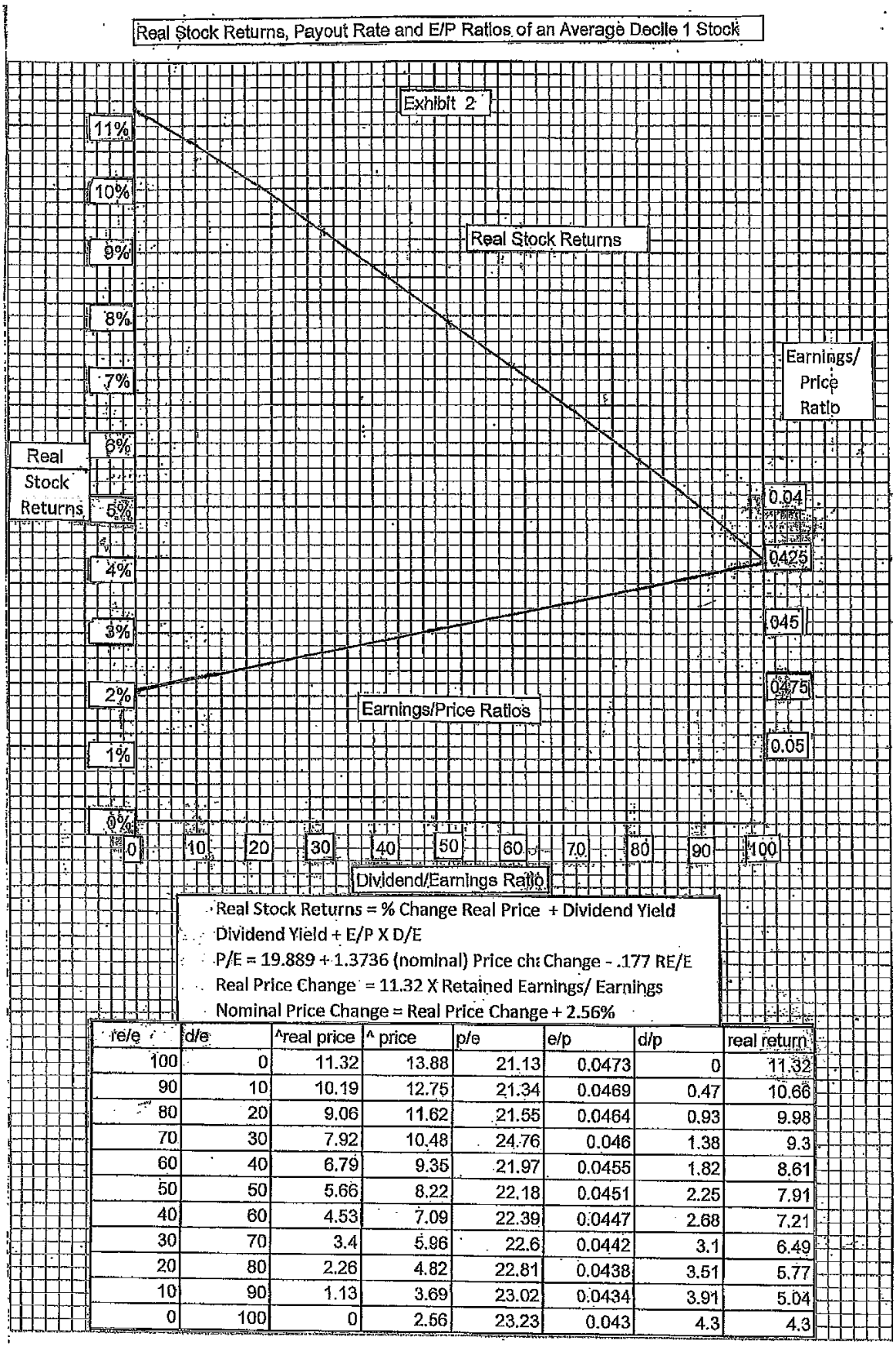
The essence of "growth," in short, is not expansion but the existence of opportunities to invest significant quantities of funds at higher than "normal" rates of return. (p.417)

While a Clorox cannot become a Teledyne, a Teledyne can become a Clorox, in the sense that a decile 1 100% retaining company can choose to pay out 70.6% of its earnings. In the context of this study, that would apply to a company which had been retaining all its earnings through 2004 and then started paying dividends thereafter.

Instead of the real earnings growth rate of the average decile 10 company, the converted company's real earnings would grow at the rate of .294 x 11.56% = 3.40% and its mean real price change would be .294 X 11.32% = 3.33%. The market would now value the company's earnings at a higher rate than it valued the average decile 10 stock. How much higher? Substituting 5.89 for P^ (5.89 = 3.33 +2.56) and 29.4 for re/e in Equation 1 results in a predicted p/e of 22.78. This is 3.05 higher than the average p/e of all ten deciles' p/e's and 3.05 higher than the average p/e of decile 10.

Again, using equation 1, the p/e levels of decile 1 stocks choosing to pay out dividends can be estimated for all payout rates. The table in Figure 2 depicts the e/p levels (the inverse of p/e levels) at 10% re/e intervals, contrasted with each re/e level's real stock return. Note that when payouts reach 100%, the estimated p/e is 23.23 and the e/p .043. At that level there is no real price gain, so real returns equal the e/p level, which has become the dividend yield. Note also that the 23.23 p/e level is considerably higher than the average p/e of the actual stocks in decile 1 (and thus confirming, ironically, Miller and Modigliani's conclusionary critique of Gordon, quoted at the top of page 2, supra).

Hypothesizing the range of p/e's attached to different re/e levels leads to a paradox. The p/e of 23.23 and e/p of .043 would be the same for all stocks of companies paying out all of their earnings. The real growth rate would be the same — zero, and the dividend yield would be the same — the e/p level. Apart from differences in corporate financial health, there would be no reason for the market to assign different p/e levels to a Teledyne and a Clorox, as their growth and payout rates would be equal. Like Gordon, I am assuming that these companies do not borrow or sell additional shares.



Real Stock Returns = % Change Real Price + Dividend Yield
Dividend Yield + E/P X D/E
P/E = 19.889 + 1.3736 (nominal) Price ch: Change - .177 RE/E
Real Price Change = 11.32 X Retained Earnings/ Earnings
Nominal Price Change = Real Price Change + 2.56%

re/e	d/e	^real price	^ price	p/e	e/p	d/p	real return
100	0	11.32	13.88	21.13	0.0473	0	11.32
90	10	10.19	12.75	21.34	0.0469	0.47	10.66
80	20	9.06	11.62	21.55	0.0464	0.93	9.98
70	30	7.92	10.48	24.76	0.046	1.38	9.3
60	40	6.79	9.35	21.97	0.0455	1.82	8.61
50	50	5.66	8.22	22.18	0.0451	2.25	7.91
40	60	4.53	7.09	22.39	0.0447	2.68	7.21
30	70	3.4	5.96	22.6	0.0442	3.1	6.49
20	80	2.26	4.82	22.81	0.0438	3.51	5.77
10	90	1.13	3.69	23.02	0.0434	3.91	5.04
0	100	0	2.56	23.23	0.043	4.3	4.3

Figure 2: Real Stock Returns, Payouts Rate and E/P Ratio of an Average Decile 1 Stock

6. Conclusion

Gordon got it right: earnings grow directly and positively with the retention of earnings, and the market value of a company stock increases as the rate of payment of dividends is increased.

Two separate studies establish that the earnings of corporations grow directly and positively with the degree to which corporations retain their earnings. The first study traces this relationship through time with the S&P 500 index, the second study examines individual companies and their stocks over the period from 2004 through 2024. This paper also demonstrates how studies which relate high earnings growth rates to low retention levels and low earnings growth rates to high retention levels are the result of earnings declining more than dividends during recessions and then rapidly recovering to their mean growth rates. The second earning's study also discloses that the market values the high return high volatility stocks of the high earnings retention companies equally with the low return low volatility stocks of the low earnings retention companies. This is the case even though the real earnings growth rate of the dividend paying companies falls faster than rate of decline of their retention rates. When reviewed together, these value formation characteristics suggest that, should a high growth 100% earnings retention company split into two identical companies, the one continuing to retain all earnings, the other paying out all earnings, the market would award the dividend paying company with a higher price to earnings level.

Footnotes

1. For simplicity of exposition in this paper, the convention is followed of using d_1 to stand for next year's dividend. Gordon actually employed ((1-b)) Yo, where Yo is this year's corporate earnings.
2. Gordon (1966), p.3. In his words, he found the proposition “attractive" as an hypothesis.

3. Miller and Modigliani (1961), p. 425.

4. Miller and Modigliani (1961), p. 426.

5. Rayner and Little (1968), p. 58.

6. Baumol, et al. (1970), p. 355.

7. The mean of nominal earnings and price growth rates of the stocks with lower earnings retention rates than 100% cannot be estimated simply by comparing the stock's retention rate with the earnings and growth rates of the 100% retention stocks. Nominal rates are composed of real rates plus the inflation rate, and the two must be accounted for separately. For example, in estimating what the nominal growth rate of an average decile 10 company would be if it were as efficient as the average decile 1 company, multiplying the 29.4% retention rate of the decile 10 stocks times the 14.07% nominal growth rate of the decile 1 stocks will yield a 4.14% growth rate. This underestimates decile 10 stock's growth rate, as it effectively reduces the inflation rate attributed to decile 10’s stock by 70.6%. The correct method is to multiply 11.58%, the real rate of growth of the decile 1 100% retention stocks, by .294 and then add 2.56. This results in an estimated nominal growth rate of 5.96%. (The actual nominal growth rate of the decile 10 stocks is 4.49%).

Addendum

After publishing the first draft of this paper with SSRN, it occurred to me some of the dividend- paying corporations in the data might have a history of earnings growth per unit of retained earnings equal to the average rate of earnings growth of the non-dividend paying companies. This turned out to be the case. To determine the growth rate per unit of earnings retained by a dividend-paying corporation, I multiplied the real rate of the corporation's actual earnings by the obverse of that corporation's retention rate. For example, for a corporation whose actual real rate of earnings growth is 10% per year and whose retention rate is 50% that corporation's real earnings rate per unit of retained earnings would be .10 X 1/.5 = .20. After performing this operation on the 512 stocks in the data sample, I selected those whose adjusted earnings growth rates ranged between 9% and 14% per year, roughly 2 1/2 % above and below the 11.56% real growth rate of the full earnings retaining corporations in decile 1 of this paper. The resulting adjusted growth rate averaged 11.88% per year, essentialy the same as the target.I then placed the key corporate data into ten deciles, sorted by retention ratios. Table 5 below contains the results of the sort. I labeled the deciles with Roman numerals to avoid confusing this table with Table 4 in the main body of this paper. For comparison I have placed Table 4 below Table 5.

Note: price change is the geometric mean of a stock's price change between 2004 and 2024.

Stock return is price change plus the mean dividend yield. Sharpe Ratio is the arithmetic price change plus dividend yield divided by the standard deviation of the price change.

			Table 5					
Decile	geX1/re/e	re/e	price ^	d/p	stockreturn	std dev	Sharpe r.	p/e
I	12.34	91.3	13.1	0.48	13.58	34.3	58.7	17.3
II	11.68	85.9	14.8	0.69	15.49	31.4	55.9	20.5
III	11.88	80.4	13	1.08	14.08	33.8	58.2	18.2
IV	12.25	76.4	11.6	1.14	12.74	35.5	48.1	20.7
V	11.85	73.5	12.7	1.24	13.94	29.2	57.1	21.3
VI	12.02	70.6	10.5	1.43	11.93	27.2	50.2	20.5
VII	11.25	66.5	9.7	1.48	11.18	22.2	57.1	22.6
VIII	11.68	60.1	9.7	1.82	11.52	27.2	47.9	21.9
IX	11.57	53.2	9.5	2.32	11.82	22.1	60.5	20.2
X	12.42	34.2	7	2.65	9.65	20.5	53.6	24.8

			Table 4					
Decile	g e	re/e	price ^	d/p	stockreturn	std dev	Sharpe r.	p/e
1	14.12	100	13.88	0	13.88	35.8	52	22.63
2	13.1	95.9	13.24	0.25	13.49	36.3	58	22.06
3	11.43	85.8	12.04	0.9	12.94	31.7	57.5	18.04
4	10.95	78	9.94	1.3	11.24	32.8	51.8	19.03
5	9.54	73.7	9.08	1.57	10.65	29.1	54.7	18.27
6	8.66	69.3	8.06	1.64	9.7	31.4	50.7	19.61
7	7.05	61.3	6.36	1.99	8.35	28.8	49.8	18.54
8	6.95	56.5	6.96	2.37	9.28	25.5	51.3	18.91
9	5.64	48.3	5.67	2.84	8.51	23.9	51.1	19.67
10	4.49	29.4	3.74	4.24	7.98	22.3	51.5	20.56

The results are something of a puzzle. The p/e's of the first three deciles I through III are extremely low, lower even than the average of all of Table 4's p/e's. Thereafter the p/e's rise rapidly. The mean level of the p/e's of deciles IV through X are 2 1/2 points higher than the mean of the p/e's of deciles 4 through 10 in Table 4. Based on admittedly limited data, what the market seems to be saying is, yes, the market will value dividends higher than retained earnings, but only if the dividends are paid out in substantial amounts. Then p/e's will vary in relation to the payout ratio. As disparate as the p/e's in deciles I through III are from those in deciles IV through X, their levels are consistent with the variables that predict them. Regressing the p/e's of the companies in the full 96 company array against their predictors price change, earnings retention ratio, and standard deviation (which in the full 96 company regression have predictive power independent of the retention ratio) yields this regression equation:

p/e = 28.16 -.1125 re/e + .3333 ^p - .115 standard deviation R^2.18

(-2.71) (-1.87) (-2.12)

Applying these co-efficients to the predictive factors in Table 5 yields these estimates and residuals:

Decile	est'ed p/e	mean p/e	residual
I	18.3	17.3	-1
II	19.8	20.5	0.7
III	19.6	18.2	-1.4
IV	19.4	20.7	1.3
V	20.8	21.3	0.5
VI	20.6	20.5	-0.1
VII	21.4	22.6	1.2
VIII	22.1	21.9	-0.2
IX	22.8	20.2	-2.6
X	24.3	24.8	0.5

In the Ancillary Findings of the main body of the paper, I hypothisized that a full retention company with average real earnings growth rate of 11.56% per year and a nominal mean price growth rate of 5.96% per year and paying out 70.6% of its earnings would have a p/e of 22.78. Applying the co-efficients of the above equation to these factors (and assuming standard deviation of 20.3 based on the statistical relationship between the retention ratios and standard deviations) results in an estimated p/e of 24.3, a level consistent with decile X's p/e of 24.8.

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