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HOW DIVIDENDS INFLUENCE VALUATION:
DO INVESTORS APPRECIATE CASH DIVIDENDS?

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ABSTRACT

This paper explores the relationship between cash dividends and value for American firms. It follows Fama and French “Taxes, Financing Decisions and Firm Value” (1998). Fama and French found that dividends convey information about profitability that are missed even when they control for variables such as earnings, investments and research and development (R&D), in the time-period 1965-1992. We extend the data-set to see if the effect of dividends is still relevant for the period 1965-2008. Fama and French ran regressions on all firms found in the Compustat database that had the relevant variables, and so do we. In addition, we run a set of regressions only on firms listed on NYSE, NASDAQ and AMEX to filter effects of low liquidity stocks.

Our findings are in line with Fama and French and we are both able to confirm their results for the time-period 1965-1992 and 1965-2008. The slopes of the dividend-coefficients are just as strong when we run regressions on NYSE, NASDAQ and AMEX only. We also confirm Lintner’s findings on dividend-smoothing and discover tax-effects around large changes in the tax-code in boom-periods.

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INTRODUCTION

Background

Dividends form the basis of valuation through the dividend discount model (DDM). The basic logic is that a company is as valuable as the discounted value of its future cumulative payouts to shareholders. On the other hand, Miller and Modigliani proved dividends irrelevant in their famous dividend irrelevance theorem. Although stylistic and theoretic in form, the theorem has gained widespread acceptance and appliance. The logic is appealing: The firm has the choice to pay out its earnings to shareholders as dividends or re-invest them. If they re-invest they will increase the worth of the firm, and consequently the share price will go up. The benefit for the shareholder will be the same. However, the firm will have to pay out its earnings to its shareholders some time (at least in theory), as this is the basis of the firm value.

Conversely, and to our surprise, we have not been able to find many papers discussing dividends in relation to pricing. Most who do, focus on events relating to extra-ordinary dividends, changes in dividend policy, and tax-effects. Papers that explore dividends over time tend to treat the dividend in a binary way, trying to find reasons for why firms do or do not pay dividends. The most prominent paper of the latter form is *Disappearing dividends or a lower propensity to pay? (Fama & French, 2001)*. In this paper the authors establish as fact that fewer firms pay dividends than before. This is an important backdrop to our research, but the binary method is not sufficient to answer our question. However, the total amount of dividends paid in the economy is steadily increasing. Further information is found on page 35.

A paper that strikes closer to home is another paper from Fama & French, 1998, *Taxes, Financing Decisions, and Firm Value,* published in the Journal of Finance. The paper use cross-sectional regressions to study how a firm's value is related to dividends and debt. Although the aim of the authors is to study tax-effects, they also find that dividends convey information about the share price that is not absorbed by the other variables (earnings, investments and R&D). We find the method appealing, and the results seem robust. And since we have not been able to find any other papers that tackle the relationship between pricing and dividends better, we will base this paper on the method of Fama & French, 1998.

Structure

The structure of this paper is as follows. First we conduct a literature review, a summary of the most important milestones in the research on dividends. This will hopefully give the reader a basic understanding of what research tell us so far about dividends related to our research question. Readers familiar with the theory of dividends can easily skip this part. The bulk of this paper is naturally made up of our own findings, and we start the analysis by going through our method and how we have have extracted the data. We hope that we are able to do this as short and intuitive as possible, and save the full recipe for the appendix. The results will be in the form of tables with values from our regressions, and commented in the text. We will round off with a conclusion and a summary of our most important findings.

LITERATURE REVIEW

Historical background

Research on dividends did not start in earnest until the middle of the 20th century. But in order to understand the development of dividends and its continued prevalence, we will start with a short history lesson.[1] Dividends were a necessary answer to investor's need for return on their funds and corporate entities' wish for survival. When the tradition of liquidation of the ship or flotilla upon return in the 1600's was superseded by the likes of the Dutch East India Trading Company, which were companies there to stay, dividends were paid to cater investor interests. The emphasis on dividends changed to earnings (in relation to valuation) as corporations survived for longer periods of time, but with the expansion and investments in infrastructure in Britain and the US, dividends again gained importance. Parallel with the development of corporate practises, laws were passed that opened up for limited liability and shareholder rights. Canal and railway companies were the first to issue preference shares around the turn of the 18th century. Researchers point to the lack of transparency up to the 20th century as a reason to why dividends were important, as investors came to rely on the dividends as a pricing mechanism instead of profits (Frankfurter & Wood, 1997). Although the 20th century ushered in a new era of corporate practices which increased transparency, including the Dow Jones Industrial Average and Moody's Industrial Security, dividends still rose to even higher levels. Dividend payout varied in the years following the crash in 1929, but in general they were declining until World War II ended (Jones & Wilson, 2002). After the war, dividends rose again and it has continued to rise in total (total dividends paid pr year), but the number of firms that pay dividends have been steadily declining (Fama & French, 2002).

Theoretical background

There are in general two questions research on dividends and dividend policies have been trying to shed light on; How do (or should) firms set their dividend policy? Why do (or should) firms pay dividends? The answers to these questions are very complex,

[1] Based on Benrud, 2009 published in the book Baker, 2009.

as research only partly answers the first and still does not have a good answer to the latter.

As to how firms set their dividend policy; Lintner, 1956, is still accepted as the founder of modern dividend policy theory. He suggests that firms set a target payout ratio and react to lasting changes in earnings by smoothing the dividend payouts over the next years. Lintner carried out both qualitative surveys, through interviews with senior executives, and quantitative surveys on dividend policy in the US. Although small in scope, in respect to the number of companies surveyed (28), he claims that his data is representative for the larger economy. This was groundbreaking work at the time, since it was the first serious effort to gain a better understanding of dividend policy, and laid the foundation for further research. What he found was that dividends are a function of long-term sustainable earnings. He derived the following equation:

$$D_t = 352.3 + .15P_t + .70\, D_{t-1}$$

Where D_t equals dividends at time t, P_t is profits (net income) at time t and D_{t-1} is last year's dividends. Here the profit is adjusted for inventory gains. The main point of his paper is that dividends are by and large dependent on two factors: last year's dividends and this year's profits. The first indicates that there is a strong tendency of smoothing, so that dividends do not adjust to a new level of earnings right away, rather they slowly revert to the new level in the course of some period of years. This is reflected in the heavy weight D_{t-1} carries in the equation above. In his interviews with senior executives he discovered that they were very reluctant to change the level of dividends before they felt sure that the new level was sustainable. This is an indication that managers are sensitive to a signalling effect, namely that a change in dividends is a strong signal to the market about how the company views the future. We will return to the signalling effect later.

As to why companies pay dividends, there seem to be no clear answer. Most theories; Miller & Modigliani, 1961, Black, 1976, Myers, 1984 suggest that companies either should not pay dividends at all or that they should pay very low dividends. Gordon, 1959, suggested that dividends form the basis of valuation. Popular theories are cost-benefit trade offs between sources of financing, a pecking order of sources of financing and a principal agent problem between managers and equity investors. Theories of sources of financing suggests that firms should not pay dividends. The principal agency problem suggests that managers could be disciplined with a dividend policy (Black, 1976). However, managers are better disciplined with debt leverage, and the firm receives an interest tax shield increasing the value of the firm using debt (Jensen, 1986). There is no tax shield received using a dividend policy. Therefore, we are still left guessing. Why do firms pay dividends? In the words of Black: “We don’t know.”

The importance of dividends and its effect on pricing of stocks was cast into serious doubt by Miller & Modigliani, 1961. Through logical reasoning they showed how dividend payout policies are irrelevant for the current valuation of a company. They argued that the value of a company is solely given by the recursive formula of discounting next period’s earnings minus investments and the value of the firm after the next period. They proved that this holds true under assumptions of perfect capital markets, rational behavior and perfect certainty, and further still holds true under uncertainty. However, they recognize that the dividend payout ratio, under the special case when a firm’s growth is solely financed by retained earnings, influences the growth rate. In this special case, the dividend policy becomes equivalent to investment policy.

According to Miller & Modigliani, 1961, a firm has the same value whether it pays dividends or not. However, they recognizes that asymmetric information and principal agency problems do influence value in the sense that signaling effects from changes in dividend policy influences the valuation of companies, especially for firms with a long history of paying steady dividends. In their final sentence, they admit to thinking that investors are not always rational in decision making: “For investors, however naive they may be when they enter the market, do sometimes learn from experience; and perhaps, occasionally, even from reading articles such as this.”

The dividend puzzle

Despite the irrelevance of dividends, as pointed out by Miller and Modigliani, firms still pay out dividends. Fischer Black coined this “the dividend puzzle” in 1976. He offers some possible explanations, but no conclusion. One of his theories is that investors are simply irrational. They may prefer dividends because they are paid out immediately, what others have called the “bird in the hand fallacy.”

According to Black, 1976, trade off theory states that retaining earnings and not paying dividends is the cheapest source of financing, such that companies would prefer retaining earnings over taking on more debt. He recognizes that investors of levered companies might prefer $1 in dividends over $1 in retained earnings that might end up in creditors pockets. However, assuming that they can negotiate better terms on the company’s credits if they agree not to pay any dividends, Black suggests that the benefits will outweigh negative effects of paying lower dividends.

Bottom line is that companies still pay out dividends, but financial theorists are not able to explain why. It must be pointed out, however, that when financial theorists are trying to explain a phenomena, it is based on the principle that all investors are rational actors seeking to maximize profit over risk. Irrationality is not taken into account, such as specific feelings towards a certain company (e.g. family-owned business) that would make the investor less inclined to disinvest.

The Capital Structure Puzzle

The pecking order theory (Myers, 1984) does not explain why firms pay dividends, but when firms choose to pay dividends for unknown reasons, the pecking order theory will affect dividend considerations. According to Myers dividends are sticky, meaning that variations in cash flows will be absorbed by debt. Fama and French performed a test of the trade-off and pecking order theories (Fama & French, 2002). They found that firms with more volatile cash flows are inclined to pay out less dividends to avoid the risk of having to issue costly debt or equity. This holds according to Fama and French under both pecking order and trade off theories. In the trade off model, firms with higher investments to earnings ratios, have lower free cash flows and less need to discipline managers with dividends. Low dividends help to avoid underinvestment problems from investments financed by risky debt. Pecking order theory says that firms with high investments to earnings should pay lower dividends to maintain capacity for low-risk debt.

Why dividends, then?

Since dividends cannot be explained by applying financial theory to perfect markets, scholars have searched for market-imperfections to find reasons for dividends. Baker, Powell & Veit, 2002, sum up these as the major three:

- taxes
- agency cost
- information asymmetry (signaling)

and the minor small:

- transaction cost
- flotation cost
- irrational investor behavior

Miller & Modigliani, 1961, touches upon at least the major imperfections, but others have taken this research further. We will in the following go through the most important papers that have discussed these issues. The research can be divided into three groups: theoretical, surveys and empirical. The theoretical papers discuss the issue from an analytical and rational point of view, but are not providing any evidence in the form of data. The ones that do, are either based on surveys, or analysis of historical data. Since this paper is an empirical study of historical data, the latter is naturally of most interest to us. There is also a considerable amount of empirical studies that apply event studies. These try to explain dividend effects by studying the the movements in stock prices around important dates, such as the dividend declaration date and the ex-dividend date. We will not spend much time discussing these.

Taxes

Taxes is a major imperfection and was one of the first arguments against Miller and Modigliani's theorem. What matters to the shareholders is the value they are left with after taxes. This means that if dividends are taxed less than capital gains, investors would prefer dividends over retained earnings. But the fact of the matter is that dividends have historically been taxed more heavily than capital gains. Miller and Modigliani recognized this imperfection, and noted that this should, in the case that taxes matter, give a premium to firms that did not pay out dividends. However, this was not a primary subject, since the availing attitude of the time was that firms that paid a dividend, should trade at a premium. Farrar & Selwyn, 1967, picked up on this issue, and found that when there is a difference between personal and corporate taxes, there exists an equilibrium where dividends are not paid out at all. The tax-effect have however, been cast in doubt in later research. In the US, pension- and college funds are exempt from taxes. This usually means that they prefer (or at least are indifferent to) dividends, as opposed to other investors that, at least until 2003[1], paid more taxes on dividends than on capital gains. This also means that other investors can trade away the dividend, by selling their stock just before the ex-dividend date, and buy them them back afterwards. Another branch of the tax-effect research is on the clientele-effect, i.e. that companies cater to their main investors needs, so that if investors prefer dividends, the company pays out dividends. Miller & Modigliani, 1961, mentioned this in their paper, and the effect has been confirmed by later research (Elton & Gruber, 1970).

Agency Cost

Managers are not perfect agents of their owners. Especially in the public market, where ownership is dispersed, can the incentives and goals of managers be quite different from those of the investors. Investors are generally profit-maximizing and demand a certain return for the perceived risk they are taking. But investors have the possibility to diversify risk, managers have not. This may lead managers to be more risk-averse than the investors want them to be, since managers stand to lose their jobs and positions. Managers may also put as much weight on corporate perks (private jets, expensive offices, etc.) and power, as they put on improving profits, and engage in empire-building to enhance their stature and self-image. What managers then try to do is to increase slack and build up a larger cash-balance, to off-set the risk of bankruptcy and use as a war-chest in case of hostile take-overs or declining revenues. This is not value-enhancing and hurts shareholders. Issuing dividends is a way of dispensing the extra cash, tighten the management structure and discipline management to maintain profit-margins.

[1] The tax-system was changed in 2003, so that both dividends and capital gains are taxed at the same rate (Jobs and Growth Tax Relief Reconciliation Act of 2003). The tax-relief was set to expire in 2010 but has been extended by the Obama-administration.

Jensen, 1986, argues that the reason dividend cuts are punished with large stock price reductions in the capital market is due to agency costs. The market assumes that a cut in dividends leave managers with more cash, which they will waste on less profitable ventures.

Information effects

Issuing dividends force firms to go to to the market to get financing for new projects, either in the bond-market or by issuing equity, instead of useing retained earnings. Easterbrook, 1984, argues that by going to the market, "the firm's affairs will be reviewed by an investment banker or some similar intermediary acting as a monitor for the collective interest of shareholder." This lowers the agency cost of monitoring and increase value for investors. The other advantage, states Easterbrook, is that this gives the firm the possibility to constantly adjust their debt/equity ratio so that it is value-enhancing.

Signaling

Following up on the work of Lintner, 1956; Baker, Farrelly & Edelman, 1985, conducted a survey in 1985 of 318 NYSE-registered firms about their attitudes and beliefs regarding dividends. They sent forms to 562 firms. Their findings mainly confirm those of Lintner, but they point to some additional factors that are useful. They find that managers generally believe that dividends affect stock-prices, contrary to Miller & Modigliani, 1961. This supports the signalling-theory, and confirms that managers find that issuing dividends is a good way of conveying information about their view of the future for the company. The survey also found that the utilities-industry has a much higher dividend payout-ratio than other industries such as retail and manufacturing. They point to the inherent differences in the nature of utilities (regulation) as a possible explanation for this, and suggests that it might be useful to single out utilities in any survey concerning dividends. Baker followed up this research in collaboration with other researches both in the US and abroad (also in Norway). The findings support Lintner's original work, and suggests that, with a few minor local variations, that the attitudes towards dividends are the same in most of the world.

Other transactions with shareholders: Share buy-backs

Another way of transferring wealth to the shareholders, and decrease cash-holdings of the firm, is through the buy-back of shares. Recent empirical research (Fama & French, 2002) indicates that buy-backs have in some respect taken over for dividends, and that newly established firms prefer buy-backs to dividends. Surveys also suggest (Baker, Farrelly & Edelman, 1985) that managers view buy-backs as a more flexible way of returning wealth to shareholders than dividends. A buy-back of shares is usually met with a positive market-reaction, since this signals that the management views its stock as undervalued. We did consider including share buy-backs in our research, but decided against it since this would fall outside the scope of this paper. Although both dividends and share buy-backs share some common features, such as decreasing the cash-balance and sends a positive signal to the market, they also differ in other aspects. Dividends represent an actual cash inflow to the shareholders without any of them having to trade shares or diminish their ownership share. Dividends are also perceived differently and is usually interpreted as a stronger signal of management's view of the future than buy-backs (Baker, Farrelly & Edelman, 1985).

In this paper we will research whether investors *appreciate* dividends. If they do, that should be reflected in the market value of companies paying dividends, as all else equal, investors would be willing to pay a premium for dividend paying stocks over non-paying stocks.

METHODOLOGY

The basic hypothesis is that dividends convey information about the future profitability and thus the value of a firm that is not conveyed through other variables, such as earnings and investments. This is in line with the signaling theory described above. We are, however, not viewing this from the management side the way Lintner did, but from an investor's point of view. If investors believe that dividends convey information about future profitability, then a higher dividend should yield a higher premium, all else equal. Likewise, an increase (decrease) in dividends, should yield a higher (lower) value. Of course, in order to isolate the effect of dividends, we need to control for other variables that conventionally convey information about profitability.

Fama and French

We follow the cross-sectional method Fama and French use in their paper *Taxes, Financing Decisions and Firm Value (1998),* and will now explain their method. Their regression is based on the principle that the market value of a firm is (Fama & French, 1998, p. 820):

i. *the market value of an all-equity no-dividends firm with the same pretax expected net cash flows (cash earnings before interests, dividends, and taxes, less investment outlays), plus*

ii. *the value of the tax effects of the firm's expected dividend and interest payments*

If one is able to capture the information effects about expected future profitability, or as Fama and French write, *expected net cash flows in financing decisions,* then the slopes, or coefficients, on dividends and debt, should isolate tax effects.

In accordance with tax-theory, they expected the dividend-coefficients to have negative signs. As already mentioned, they found the opposite. We therefore expect the dividend coefficients to be positive. In other words, the positive effect of dividends (which according to theory, may be due to signalling effects or other factors described in the literature review) triumphs any negative tax-effects.

Fama and French use the variables Earnings, Investments and R&D, to proxy for future profit and thereby value. They use this year's values, as well as the growth over the past two and next two years (according to Fama and French, who cite Fama, 1990, two years is as far as the market is able to predict), to proxy for expected net cash flows. We do not believe that these variables capture all the information about expected net cash flows, but with data on this aggregate level, it is not a far-fetched idea that they overall capture the most relevant information. The value of a firm, the dependent variable, is measured by the *"spread of value over cost, V_t-A_t,"* i.e. the total market value of equity and debt, minus assets. Fama and French also include a variable that is meant to capture the unexpected changes in value, dV_{t+2}/A_t. The logic of this is that if an expected change in a variable has a positive effect on the dependent variable, and an unexpected change has a positive effect on V_{t+2}. Using Kothari & Shanken, 1992, Fama and French argue that the slope of dV_{t+2}/A_t should then be negative. Even though dV_{t+2}/A_t is not perfectly correlated with the unexpected future changes in the variables, it provides a check for unexpected changes in the variable components. Again, according to Fama and French, the signs on dV_{t+2}/A_t should be opposite those of the variables that measure future changes (t+2), if it is to capture those effects. We will later see that this is the case.

All values are scaled to assets, to avoid the effect of big firms influencing the results more than small firms (heteroscedasticity). Fama and French apply four regressions, with two different dependent variables: spread of value over cost (regressions 1 and 2) and the change in value over cost (regressions 3 and 4). On each of these two dependent variables they measure change in dividend- and debt-levels (regression 1 and 3), and dividend- and debt-policy (regression 2 and 4). The first regression looks like this:

$$
\begin{aligned}
(V_t - A_t)/A_t = \; & a + a_1E_t/A_t + a_2dE_t/A_t + a_3dE_{t+2}/A_t \\
& + a_4dA_t/A_t + a_5dA_{t+2}/A_t \\
& + a_6RD_t/A_t + a_7dRD_t/A_t + a_8dRD_{t+2}/a_t \\
& + b_1I_t/A_t + b_2dI_t/A_t + b_3dI_{t+2}/A_t \\
& + b_4D_t/A_t + b_5dD_t/A_t + b_6dD_{t+2}/A \\
& + c_1dV_{t+2}/A_t + e_t \qquad (1)
\end{aligned}
$$

Where V=Market Value, A=Book Value of Assets, E=Earnings, RD=Research and Development, I=Interest Payments, D=dividends, a-c are the regression coefficients and e is the error variable. The notation d is for change. This means that e.g. $dE_t/A_t = (E_t - E_{t-2})/A_t$ and $d(D_t / A_t) = D_t / A_t - D_{t-2} / A_{t-2}$. Interest is a proxy for the debt-level. D/A is a proxy for dividend policy. Regression 2:

$$
\begin{aligned}
(V_t - A_t)/A_t = \; & a + a_1E_t/A_t + a_2dE_t/A_t + a_3dE_{t+2}/A_t \\
& + a_4dA_t/A_t + a_5dA_{t+2}/A_t \\
& + a_6RD_t/A_t + a_7dRD_t/A_t + a_8dRD_{t+2}/a_t \\
& + b_1I_t/A_t + b_2d(I_t/A_t) + b_3d(I_{t+2}/A_{t+2}) \\
& + b_4D_t/A_t + b_5d(D_t/A_t) + b_6d(D_{t+2}/A_{t+2}) \\
& + c_1dV_{t+2}/A_t + e_t \qquad (2)
\end{aligned}
$$

The difference between (1) and (2) is the way change in dividends and interest-expense is measured. In (2), it is the level, not the amount, that is regressed against excess value. $d(D_t / A_t) = D_t / A_t - D_{t-2} / A_{t-2}$ is a proxy for the change in dividend policy. Although, according to Lintner, 1956, D/E would be a better measure of dividend policy, this measure would not be consistent with the formula. $dD_t/A_t = (D_t - D_{t-2})/A_t$ represents the absolute change in dividends, divided by assets.

Scaling the dividends to assets can lead to misrepresentation, as *"difference in leverage can also produce cross-firm variations in D/A"* (Fama & French, 1998, p. 824). Leverage must therefore be taken into account. Fama and French do this by including leverage in the regression. One way we could mitigate the leverage-effect, could be to scale the results to leverage. On the other hand, this would complicate the regression further. Although we are not primarily interested in the debt-effect, we include it in our regressions for two reasons. First of all, to avoid that leverage clouds the effect of dividends in our regressions, and secondly, in order to maintain consistency with Fama & French, 1998.

Regressions (3) and (4) give information about the change in value, in relation to the change in the variables. Said another way, how much value is created by changing the variables (adding another dollar of R&D, dividend etc.). It is disputable whether value is created, as Miller and Modigliani would argue that no value is created through financing decisions. On the other hand, value is created by allocating resources to where they are more needed, or yield a higher risk/return. Viewed in this way, one could argue that increasing dividends to investors, who then can invest these funds better than the firm can, will increase value. This is in line with Jensen, 1986, and adds to the theoretical basis for our hypothesis that a positive change in dividends will produce a positive change in value.

$$
\begin{aligned}
d(V_t - A_t)/A_t = a &+ a_1 dE_t/A_t + a_2 dE_{t+2}/A_t \\
&+ a_3 dA_t/A_t + a_4 dA_{t+2}/A_t \\
&+ a_5 dRD_t/A_t + a_6 dRD_{t+2}/a_t \\
&+ b_1 I_t/A_t + b_2 dI_t/A_t + b_3 dI_{t+2}/A_t \\
&+ b_4 D_t/A_t + b_5 dD_t/A_t + b_6 dD_{t+2}/A \\
&+ c_1 dV_{t+2}/A_t + e_t \qquad (3)
\end{aligned}
$$

Likewise, the change in dividend-policy is expected to produce a positive change in value, in line with signalling-theory. Fama and French notes that D/A is a noisy proxy for dividend policy, but nevertheless the best one available. Conventionally, D/E is the usual measure for dividend policy (Lintner, 1956). And changes in assets would in our regression be perceived as a change in dividend-policy. However, as the dependent variable is also scaled to assets, and D/A is a direct measure of return on assets (dividends on assets), d(D/A) is a good enough approximation to dividend policy. The fourth regression is:

$$
\begin{aligned}
d(V_t - A_t)/A_t = a &+ a_1 dE_t/A_t + a_2 dE_{t+2}/A_t \\
&+ a_3 dA_t/A_t + a_4 dA_{t+2}/A_t \\
&+ a_5 dRD_t/A_t + a_6 dRD_{t+2}/a_t \\
&+ b_1 d(I_t/A_t) + b_3 d(I_{t+2}/A_{t+2}) \\
&+ b_4 d(D_t/A_t) + b_6 d(D_{t+2}/A_{t+2}) \\
&+ c_1 dV_{t+2}/A_t + e_t \qquad (4)
\end{aligned}
$$

Data selection

As Fama and French, we use data from the Compustat database, provided by Wharton Research Data Services. More specifically, we used the "North America Fundamentals Annual" which includes both accounting details and fiscal year-end stock data.

Replicating Fama & French, 1998, we use data for all publicly listed American industrial companies in the Compustat database, publishing annual financial reports between January 1963 and December 2010 (Fama and French: 1963-1992). This data set includes accounting values for variables such as total assets, debt, interest payments, dividend payments, earnings, research and development costs and advertising costs, in addition to (fiscal) year-end closing price and number of stocks on issue.

Fama and French use Compustat variable 199, which is common stock closing price at the end of the fiscal year and Compustat variable 54, shares outstanding at fiscal year end, to derive market value of common equity. We do the same, but we believe that this choice deserves some consideration. When matching price data to accounting data, the timing of the stock-prices is important. Since we use fiscal year-end data, the annual report will not have been published. We believe, however, that the most important parts of the information in the annual reports are already public, as firms will have published three quarterly reports and provided guiding to analysts. Professional investors read quarterly reports and make assumptions and predictions to arrive at expectations for the performance of companies for the year. Hence, it is a fair assumption that most of the information from the annual report is known at the time of fiscal year expiry. Since the date of annual report publication is not available in the database, the other approach would be to assume that all financial reports would have been published at least three months after fiscal year end. However, the stock price three months after fiscal year end would also include new information from events happening after fiscal year end. Therefore, we believe that matching accounting data with stock data three months later, would be less preferable.

In line with Fama and French (1998), for a company to be included in year t, it must have all the relevant data for year t, t+2 and t-2 (5 years). This means that the data line must contain a number, otherwise it is discarded. Obviously, this leads to a lot of data being discarded. But we rather want that, than to use incomplete data. For example, many companies list nothing (blank) in dividends. It is not feasible for us to find out if this means that the company paid out no dividends, or that it did not report it. The method for selecting the data also means that a company must have filed reports for at least three years before it can be counted. Fama and French note that there is a possibility of a survivor-bias, but that it would be much worse if we ran a time-series regression instead. This is of course true. Adding to this, we believe that when we are working with such large aggregates, it can be an advantage that a company has existed for some time before it is counted in the data. This way we may avoid some outliers that otherwise might have had a disproportionate impact on the results.

The average number of included companies (data-lines) per year is 2,655 between the years of 1965 and 1992, and 3,177 between the years of 1965 to 2008, ranging from 634 in 1965 to 4,463 in 2002. After 2002, the number of companies decline to 3,647 in 2008. A total of 139,805 data-lines are included, while 111,784 data-lines were dropped due to missing variables. 80,685 of these were dropped because of missing information about share-price and number of shares. We suspect these to include many unlisted firms, and do not think that our data-set loses much value because of this. The number of variables (in the regressions) for each formula vary from 11 to 15, while these again are based on data from a number of other variables (in Compustat). See page 19 and the file Variable Descriptions from Wharton.pdf in the enclosed files for further details.

Calculating variables from the data-set

We follow the procedure of Fama & French, 1998, to calculate the variables. The codes have changed names since they wrote their article, but Wharton/Compustat provides a list of keys so that we are positive that we use the same variables (see appendix A.6). Most of the variables used in the regression are calculated from several other variables, and we will now go through how each of the regression variables are calculated (Wharton/Compustat code in parenthesis):

- V, value, is the product of the number of common shares (CSHPRI) and the closing price at the end of the fiscal year (PRCC_F), plus preferred stock taken in the order of availability: redemption value (PSTKRV), liquidating value (PSTKL), or carrying value (PSTK), plus total liabilities (LT).
- A, assets is total assets (AT).
- E, earnings, is income before extraordinary items (IB), plus interest expense (XINT), plus, when available, deferred taxes income account (TXDI), and investment tax credit income account (ITCI).
- RD, Research and Development (XRD).
- I, interest expense (XINT).
- D, dividends common (DVC).

Differences between our data and Fama and French (1998)

Means and Standard Deviations of the Regression Variables 1965-1992:

	GN12 Mean	GN12 Stdev	FF98 Mean	FF98 Stdev
(V0-A0)/A0	0.337	0.804	0.350	0.835
E0/A0	0.069	0.070	0.070	0.065
dE0/A0	0.012	0.074	0.013	0.066
dE+2/A0	0.017	0.087	0.019	0.082
dA0/A0	0.156	0.240	0.170	0.222
dA+2/A0	0.230	0.390	0.255	0.392
RD0/A0	0.013	0.028	0.013	0.028
dRD0/A0	0.003	0.014	0.003	0.013
dRD+2/A0	0.004	0.019	0.004	0.018
I0/A0	0.024	0.017	0.021	0.017
dI0/A0	0.004	0.014	0.004	0.012
dI+2/A0	0.006	0.018	0.006	0.017
D0/A0	0.016	0.017	0.016	0.018
dD0/A0	0.002	0.008	0.002	0.008
dD+2/A0	0.003	0.011	0.003	0.009
d(I0/A0)	0.002	0.012	0.001	0.011
d(I+2/A+2)	0.001	0.013	0.001	0.011
d(D0/A0)	0.000	0.007	0.000	0.008
d(D+2/A+2)	0.000	0.009	0.000	0.008
dV+2/A0	0.316	0.936	0.371	1.004

GN12 : Gregersen & Nielsen, 2012 FF98 : Fama & French, 1998

Processing data

The sheer amount of data needed to run these regressions are daunting. None of the programs available to us, like MiniTAB and SPSS, are able to process the data in any effective way. The cross-sectional regression method requires that the data is sorted on years, so that regressions can be run year-by-year. Sorting the data manually is just not possible within a practical time-frame. Another problem for standard statistics programs is the trimming. While it is possible to trim in Minitab, it is only possible to do so one variable at the time. As explained further down, this would cause us to lose far too many variables, and would not be in line with the methods of Fama and French. MiniTAB and SPSS adjusts the input data to account for certain statistics, such as auto-correlation, which is feasible for time series regressions, but probably not optimal for running our cross sectional regressions. The closed source code nature of MiniTAB and SPSS makes it difficult or impossible for us to know exactly what adjustments they make. The only way Fama and French, account for potential auto-correlation in the two year change variables is by requiring a higher T-statistic for significance (Fama & French, 1998, p. 826). Therefore, we should not adjust the cross sectional data sets before solving the regression equations.

Next we will explain the basic functions of our program. The full code for the program is provided on the enclosed disc in line with open-source principles.

The program works in the following way. It reads tab-separated text data files, optionally compressed using a lossless GZip routine. First we load the data file downloaded from the Compustat database. Then we can load the data file from the CRSP data, so that the program could use CRSP price and number of shares data for the fiscal year end month if this information is not available in the Compustat file. However, adding CRSP data only leads to an increase of about 18 companies in average per year over the 44 year period from 1965 to 2008. Since adding data from CRSP does not add much to the data set, and Fama and French used only Compustat data, we decided to only use COMPSTAT data as well. However, the option to include price data from CRSP could be useful for later research.

Next, we had to process the data and calculate the right variables for use in the regressions, see page 19 for a list of the variables. We scaled these variables to assets, see page 14 for explanation. We also excluded observations not containing all necessary data, explanation is found on page 18.

Because the variables are scaled to assets, which is an issue if assets are zero or close to zero, Fama and French *drop 0.5 per cent of the observations in each tail of the distribution of each explanatory variable,* (Fama & French, 1998, p. 826), in order to avoid data errors and extremely influential observations. We do the same, and trim the 0.5 per cent tails in both ends of the data for each variable based on the full data set for each year. By trimming each variable based on the full data set, we loose less than n percent of the data for n variables, as the the same company can be an extreme observation for more than one variable. When trimming the all Compustat firms data, we loose on average 7.4 per cent of the data per year for formula 1 and 2 and on average 6.2 per cent of the data for formula 3 and 4. Even after trimming, there are some extreme-values left in the data-set. These are typically assets=0. When scaling to assets, this sometimes result in the observed value of the scaled variables to be 0/"0" or infinity. This would lead to an invalid or singular data matrix, which would lead to none or infinite solutions to the regression equations. Therefore, companies with such observed values in any variable included in the regression formula are removed before the program calculates the coefficients. Fama and French do not report that they have encountered this problem after trimming. We believe that this might be explained by the fact that our data-set includes firms that are not included in their data-set, because of the updates that have taken place over the years since they collected their data, see the appendix A.3 for our e-mail correspondence with Compustat and Wharton. It is also possible that they had this problem, but failed to report it because their statistical software automatically discarded observations that divided over zero (we know that Minitab does this). However, we cannot know for sure, since we do not know what software Fama and French used.

Fama and French note that the difference in capitalization rates might obscure the data. They solve this by sorting the companies according to size (fifty - fifty) and book-to-market ratio (30 - 40 - 30 per cent). They find that while there are differences between the groups, they are not big enough to report.

We have nevertheless embedded the option to split the data after trimming into smaller data sets based on Fama and French's SMB and/or HML percentiles, and dividend payers and non dividend payers. We have defined non dividend payers as companies for which Dt/At and dDt/At is zero for formula 1 and 3, and companies for which Dt/At and d(Dt/At) is zero for formulas 2 and 4, since this is the dividend information that would be available at time t.

Regression

Finally, we run the regressions. Our program does an ordinary least squares regression for each year and calculates the mean of each coefficient, a corresponding standard error and T-statistic, in correspondence with the Fama/MacBeth (1973) method, formulas (2) and (3).

The regression equation we used for calculating the coefficients of each cross-section is the following.

(1) $$\boldsymbol{A}^T \boldsymbol{A}\boldsymbol{\beta} = \boldsymbol{A}^T \boldsymbol{y}$$

Where $\boldsymbol{A}^T$ is the *m x n* matrix of data observations. *m* is the number of independent variables and *n* is the number of observations. $\boldsymbol{A}^T$ is the transpose of $\boldsymbol{A}$, and vice versa. $\boldsymbol{\beta}$ is an *m x 1* vector of the unknown coefficients. $\boldsymbol{y}$ is an *n x 1* vector of response variable observations. This is basically a set of m linear equations of *m* unknowns, that minimize the least squares fit problem.

(2) $$SE_i = \frac{\sum_{t=0}^{n} (\beta_{i,t} - \bar{\beta}_i)^2}{\sqrt{n}\sqrt{n-1}}$$ where *t* is the time index and *i* is the coefficient index.

(3) $$T_i = \frac{\beta_i}{SE_i}$$

Further, we used the method of Fama & MacBeth, 1973, calculated the average of each annual cross-sectional coefficient. Calculated a standard error (2) for each coefficient as the standard deviation of the annual cross-sectional coefficients, divided by the square root of the number of cross-sections. The Fama/MacBeth T-statistic (3) is not equal to a student t-statistic. It is similar in nature though, as it conveys information about the probability (or improbability) of the correctness of the null hypothesis; that the mean of the cross-sectional coefficients is 0. We consider the calculated mean of the coefficient to be significant if the Fama/MacBeth T-statistic is above a certain threshold. In this case we relay on the calculations of Fama and French and require an absolute t-value close to 3.0 or more (Fama & French, 1998, p. 826). The Fama/MacBeth T-statistic is the mean of the cross-sectional coefficient divided by the corresponding Fama/MacBeth standard error of that coefficient.

RESULTS

We present our results in the following order. First, we compare our results with that of Fama and French (1998), from the same time period, 1965-1992. The point is to show that we are able to re-create their results and thereby prove that we have followed the same method they used. Then we expand the time-period to include the years up until 2008. Due to the construction of the regression formula, this is as far as we have data. These regressions are run on all Compustat firms, which include all firms reporting in USD listed on any major North American exchange as well as over the counter and pink sheet listings with available market valuation data. To provide a check for differences in liquidity or any other attributes, we also run a set of regressions only on firms that are listed on the major exchanges: NYSE, NASDAQ and AMEX. In order to explain the behavior of the coefficients, we also include some descriptive statistics on earnings and dividends, based on the same data material.

All Compustat Firms 1965-1992

We are by and large able to reproduce the results of Fama and French (1998). Our results differ a little, but we attribute this to the changes that have been made in the data-material since 1995, when Fama and French extracted their data. According to Standard and Poor Capital IQ, who are responsible for the Compustat database, the data have been expanded over the years, as more data has been made available through IPOs and mergers (see also correspondence with Standard and Poor in the appendix A.3). It is also possible that differences, such as how many decimals the statistical software that was used by Fama & French, 1998, were able to handle and store during and between calculations, could produce some differences in the results.

Each regression is listed and commented on below. For every regression we list the variables with its means (average coefficient for the years 1965-1992) and the Fama-Macbeth T-values (FM T). For comparison the corresponding results of Fama & French, 1998, FF98, are listed next to our results; Gregersen & Nielsen (2012), GN12. Significant coefficients are highlighted in bold types.

All Compustat Firms, formula 1, 1965-1992:

	GN12	FF98	GN12	FF98
(V0-A0)/A0	Mean	Mean	FM T	FM T
Const	-0.23	-0.17	-2.46	-2.82
E0/A0	2.20	1.8	2.15	2.61
dE0/A0	0.17	0.43	0.53	2.43
dE+2/A0	**0.67**	**0.8**	3.10	3.08
dA0/A0	**0.64**	**0.66**	8.84	12.21
dA+2/A0	**0.48**	**0.45**	5.40	5.48
RD0/A0	**4.44**	**4.29**	9.11	7.24
dRD0/A0	1.46	4.3	1.72	3.74
dRD+2/A0	**5.03**	**5.66**	5.21	6.86
I0/A0	1.13	-1.17	1.02	-1.54
dI0/A0	**-4.64**	**-4.21**	-3.65	-5.94
dI+2/A0	**-3.77**	**-4.57**	-4.48	-5.24
D0/A0	**4.04**	**4.22**	5.35	5.42
dD0/A0	**5.48**	**6.63**	5.81	6.08
dD+2/A0	**7.77**	**8.1**	9.81	9.98
dV+2/A0	**-0.18**	**-0.16**	-3.05	-2.62

GN12 : Gregersen & Nielsen, 2012 FF98 : Fama & French, 1998

The positive effect of dividends on value is prevalent here as in Fama & French, 1998. All dividend coefficients are more than 5 standard-errors from zero. We were surprised to find a positive value on interest (I/A), but the coefficient is not significant neither in our results nor the results of Fama & French, 1998. We require a T-value of +/- 3 or more. A closer look at the regressions for each year, reveal a very high coefficient for I0/A0 in ‘65 and ‘66, which have a large impact on the average (all years are listed in the appendix). The average I/A coefficient for the years 1967 to 1992 is -0.22. For most of the seventies the coefficient is positive, while in the eighties mostly negative. This is reflected in the rather high standard error and low T-values (see appendix A.4 for more detail). The other interest-variables are in line with Fama & French, 1998. dV_{t+2}/A_t is significant in our regressions. This means that the variable is able to capture the effect of unexpected changes in the future variables. All the dividend variables are significant and positive.

Formula 2, all Compustat firms 1965-1992:

	GN12	FF98	GN12	FF98
(V0-A0)/A0	Mean	Mean	FM T	FM T
Const	-0.22	-0.16	-2.36	-2.56
E0/A0	2.65	2.29	2.56	3.18
dE0/A0	0.37	0.76	1.25	4.48
dE+2/A0	**0.89**	**1.16**	3.87	4.14
dA0/A0	**0.48**	**0.54**	8.27	10.04
dA+2/A0	**0.40**	**0.36**	4.91	4.9
RD0/A0	**4.31**	**4.12**	8.62	6.72
dRD0/A0	1.85	4.8	2.14	3.98
dRD+2/A0	**5.16**	**5.7**	5.64	6.82
I0/A0	-0.45	-3.36	-0.35	-3.58
d(I0/A0)	0.34	0.11	0.39	0.16
d(I+2/A+2)	-0.03	-2.17	-0.04	-2.19
D0/A0	**5.27**	**5.92**	6.36	8.4
d(D0/A0)	*2.03*	*2.62*	2.66	3.26
d(D+2/A+2)	**4.78**	**5.66**	4.82	5.38
dV+2/A0	-0.17	-0.15	-2.75	-2.49

GN12 : Gregersen & Nielsen, 2012 FF98 : Fama & French, 1998

There are some discrepancies compared to Fama & French, 1998, most notably in dRD0/A0 and d(I0/A0), and as in formula 1, I0/A0. However, the interest variables are not significant in our results, meaning there is no basis in the regression results to claim that interest or change in debt policy has an impact on value, which is more in line with Miller & Modigliani, 1961. The dividend-variables are strong, however, ranging from 2.66 to 6.36 standard-errors from zero. The regression confirms the strong positive effect a positive change in the dividend-ratio has on value. What is even more interesting is the positive effect a future change in the dividend-ratio has on value. According to Fama & French, 1998, this can be attributed to investor's predictions about the future prospects of a firm. In other words, a firm which is expected to increase its dividend-ratio in the future, has a higher value-to-assets than other firms (all else equal). Another way of looking at it would of course be that a profitable firm is expected to increase its dividend ratio.

Formula 3, all Compustat firms 1965-1992:

	GN12	FF98	GN12	FF98
d(V0-A0)/A0	Mean	Mean	FM T	FM T
Const	**-0.11**	**-0.13**	-4.11	-5
dE0/A0	**3.05**	**3.46**	4.73	6.85
dE+2/A0	0.84	0.83	4.61	5.05
dA0/A0	0.20	0.16	2.67	1.79
dA+2/A0	**0.28**	**0.34**	4.43	5.11
dRD0/A0	**2.96**	**2.69**	3.06	2.33
dRD+2/A0	1.37	2.96	2.27	3.72
dI0/A0	**-4.95**	**-6.16**	-4.16	-5.1
dI+2/A0	-0.84	-2.13	-1.24	-2.55
dD0/A0	2.25	3.29	2.22	2.68
dD+2/A0	**3.86**	**4.9**	5.44	4.42
dV+2/A0	**-0.14**	**-0.14**	-3.46	-3.53

GN12 : Gregersen & Nielsen, 2012 FF98 : Fama & French, 1998

Formula 3 and 4 regress the effect on the two year change in value to assets. Our results are in line with Fama & French, 1998, although we have lower coefficients on some of the variables. Both the increase and the anticipatory increase is strongly positive and respectively 2.22 and 5.44 standard-errors from zero. The fact that the expected future increase in dividends is more significant than the historical increase in dividends, is in line with Lintner's theory of lagged dividend policies, in the way that future dividends are more correlated with today's profitability than historical dividends.

Formula 4, all Compustat firms 1965-1992:

	GN12	FF98	GN12	FF98
d(V0-A0)/A0	***Mean***	***Mean***	***FM T***	***FM T***
Const	**-0.10**	**-0.11**	-3.33	-3.44
dE0/A0	**3.40**	**4.13**	4.80	6.13
dE+2/A0	**0.95**	**1.11**	5.10	4.75
dA0/A0	0.07	0	1.24	0.03
dA+2/A0	**0.25**	**0.27**	4.40	4.89
dRD0/A0	**3.27**	**3.77**	3.13	2.66
dRD+2/A0	1.58	3.08	2.44	3.92
d(I0/A0)	**-3.56**	**-5.88**	-4.11	-4.66
d(I+2/A+2)	0.60	-0.6	1.17	-0.54
d(D0/A0)	*1.79*	*2.29*	2.74	2.31
d(D+2/A+2)	1.19	0.05	1.51	0.04
dV+2/A0	**-0.13**	**-0.14**	-3.14	-3.26

GN12 : Gregersen & Nielsen, 2012 FF98 : Fama & French, 1998

The change in dividend-policy, d(D0/A0), comes out more significant, but with a slightly lower coefficient than Fama & French, 1998. Both in their and in our results, the backward-looking change, d(D0/A0) is in the borderline of being significant, while the forward-looking variable, d(D+2/A+2) is not significant in neither our nor the Fama & French, 1998, results . The other variables are more or less in line with Fama & French, 1998. The d(I+2/A+2) variable has opposite signs, however this coefficient is not significant neither in the results of Fama & French, 1998, nor in our results, hence it is likely that this coefficient should really be zero. Theoretically, that is in line with Miller & Modigliani, 1961, that increasing debt should not create value. However, we see a significant dis-advantage for the historical increase in debt variable, which is not in line with tax shield theory. This is a sign that historical increase in debt is generally viewed as a sign of distress over a sign that management is trying to exploit tax shields. In that light, it is possible that an historical increase in dividends represents opposite, positive, signals about management's beliefs for future profitability. However, as previously mentioned, the historical change in dividend policy is just on the borderline of being significant.

All Compustat Firms 1965-2008

We have in the previous chapter shown that we are able to run the same regressions as Fama and French did. There were some differences in the results, due to updates of the data material done by Standard and Poor Capital IQ, but overall, the regressions yielded the same results. Next, we will extend the time-period to see if the pattern is the same for the whole period 1965-2008. 2008 is as far as we can run the regressions, since we require t=0,+/-2, and 2010 is the last year we have complete annual data for. As well as running the full regressions, we will also run regressions on the time-period 1993-2008, in order to identify the impact the new data has on the results. A time-period of 15 years is not much in relation to the amount of data we have, but we believe it is useful at least for illustrative purposes.

Formula 1, all Compustat firms 1965-2008:

(V0-A0)/A0	*65-08 Mean*	*T*	*65-92 Mean*	*T*	*93-08 Mean*	*T*
Const	-0.03	-0.38	-0.23	-2.46	0.32	4.83
E0/A0	0.71	0.98	2.20	2.15	-1.88	-4.04
dE0/A0	0.38	1.83	0.17	0.53	0.76	4.61
dE+2/A0	0.34	2.02	0.67	3.10	-0.23	-1.10
dA0/A0	0.54	7.70	0.64	8.84	0.36	2.64
dA+2/A0	0.42	3.79	0.48	5.40	0.31	1.18
RD0/A0	4.54	11.79	4.44	9.11	4.71	7.30
dRD0/A0	1.10	1.85	1.46	1.72	0.46	0.68
dRD+2/A0	4.51	6.81	5.03	5.21	3.59	5.49
I0/A0	2.67	2.33	1.13	1.02	5.35	2.25
dI0/A0	-4.88	-5.02	-4.64	-3.65	-5.30	-3.48
dI+2/A0	-2.50	-3.50	-3.77	-4.48	-0.27	-0.24
D0/A0	5.97	8.68	4.04	5.35	9.35	10.86
dD0/A0	3.46	4.61	5.48	5.81	-0.08	-0.15
dD+2/A0	6.13	8.49	7.77	9.81	3.26	2.89
dV+2/A0	-0.15	-2.52	-0.18	-3.05	-0.09	-0.72

Some of the coefficients change dramatically when we extend the time-period. Earnings are no longer significant, which is very counter-intuitive. For the time-period 93-08, E0/A0 is significantly negative, although changes in earnings are positive. On the other hand, dividend-coefficients are strong, with D0/A0 10.86 standard-errors from zero (5.35 in 1965-1992). RD/A0 is 11.79 standard-errors from zero, compared to 9.11 in the data-set that ran from 1965-1992. The future change in R&D is also stronger here than in the period 65-92. Earnings to assets takes a dive in the time-period 1993-2008. We attribute this to the increase in the price-to-book ratio, which is strongly connected to our dependent variable, and price-to-earnings. The development in the average V/E-ratio serves to illustrate the point:

The V/E ratio is based on the same data as we have used for our regressions. However, we have used a simplified approach, where we have divided the mean market value of equity and debt over mean earnings (before interest-payments, but after tax). This is not the same as average V/E, but it is a close approximation and illustrate well the development in the ratio over the time-period. The ratio has been climbing since a low of 10 in 1981, but what is even more important to the impact on our data, is the rise from 23 in 1994 to 50 in 2001. Although it dropped after that, we believe this explains the negative coefficient on earnings in the period 1993-2008.

Formula 2, all Compustat firms 1965-2008:

	65-08			93-08		
(V0-A0)/A0	***Mean***	***SE***	***T***	***Mean***	***SE***	***T***
Const	-0.06	0.08	-0.70	0.23	0.12	1.92
E0/A0	0.91	0.76	1.19	-2.15	0.46	-4.64
dE0/A0	0.61	0.20	3.06	1.04	0.15	7.01
dE+2/A0	0.47	0.18	2.57	-0.25	0.21	-1.17
dA0/A0	0.37	0.05	6.86	0.19	0.09	1.96
dA+2/A0	0.36	0.09	3.91	0.29	0.21	1.36
RD0/A0	4.41	0.48	9.23	4.59	1.00	4.57
dRD0/A0	1.79	0.66	2.71	1.67	1.03	1.62
dRD+2/A0	4.62	0.65	7.11	3.68	0.78	4.74
I0/A0	1.91	1.48	1.30	6.04	3.17	1.90
d(I0/A0)	-1.61	1.32	-1.22	-5.01	3.17	-1.58
d(I+2/A+2)	0.10	0.59	0.17	0.33	0.57	0.58
D0/A0	7.56	0.81	9.33	11.58	1.15	10.06
d(D0/A0)	1.24	0.53	2.33	-0.13	0.45	-0.29
d(D+2/A+2)	4.01	0.88	4.57	2.67	1.67	1.59
dV+2/A0	-0.14	0.06	-2.31	-0.08	0.13	-0.65

The change in dividend-ratio loses significance when we extend the data-set. For the period 1993-2008, the coefficient is negative (but again, not significant), albeit the D0/A0 is even stronger. In other words, the dividend premium is larger for the time-period 1965-2008, than it was in 1965-1992.

Formula 3, all Compustat firms 1965-2008:

	65-08			93-08		
d(V0-A0)/A0	***Mean***	***SE***	***T***	***Mean***	***SE***	***T***
Const	-0.10	0.04	-2.27	-0.09	0.12	-0.76
dE0/A0	1.51	0.61	2.47	-1.18	0.94	-1.26
dE+2/A0	0.41	0.17	2.47	-0.33	0.24	-1.36
dA0/A0	0.34	0.07	4.66	0.58	0.13	4.36
dA+2/A0	0.23	0.09	2.65	0.16	0.22	0.71
dRD0/A0	2.54	0.73	3.46	1.80	1.11	1.62
dRD+2/A0	2.25	0.58	3.89	3.80	1.11	3.41
dI0/A0	-4.30	0.99	-4.33	-3.17	1.79	-1.77
dI+2/A0	-1.10	0.54	-2.04	-1.55	0.91	-1.70
dD0/A0	1.99	0.69	2.89	1.52	0.66	2.29
dD+2/A0	3.42	0.57	6.01	2.64	0.95	2.79
dV+2/A0	-0.13	0.04	-3.36	-0.11	0.08	-1.37

The results from Fama & French, 1998 are robust and holds when we extend the period to 2008. The only large change is in the earnings-variable, which was discussed above. The t-value of 2.47 comes short of our hurdle of 3, but it is not a too far stretch to say that this implies that changes in earnings explain some of the changes in value. But the link is weak. The dividend-variables are slightly stronger here than in the 65-92 data-set, and we are tempted to declare the dD0/A0 slope significant. There is no doubt, however, that the future change in dividend pay-out does a far better job at explaining past change in value to assets.

Formula 4, all Compustat firms 1965-2008:

	65-08			93-08		
d(V0-A0)/A0	***Mean***	***SE***	***T***	***Mean***	***SE***	***T***
Const	-0.09	0.05	-1.84	-0.07	0.12	-0.57
dE0/A0	1.62	0.70	2.30	-1.49	1.15	-1.30
dE+2/A0	0.48	0.18	2.71	-0.33	0.27	-1.24
dA0/A0	0.25	0.07	3.31	0.55	0.15	3.62
dA+2/A0	0.22	0.06	3.59	0.17	0.14	1.22
dRD0/A0	2.70	0.82	3.28	1.71	1.34	1.27
dRD+2/A0	2.21	0.69	3.22	3.32	1.51	2.20
d(I0/A0)	-3.77	0.75	-5.01	-4.13	1.44	-2.87
d(I+2/A+2)	-0.12	0.70	-0.18	-1.38	1.68	-0.82
d(D0/A0)	1.61	0.47	3.42	1.30	0.63	2.06
d(D+2/A+2)	1.21	0.83	1.46	1.24	1.86	0.67
dV+2/A0	-0.12	0.04	-3.07	-0.11	0.08	-1.28

There are not many changes here. We can see that, as was the case for the time-period 65-92, past changes in dividend ratios are significant, while future changes are not. Earnings are no longer significant, while dA0/A0 is significant here, which it was not in 65-92. The same applies for dRD+2/A0.

After extending the data Fama and French used for their paper to 2008, we conclude that their findings still hold true. Dividends carry information about profitability that is not captured by the other variables, and are positive. Earnings seem to be less significant in the latter years, and we believe this is connected to the increasing P/E-ratios, particularly in the time-period leading up to the dot-com crash (1993-2001). Since the coefficients we use are averages for all years, such a time-period with that high ratios have a large impact on the means.

NYSE, NASDAQ and AMEX 1965-2008

We have so far walked in the steps of Fama and French, regressing all Compustat Firms. Since this data includes all firms that file the annual 10-K report, we suspect that some stocks with typically low liquidity can produce extreme values that have a dis-proportional impact on the regressions. We have therefore run a set of regressions on firms that are listed on the major exchanges: NYSE, NASDAQ and AMEX. These stocks are traded more frequently and are followed by a large number of analysts. This increases the likelihood that their price reflects the expected value of their future cash-flows. The fact that the stocks are traded with high frequency, thus making them liquid, means that it is easier for an investor to sell his stocks without influencing the price too much.

In essence, the friction should be less for NYSE, AMEX and NASDAQ stocks than for over the counter traded or non-listed stocks. A possible hypothesis is that investors would pay less interest in the dividend, since they could easily construct a home-made dividend by selling stock. This would be in line with the bird-in-the-hand fallacy. On the other hand, in signalling theory, the actual pay-out per se does not matter. It is the information contained in dividends that matter. Tax-effects are also different in such a market, since it would be possible, with little friction, to trade away the tax disadvantage by selling and buying around the ex-date. The first theory would mean that the dividend-variables are less important in this data-set, the second means that we should see no change, and the latter implies that the dividend will be larger. There is no way for us to tell which effect is at work or has the highest influence. However, we can find the effects.

We present the results of regressions 1 and 2, spread of value to assets, first:

Formula 1				**Formula2**			
(V0-A0)/A0	***Mean***	***SE***	***T***	***(V0-A0)/A0***	***Mean***	***SE***	***T***
Const	-0.13	0.07	-1.74	Const	-0.10	0.07	-1.40
E0/A0	3.10	0.61	5.12	E0/A0	3.59	0.63	5.75
dE0/A0	0.02	0.21	0.11	dE0/A0	0.11	0.20	0.55
dE+2/A0	1.20	0.15	8.22	dE+2/A0	1.34	0.16	8.40
dA0/A0	0.64	0.05	12.01	dA0/A0	0.49	0.04	11.16
dA+2/A0	0.41	0.06	6.34	dA+2/A0	0.32	0.06	5.33
RD0/A0	4.89	0.41	11.82	RD0/A0	4.82	0.42	11.47
dRD0/A0	1.88	0.47	4.03	dRD0/A0	2.10	0.47	4.47
dRD+2/A0	5.37	0.66	8.14	dRD+2/A0	5.83	0.79	7.39
I0/A0	-1.73	0.87	-2.00	I0/A0	-3.68	0.88	-4.16
dI0/A0	-5.26	0.84	-6.22	d(I0/A0)	-0.04	0.59	-0.07
dI+2/A0	-4.64	0.59	-7.89	d(I+2/A+2)	-1.21	0.61	-1.97
D0/A0	5.24	0.62	8.48	D0/A0	5.59	0.56	10.04
dD0/A0	3.22	0.81	3.98	d(D0/A0)	1.61	0.57	2.82
dD+2/A0	5.33	0.67	7.96	d(D+2/A+2)	4.37	0.69	6.33
dV+2/A0	-0.15	0.05	-3.14	dV+2/A0	-0.14	0.05	-2.92

Overall, the slopes and the t-values are higher (absolute values) in this data-set than all Compustat firms. This could be due to the fact that so many analysts and investors follow these stocks and the information requirement is very strict for listed firms. The biggest difference lies in the earnings variables. Here, both E0/A0 and dE+2/A0 are significant, which they were not in the data-set that included all Compustat firms. All interest-coefficients are negative. The dividend-variables have slightly higher coefficients and t-values, which is consistent with signalling-theory.

Formula 3				**Formula 4**			
d(V0-A0)/A0	***Mean***	***SE***	***T***	***d(V0-A0)/A0***	***Mean***	***SE***	***T***
Const	-0.10	0.02	-4.69	Const	-0.09	0.02	-3.78
dE0/A0	2.98	0.44	6.73	dE0/A0	3.29	0.48	6.78
dE+2/A0	0.88	0.14	6.20	dE+2/A0	0.96	0.15	6.60
dA0/A0	0.34	0.06	5.62	dA0/A0	0.21	0.05	3.86
dA+2/A0	0.34	0.05	6.85	dA+2/A0	0.27	0.04	6.06
dRD0/A0	2.00	0.65	3.09	dRD0/A0	2.09	0.68	3.08
dRD+2/A0	2.66	0.48	5.57	dRD+2/A0	3.08	0.53	5.79
dI0/A0	-6.46	0.87	-7.42	d(I0/A0)	-4.10	0.65	-6.33
dI+2/A0	-3.09	0.72	-4.32	d(I+2/A+2)	-1.29	0.86	-1.50
dD0/A0	2.21	0.79	2.81	d(D0/A0)	2.40	0.59	4.06
dD+2/A0	3.32	0.62	5.39	d(D+2/A+2)	1.94	0.68	2.84
dV+2/A0	-0.14	0.03	-4.21	dV+2/A0	-0.13	0.03	-3.91

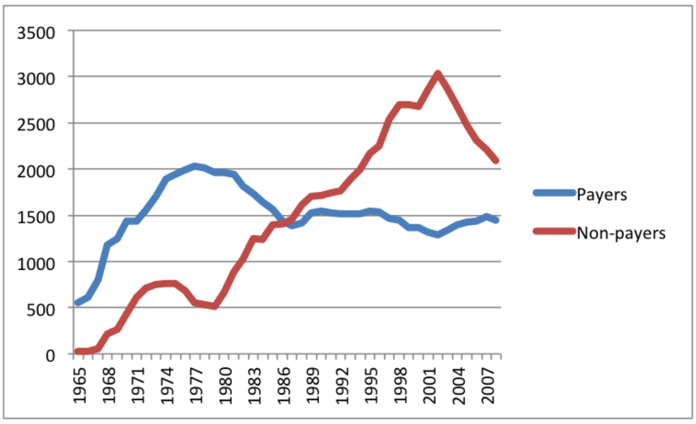
The same picture emerges when we regress the change in value to assets, the standard-errors are smaller for this data-set and the coefficients are more evenly distributed on the different variables. The earning-variables are positive and even more significant, with T-values in regressions 3 and 4 above 6. This is a large difference from the other data-set, where we showed that the relationship between increased earnings and increased value was weak at best. Here, they are strong and do a better job at explaining value than any of the other pair of variables. Despite strong earnings-variables, dividends still have explanatory power on the same level as in the other data-set: dD0/A0 and dD+2/A0 are slightly lower in this data-set, d(D0/A0) and d(D+2/A+2) are slightly higher. The conclusion is still that increased dividends are associated with increased value, both forward and backward-looking.

Characteristics of dividends in the data-set

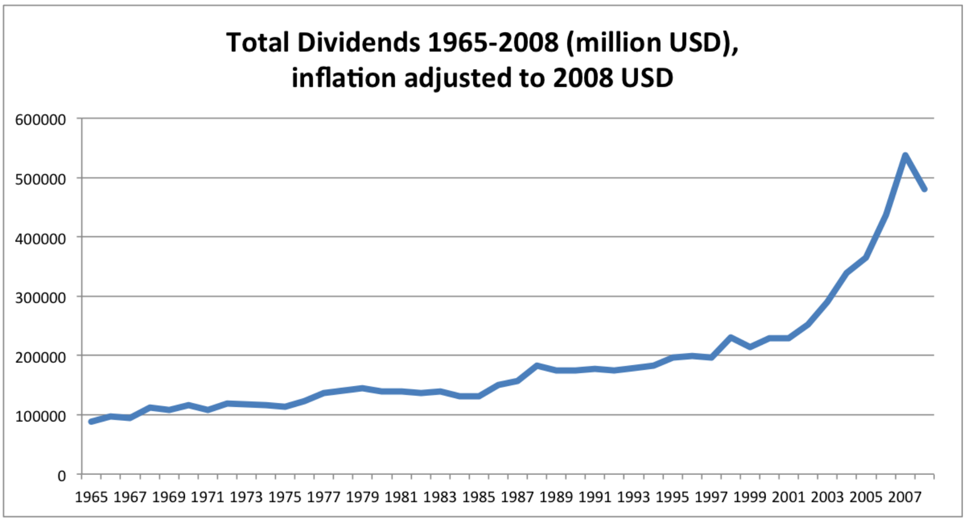
Pay-out rate

We have proven that the findings of Fama & French, 1998, holds, namely that dividends convey information about value missed by other control variables, also when we extend the time-period to include the period 1993-2008. However, there is some discussion in the academia about the relevance of dividends. Most relevant to us is another article by Fama & French, 2001, *Disappearing Dividends: changing firms characteristics or lower propensity to pay?,* in which they show that the proportion of firms that pay dividends have been decreasing. There is no doubt that is true. We find the same in our data:

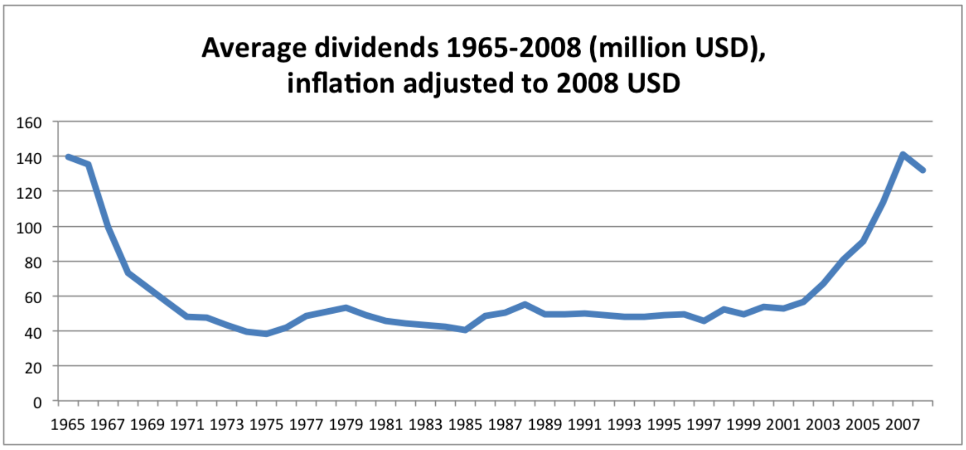
Number of dividend payers and non-payers 1965-2008



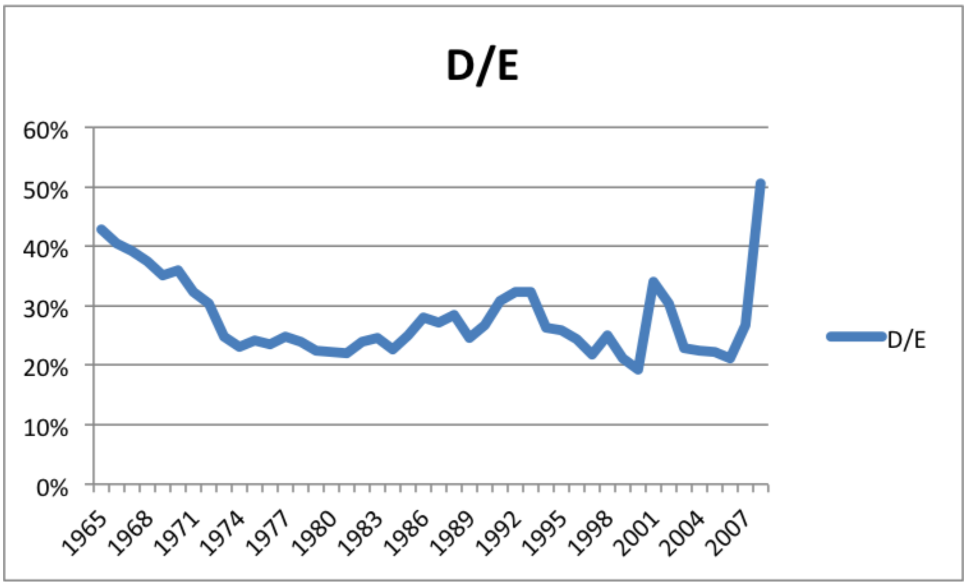
Fama & French, 2001, found that this is due both to an increase in growth-firms, firms that re-invest rather than pay out dividends, and lower propensity to pay even for firms with characteristics that previously meant that they would pay (large, low growth and stable earnings). If this is true, why are dividends still significant? We believe it is because dividends are in fact not disappearing. Total dividends paid out have increased steadily through-out the period, but went down in 2008 following the crash of the sub-prime bubble, as the illustration below shows:



Total dividends paid out are in fact increasing, even when we adjust for inflation as we have done here. This does not necessarily mean that firms on average pay out more dividends, the growth seen in the graph above could just be a result of the growth in the number of companies. It is therefore useful to look at total dividends paid out per firm per year:



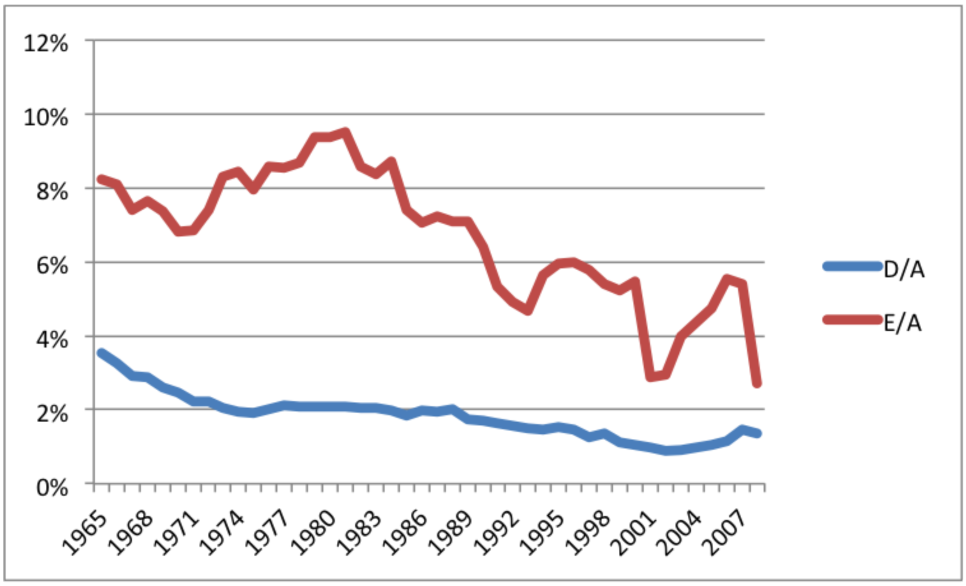
The previous graph illustrates how stable dividend pay-outs have been, on average. It was high in 1965. However, in 1965 the number of firms included in our data set is low, only 634. The later period from around 2003 to 2008 is more interesting, as we see how much pay-out increases. The tax-code changed in 2003, which resulted in the same tax-rates for dividends and capital gains alike, of 15 per cent. This might explain why the average paid out dividends increased after 2003, but it could also reflect the general growth in the economy. To see if this was the case, we have looked at the average dividend-ratio (dividends in per cent of earnings) for all the firms included in our data-set:



What is evident is that while dividends as a share of earnings declined from 1965 to the mid-seventies, the pay-out rate has been more or less stable between twenty and thirty per cent. This graph is based on average earnings over average dividends, so it represents the total pay-out rate on total earnings of all firms in the data-set. Since Fama & French, 2001, rely only on data from NYSE, NASDAQ and AMEX, we also computed the ratio for only those firms. The pattern is the same, but the payout-ratio is a little higher overall for the firms listed on NYSE, NASDAQ and AMEX.

Our regressions are scaled to assets, so it is interesting to see the development in dividends to assets. This would not have much meaning without earnings to assets, so we have included both.

Dividends and Earnings to Assets, 1965-2008



Both direct (dividends) return on assets (D/A) and return on assets (E/A) have declined and are low. It is hard to believe that returns can be this low, but we have also done the same exercise with firms listed on NYSE, NASDAQ and AMEX only. The pattern is the same, declining returns over time, but on a lower level with earnings to assets between 1-3 per cent. Again this is mean on mean, and return on assets is assigned to both equity and debt.

The point in our discussion, however, for the relevance of dividends, is that dividends are declining in relation to assets, but so are earnings. The declining cash dividends are in accordance with the findings of Skinner, 2008, that stock repurchases are generally taking over for dividend payouts. However, that does not explain the same general development in earnings to assets.

Dividend Payers versus non Payers

We split the data set into Dividend Payers and Non Payers and trimmed each tail of the observed values of (V0-A0)/A0 by 0.5 per cent for each year. Non Payers did not pay dividends in the observed year and did not change their dividend payouts from two years before.

(V0-A0)/A0	*1965 – 2008*
Mean Full Population	1.438
Mean Dividend Payers	0.497
Mean Non Payers	1.988
Difference	1.491
Standard Error	0.489
T	3.049

As this simple hypothesis test shows, the average extra value over assets is significantly higher in the Non-Payers population than in the Dividend Payers population. The standard error is calculated based on the full population. This does however not say much about the effect dividends have on value, however it confirms that firms which do not pay dividends generally have higher valuation, most probably because firms with high growth opportunities generally do not pay dividends.

Dividend Payers	36.9 %	Non Dividend Payers	63.1 %

The percentage of dividend payers has been decreasing steadily from 93.7 per cent in 1965 to 29.4 per cent in 2002. From 2003 it has increased again to 40.1 per cent following the Bush administration tax equalization on dividend taxes and capital gains taxes.

CONCLUSION

Dividends convey information about value that is not explained by other variables, such as earnings, investments and R&D. Fama and French proved this was true for the time-period 1965-1992, and we have confirmed that their results also hold when we extend the period to 1965-2008. The conclusion is the same if we run the same regressions on firms listed on NYSE, NASDAQ, AMEX only. Dividends are not disappearing, as the amount of dividends paid out increase steadily. The number of firms that did not pay out dividends were twice that of payers in the year 2000, but this number has since declined to 2000 non-payers and 1500 payers.

There is a tendency to smooth dividends over time. We found that the dividends for the previous year does a better job of explaining current dividends than this years earnings. However, the Lintner regression (Appendix A.2) also revealed large deviations around times with high growth and a positive change in the dividend-tax. We conclude that there are tax-effects in dividends, but the positive effect on value should matter more than the negative effect of taxes.

FURTHER RESEARCH

The ability to process vast amounts of data opens up possibilities for further research. One avenue of approach that we have not found place for here is to regress the different listings (NYSE, NASDAQ, AMEX or other) separately. Further, running regressions on different sectors or industries might reveal more, or less, explanatory power of dividends in different sectors. These regressions require a large data-set to have explanatory power, so it might prove difficult to find any significance in smaller markets such as the Norwegian. But larger markets, might prove interesting. We did find one paper that applied the same cross-sectional method on the German market (Nowak, 1998). As mentioned in the literature-review, we considered including share buy-backs in our regressions. Although the characteristics of buy-backs are very different from dividends, they might contain information at the levels found for dividends. The Compustat database provide information on treasury stocks on at least an annual basis, and with the computer program we have constructed for our research, it should be a manageable task to extract the necessary data and do regressions.

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Appendix

A.1 Contents of data disc

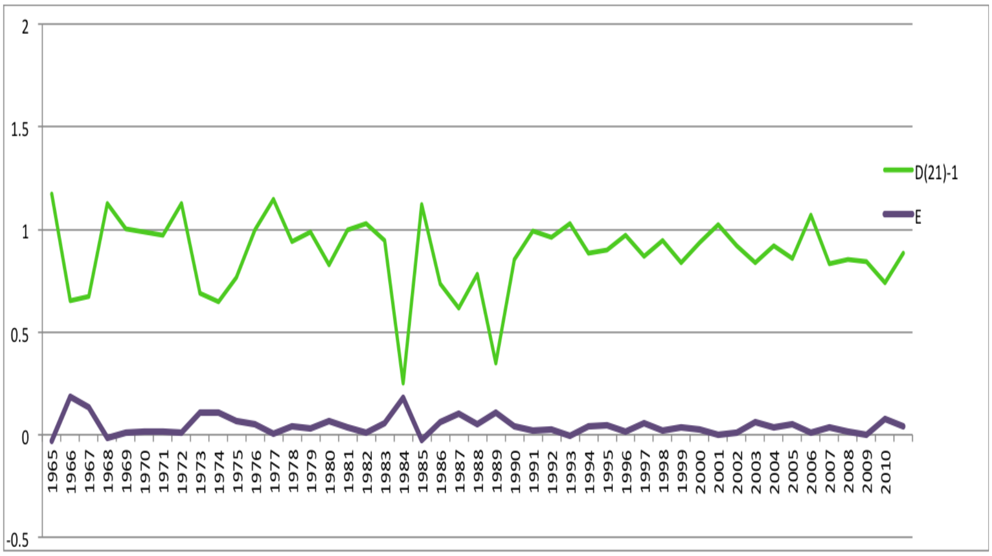
- Data Codes / Variable Descriptions from Wharton
- Descriptive statistics for the regressions
- Excel spread sheet with coefficients for every year for every regression
- List of variables
- Tax brackets
- Source code and binary version of our statistics software

A.2 Dividend smoothing (Lintner Regression)

We are curious to see if we can find any evidence of dividend-smoothing in our data-set. Leaning on the findings of Lintner (1956), we have regressed the following equation:

$D_t = D_{t-1} + E_t + c$

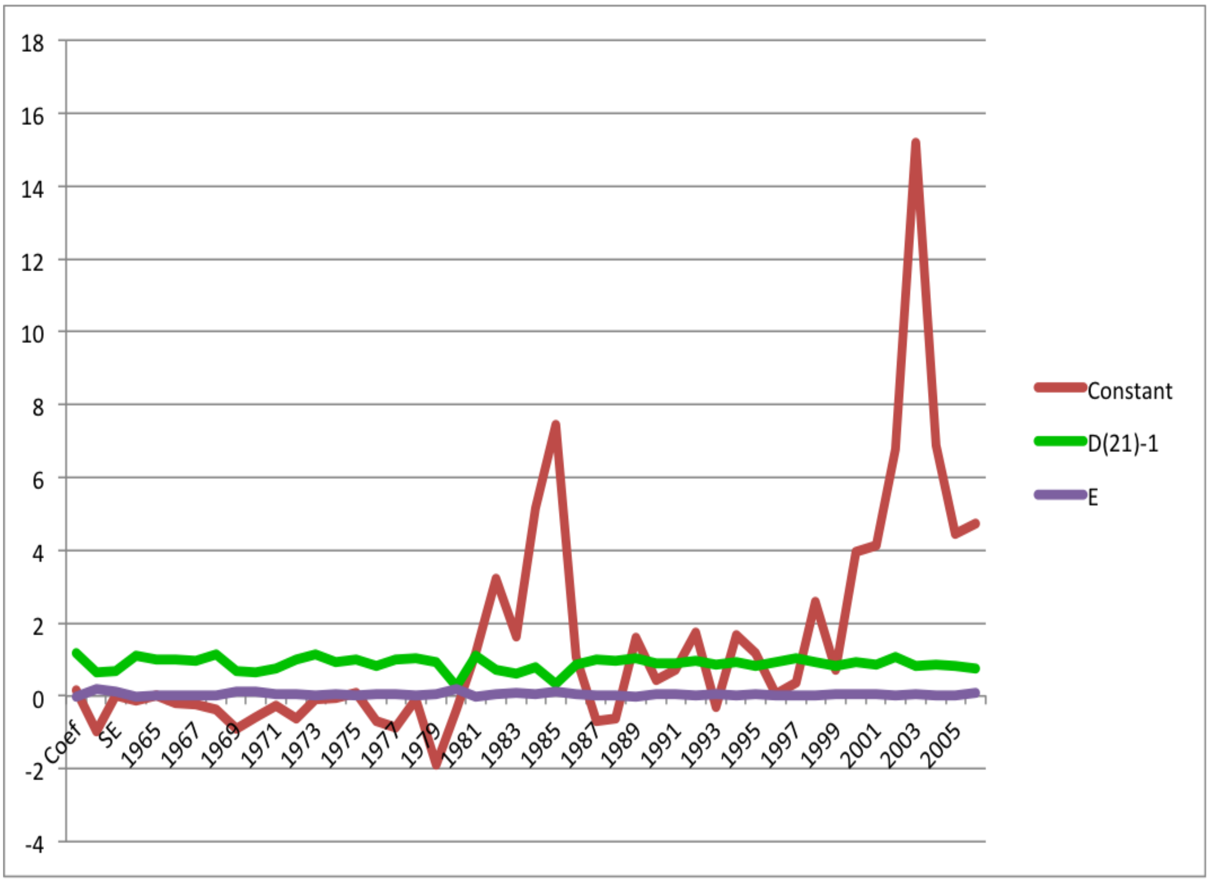
Excluding the constant for now, and focusing on the slope of the earnings and the dividend variable, the following graph emerges:



The mean coefficients are as follows:

Coef	MEAN	SE	T
Constant	**1.46**	**0.45**	**3.23**
D(21)-1	**0.88**	**0.03**	**32.09**
E	**0.04**	**0.01**	**6.30**

The dividend variable is large which indicates that firms smooth their dividends in accordance with last year's dividend. The mean coefficient for last years dividend is very significant, 32 standard-errors from zero. The constant is very large, which reflects the variations in the data-set. In the next graph we have included the constant and the deviations are apparent:



The spikes in the mid-eighties (top in 1988) and in 2006 suggests that there were large dividend-payouts in these years, and that firms that had not previously paid out any large dividends, suddenly did so. We believe that this can be attributed to the adjustments in the tax-code. One was passed into law in 2003, which brought taxes on dividends down to the same level as capital gains, at 15%. The down-turn had not started yet, so we do not think this is an example of risk-shifting (transferring wealth to shareholders at the cost of debtors). Similarly, the eighties were also a boom-period and in 1988 the taxes on dividends went down to the same level as capital gains.[1]

Alas, contrary to our previous regressions (Fama & French, 1998), we find a tax-effect. But it seems that it is only prevalent on this aggregate level in conjunction with large revisions to the tax-code. Event-studies have been able to prove this on a smaller level. They show that stocks do not fall by their full amount at the ex-dividend date, implying that investors have already included the tax in their calculations. We can only conclude that taxes matter, but dividends matter more.

1 Citizens for Tax Justice: “Tax rates 1913 on Nov 2011” - http://www.ctj.org/pdf/regcg.pdf

A.3 E-Mailing with S&P Capital IQ

Hello Kyrre,

The United States companies included within Compustat can be listed on any major exchange you listed below as well as Over The Counter or Pink Sheet listings. Our main criteria for adding is they must file regularly (annual 10-K and interim 10-Q report) with the SEC and they must have consistent pricing data as well. I am not sure how WRDS presents the data but we do include Exchange data on the security level.

I am sorry if I did not explain it appropriately earlier, but we have increased the population of our database since 1993. We do not delete companies that become inactive (either through bankruptcy or acquisition, etc) and we have added companies either through spin-offs, IPO's or just general increase in our collection capabilities. I cannot give you an exact number but the population of the database has increased significantly. Please let me know if there is anything else.

Thank You,

Jason

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Centennial, CO 80112
800-523-4534
clientsupport@standardandpoors.com

-----Original Message-----
From: Kyrre Gregersen [mailto:Kyrre.Gregersen@stud.nhh.no]
Sent: Wednesday, January 04, 2012 11:31 AM
To: Standard & Poor's Client Support [NA]
Subject: RE: Compustat data (Case#789044 - Jason)

Hello Jason,

and thank you for your answer. As I understand there have been no increase in the number of firms prior to 1993. Is this correct?

And I hope you have the opportunity to answer another question: From which listings are Compustat firms drawn? The reason I am asking is that we suspect Fama and French might only have used data on firms that are listed on NYSE, NASDAQ and AMEX. When we extracted our data set, we ticked the "search the entire database" (and USD currency). Perhaps this could explain why our dataset is larger than the one FF used in their paper (FF1998)?

Thank you,

Kyrre Gregersen

-----Original Message-----
From: Standard & Poor's Client Support [NA] [mailto:clientsupport@standardandpoors.com]
Sent: Tue 20.12.2011 22:36
To: Kyrre Gregersen
Subject: Compustat data (Case#789044 - Jason)

Hello Kyrre,

After discussion with data researchers we believe the only difference that needs to be addressed is the increased populations of companies that we cover. We have had some data definition changes and some collection procedures modified but in looking at the data items you are referencing there should be no material differences compared to 1993. If you are looking at Global companies as well, you might want to keep in mind there could be small differences based on the implementation of IFRS through Europe around 2005. Again, with respect to the items you are pulling, you should not see any changes that would differ from the same items pulled in 1993 as IFRS does not affect the reporting or collection of these items. Please let me know if you have any further questions.

Thank You,

Jason

Lead Product Consultant, Client Services
S&P Capital IQ
7400 South Alton Court
Centennial, CO 80112
800-523-4534
clientsupport@standardandpoors.com

-----Original Message-----
From: Kyrre Gregersen [mailto:Kyrre.Gregersen@stud.nhh.no]
Sent: Tuesday, December 20, 2011 4:08 AM
To: Standard & Poor's Client Support [NA]
Subject:

Sir,

first of all I have to thank you for providing such a comprehensive and user-friendly database. I have access to COMPUSTAT through WRDS and they have directed me to you.

I am, together with a co-student, doing research in dividends and follow the steps of Fama and French in their paper "Taxes, Financing Decisions, and Firm Value" (1998). In this paper they use only COMPUSTAT data. As we are trying to recreate their results, we need to find out if and what changes there have been in the data-material since the time when FF wrote their paper (or extracted the data, possibly as early as 1993). I suspect one change might be that more COMPUSTAT firms have been updated with a historical shareprice, and perhaps number of shares. Since not having either of this, is a ground for excluding the firm in the
regressions, this would explain why our data-material contains more firms than FF98, even though we select variables on the exact same criterias. The most important variables we use are (time period 1965-1992):

DVC-Dividends paid to common shareholders(21)
XINT-Total interest paid (15)
XRD-R&D expenditures (46)
IB-Earnings before extraordinary items (18)
PRCC_F - Stock-price (199)
CSHPRI- Shares outstanding (54)

If we were to be provided with information as to if and how this data might have changed in the last ten years or so, it would be a great help to our work.

Sincerely
Kyrre Gregersen

Solution:
Dear Kyrre:

Thanks, I can better understand you question now. We can find no statement from Compustat that would address your specific problem, although your conjecture of companies being added seems reasonable.
We do know that some companis are added at the request of Compustat customers, and probably with retroactive data. But as to any more general criteria, I think your best option is to contact compustat directly (clientsupport@sandp.com), as they know the data best.
regards,
WRDS Support

Sir,
thank you for your response. I apologize for my rather short description of my problem. The thing is that we are not using the CRSP database, only COMPUSTAT. The article I am refering to is "Taxes, Financing Decisions, and Firm Value" by Fama & French (1998). In this paper they use only COMPUSTAT data. As we are trying to recreate their results, we need to find out if and what changes there have been in the data-material. I suspect one change might be that more COMPUSTAT firms have been updated with a historical share price, and perhaps number of shares. Since not having either of this, is a ground for excluding the firm in the regressions, this would explain why our data-material contains more firms than FF98, even though we select variables on the exact same criterias. The most important variables we use are (time period 1965-1992):
DVC-Dividends paid to common shareholders(21)
XINT-Total interest paid (15)
XRD-R&D expenditures (46)
IB-Earnings before extraordinary items (18)
PRCC_F - Stock-price (199)
CSHPRI- Shares outstanding (54)
If we were to be provided with information as to if and how this data might have changed in ten years time, it would be a great help to our work.

Yours sincerely,
Kyrre Gregersen

-----Original Message-----
From: Wharton School - WRDS [mailto:wrds-support@wharton.upenn.edu]
Sent: ma 19.12.2011 01:51
To: Kyrre Gregersen
Subject: Ticket #632-8478272: A Response from the WRDS Support Team (Is historical data being updated?)
Solution:
Your answer might best be found on this page of Ken French's web site (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/changes_crsp.html):
"Please note: CRSP has recently completed the Pre62 Daily Data Series Project. The addition of these new daily data results in changes to month-end prices and to dividend ex-dates. These changes have resulted in many small changes to historical returns on my website. For a description of the project and the types of changes made, please refer to the Pre62 Project Notes. :
regards,
WRDS Support

Ticket Information:

Ticket #:	8478272
Date Created:	12/16/2011 12:07 PM EDT
Summary:	Is historical data being updated?
Details:	
Username:	kyrre
Email:	kyrre.gregersen@stud.nhh.no

I am using the COMPUSTAT North America Annual database to get data to reproduce the results of Fama & French (1998). I am testing for the same time-period as they did, namely 1965-1992. My question, since I have not been successfull in reproducing the exact same numbers, is whether the data have been changed in some way from then to now? I have based my dataselection on the same datacodes they refer to in their article.

If you have general questions, please direct them to
wrds-support@wharton.upenn.edu.

A.4 Statistics

The following pages will show statistics for every coefficient for each year we ran the Fama & French, 1998, regressions. Then follow some statistics from the data set extraction, and federal US tax rates since 1913.

Formula 1 and 2 – All compustat firms

Formula 1 - All Compustat Firms

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Const	-1.23	-1.27	-1.11	-0.58	-0.48	-0.40	-0.45	-0.63	-0.54	-0.53	-0.41	-0.40	-0.43	-0.35	-0.30	-0.14	-0.01	0.23	0.43	0.23	0.28	0.36
E0/A0	13.16	9.20	17.60	11.09	8.02	6.74	7.24	0.78	1.81	0.56	0.97	1.44	1.67	1.19	1.85	1.34	-0.35	-2.11	-2.25	-2.15	-1.67	-2.07
dE0/A0	-0.67	2.50	-6.15	-1.30	-1.61	-2.23	-0.75	-0.21	-0.01	0.08	0.36	0.29	0.02	0.29	0.04	-0.50	0.97	0.68	1.08	1.16	1.44	1.73
dE+2/A0	1.78	1.08	0.73	3.84	1.23	1.89	3.76	1.03	1.30	0.48	1.30	1.09	0.27	0.04	0.98	0.44	-0.42	-0.73	-0.04	-0.27	0.39	0.21
dA0/A0	0.94	1.43	1.73	1.08	1.31	0.75	0.86	0.35	0.70	0.44	0.40	0.39	0.32	0.32	0.10	0.63	0.66	0.46	0.31	0.43	0.49	0.29
dA+2/A0	-0.63	-0.26	0.10	0.96	0.44	-0.08	0.80	1.18	1.23	0.28	0.53	0.26	-0.05	-0.03	0.26	0.77	0.28	1.03	0.98	0.31	0.40	1.21
RD0/A0	6.20	6.91	1.91	9.72	10.50	6.82	9.98	6.03	5.61	3.24	2.34	3.59	2.00	1.36	2.20	2.35	0.77	3.73	3.39	3.43	5.20	3.67
dRD0/A0	-0.06	-1.15	6.65	-5.05	18.96	-0.64	-4.54	-3.86	-0.66	2.53	3.33	0.71	3.07	2.29	2.11	3.38	5.92	0.40	3.83	2.12	0.13	-1.28
dRD+2/A0	4.91	7.10	27.22	10.14	5.61	1.06	8.80	6.71	-0.18	3.38	3.72	2.35	-0.50	3.49	0.89	8.58	4.97	6.22	6.21	3.42	4.64	3.77
I0/A0	13.34	24.02	1.35	-3.07	-2.25	-3.07	-4.43	7.00	3.15	5.34	3.33	2.27	2.73	2.85	0.43	0.41	-1.22	-2.21	-2.53	-1.72	-2.17	-3.45
dI0/A0	0.06	-32.17	-6.10	-16.40	-15.99	-1.42	-3.39	-1.70	-4.01	-4.71	-3.14	-1.96	-2.29	-3.20	1.86	-3.33	-1.65	-0.73	-0.03	-1.67	-3.21	-0.74
dI+2/A0	8.05	-0.02	-11.40	-6.34	-8.85	-2.26	-13.88	-2.40	-5.22	-0.97	-0.82	-0.87	1.64	0.00	-0.88	-2.07	-2.37	-5.75	-5.07	-2.60	-2.25	-6.28
D0/A0	11.50	10.47	0.03	0.07	0.64	1.57	2.40	6.24	4.96	6.52	3.94	4.08	3.69	1.28	-1.48	-2.24	-0.39	1.01	-1.08	2.01	3.45	5.94
dD0/A0	-0.94	-8.74	2.63	6.43	16.18	11.73	15.75	8.45	2.76	1.39	2.78	3.55	3.48	8.60	11.38	3.65	4.30	6.37	10.64	5.48	5.83	5.27
dD+2/A0	13.69	10.27	3.83	14.27	12.22	3.40	3.75	7.84	8.65	4.96	7.94	4.95	5.83	3.56	2.44	8.76	1.11	4.19	8.99	8.65	0.38	9.90
dV+2/A0	0.19	0.13	0.15	-0.52	-0.01	0.18	-0.31	-1.13	-0.85	-0.10	-0.44	-0.22	0.06	0.08	-0.03	-0.34	0.03	-0.38	-0.42	0.00	-0.09	-0.66

(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	FF98 Mean	SE	T	FF98 T
Const	0.35	0.18	0.25	0.13	0.22	0.26	0.39	0.28	0.47	0.42	0.44	0.44	0.42	0.13	0.21	0.43	0.45	0.39	0.71	0.17	0.26	-0.52	-0.03	-0.17	0.07	-0.38	-2.82
E0/A0	-1.76	-1.43	-3.03	-0.96	-3.20	-2.19	-2.40	-1.28	-1.70	-2.26	-1.66	-1.44	-3.11	-1.97	-1.77	4.25	-1.15	-3.86	-3.92	-2.70	-1.64	-3.45	0.71	1.80	0.73	0.98	2.61
dE0/A0	1.08	0.87	1.69	0.90	1.53	1.39	1.82	0.75	0.75	1.30	0.88	1.13	1.27	0.47	0.55	0.27	-0.18	1.91	1.05	0.35	0.45	-0.59	0.38	0.43	0.21	1.83	2.43
dE+2/A0	0.38	0.18	-0.51	-0.24	-1.11	-0.18	-0.18	-0.47	-0.69	-0.04	-0.20	-0.14	0.13	-0.19	-0.85	2.58	-0.17	-0.23	-1.16	-0.85	-0.19	-1.07	0.34	0.80	0.17	2.02	3.08
dA0/A0	0.35	0.44	0.66	0.37	0.83	0.87	0.66	0.51	0.61	0.73	0.35	0.20	0.52	0.27	0.19	-1.16	-0.10	0.04	0.92	0.21	0.37	1.40	0.54	0.66	0.07	7.70	12.21
dA+2/A0	0.60	0.40	0.43	0.35	1.13	0.66	0.44	0.13	0.35	0.51	0.29	0.12	1.35	1.65	0.65	-3.10	0.19	-0.09	-0.25	1.40	1.13	0.24	0.42	0.45	0.11	3.79	5.48
RD0/A0	3.49	3.48	4.59	1.92	5.92	3.99	4.36	3.64	6.81	6.14	6.19	3.31	5.18	4.40	7.44	2.24	7.63	6.82	3.79	0.27	7.88	-0.80	4.54	4.29	0.38	11.79	7.24
dRD0/A0	0.35	2.11	-4.04	1.22	0.11	2.93	2.55	0.16	-0.52	-0.33	2.45	1.97	1.70	0.96	-2.17	3.66	-2.12	3.45	-6.45	-1.91	0.31	3.68	1.10	4.30	0.59	1.85	3.74
dRD+2/A0	2.05	1.69	2.38	2.42	6.38	3.31	2.90	2.67	4.75	5.52	5.73	2.08	7.43	4.19	5.75	-1.10	1.00	5.26	1.06	3.37	7.44	-0.54	4.51	5.66	0.66	6.81	6.86
I0/A0	-3.88	0.13	-0.18	-1.15	-1.13	-2.15	-3.09	-2.13	-4.60	-1.73	0.33	-0.30	4.17	6.26	9.60	-10.11	13.69	14.87	5.50	12.60	12.90	27.58	2.67	-1.17	1.14	2.33	-1.54
dI0/A0	-1.13	-3.03	-4.58	-3.08	-5.98	-6.32	-8.88	-5.73	-5.06	-6.54	-2.72	-0.03	-3.79	-5.95	-0.22	-1.03	-0.06	-4.23	-6.31	-4.22	-3.97	-26.03	-4.88	-4.21	0.97	-5.02	-5.94
dI+2/A0	-3.93	-2.97	-2.38	-5.54	-9.70	-10.32	-5.96	-2.47	-5.25	-6.99	-2.70	-1.81	0.18	-1.86	-0.47	8.61	0.64	-2.16	0.66	6.28	2.09	6.87	-2.50	-4.57	0.71	-3.50	-5.24
D0/A0	4.90	5.21	10.20	8.05	10.43	9.70	9.30	7.21	5.84	8.97	11.78	13.73	10.15	12.27	9.20	1.04	5.22	11.96	9.67	7.60	10.99	14.61	5.97	4.22	0.69	8.68	5.42
dD0/A0	5.26	6.82	6.47	0.79	1.81	5.45	4.79	0.64	0.53	-1.49	-1.94	-5.29	-1.08	-0.01	0.86	1.38	-0.24	2.42	0.95	0.61	-2.05	-1.38	3.46	6.63	0.75	4.61	6.08
dD+2/A0	8.72	8.31	12.83	12.99	16.66	8.40	1.70	4.09	3.62	-0.93	1.55	-0.27	7.67	1.18	7.08	-8.98	1.98	7.83	3.25	6.81	6.28	9.28	6.13	8.10	0.72	8.49	9.98
dV+2/A0	-0.21	-0.07	0.03	0.06	-0.21	-0.10	0.00	0.10	0.01	-0.11	0.01	0.03	-0.74	-0.88	-0.19	1.25	0.00	0.09	0.20	-1.00	-0.29	0.05	-0.15	-0.16	0.06	-2.52	-2.62

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.57	0.54	0.67	0.63	0.65	0.47	0.69	0.45	0.47	0.30	0.32	0.32	0.31	0.32	0.37	0.59	0.59	0.70	0.73	0.78	0.82	0.84
RSq	0.63	0.51	0.53	0.60	0.43	0.50	0.46	0.79	0.48	0.27	0.37	0.32	0.31	0.32	0.28	0.34	0.23	0.28	0.33	0.14	0.19	0.38

(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.88	0.76	0.90	0.78	1.50	0.99	1.15	0.90	1.27	1.18	1.47	1.52	2.29	1.67	2.22	29.25	4.29	6.98	7.40	6.37	2.57	4.17
RSq	0.19	0.19	0.25	0.23	0.22	0.24	0.21	0.25	0.27	0.28	0.20	0.20	0.55	0.55	0.35	0.20	0.70	0.63	0.45	0.30	0.43	0.52

ANOVA

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	561	612	828	1357	1485	1837	2016	2229	2416	2615	2663	2626	2543	2502	2436	2592	2794	2809	2944	2845	2928	2800
DF total	576	627	843	1372	1500	1852	2031	2244	2431	2630	2678	2641	2558	2517	2451	2607	2809	2824	2959	2860	2943	2815
SS regression	314	186	414	802	470	406	807	1,753	487	87	162	128	105	116	131	459	277	538	775	279	473	1,176
SS error	185	181	372	544	623	412	958	455	523	241	274	268	237	251	332	901	955	1,368	1,574	1,717	1,967	1,962
SS total	498	366	786	1,346	1,093	818	1,766	2,208	1,011	328	437	396	342	367	463	1,360	1,232	1,906	2,350	1,996	2,440	3,138
MS regression	21	12	28	53	31	27	54	117	32	6	11	9	7	8	9	31	18	36	52	19	32	78
MS error	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
F	63	42	62	133	75	121	113	572	150	63	105	84	75	77	64	88	54	74	97	31	47	112
P																						

(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	2804	2982	3189	3219	3234	3234	3372	3457	3677	3736	3967	4090	4006	3994	4127	4277	4174	4050	3866	3713	3664	3503
DF total	2819	2997	3204	3234	3249	3249	3387	3472	3692	3751	3982	4105	4021	4009	4142	4292	4189	4065	3881	3728	3679	3518
SS regression	507	396	839	573	1,994	1,020	1,160	925	2,194	1,968	2,192	2,351	25,464	13,547	10,755	888,281	178,798	341,593	172,705	64,881	17,961	64,718
SS error	2,175	1,734	2,577	1,959	7,260	3,182	4,431	2,825	5,880	5,158	8,597	9,474	21,011	11,075	20,366	3,659,474	76,891	197,520	211,897	150,737	24,148	60,978
SS total	2,683	2,131	3,416	2,532	9,254	4,202	5,590	3,750	8,074	7,126	10,788	11,826	46,475	24,622	31,121	4,547,755	255,689	539,113	384,602	215,618	42,108	125,697
MS regression	34	26	56	38	133	68	77	62	146	131	146	157	1,698	903	717	59,219	11,920	22,773	11,514	4,325	1,197	4,315
MS error	1	1	1	1	2	1	1	1	2	1	2	2	5	3	5	856	18	49	55	41	7	17
F	44	45	69	63	59	69	59	75	91	95	67	68	324	326	145	69	647	467	210	107	182	248
P																						

Formula 2 AllCompustatFirms

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Const	-1.39	-1.17	-0.85	-0.47	-0.48	-0.46	-0.46	-0.71	-0.52	-0.53	-0.42	-0.41	-0.46	-0.36	-0.33	-0.10	0.02	0.26	0.42	0.24	0.31	0.38
E0/A0	13.44	8.50	17.56	11.99	10.46	7.39	8.15	1.37	3.10	1.28	1.41	1.90	2.11	1.48	2.16	1.54	0.05	-1.58	-1.95	-1.89	-1.39	-1.80
dE0/A0	0.94	3.46	-4.90	-1.46	-1.99	-2.23	0.24	-0.13	-0.53	0.09	0.44	0.40	0.32	0.39	0.22	-0.17	0.96	0.72	1.27	1.16	1.29	1.77
dE+2/A0	0.69	1.93	0.58	3.78	2.52	2.13	4.44	1.37	1.38	0.79	1.61	1.31	0.47	0.06	1.14	0.55	-0.26	-0.36	0.20	-0.13	0.35	0.45
dA0/A0	0.57	0.84	1.50	0.81	1.05	0.78	0.75	0.24	0.45	0.25	0.26	0.25	0.22	0.23	0.14	0.47	0.52	0.39	0.27	0.33	0.28	0.23
dA+2/A0	-0.46	-0.25	-0.24	0.79	0.39	-0.13	0.46	1.16	1.10	0.22	0.54	0.24	0.00	-0.03	0.21	0.73	0.20	0.91	0.82	0.22	0.34	1.02
RD0/A0	5.69	4.61	3.23	10.08	10.32	7.46	10.34	5.68	5.65	3.18	2.08	3.54	1.95	1.15	1.72	1.07	0.48	3.81	3.60	3.58	4.58	3.66
dRD0/A0	-0.81	3.91	3.88	-4.41	20.22	-1.52	-4.34	-4.01	-0.73	2.29	3.41	1.05	2.96	2.49	2.81	6.02	6.40	0.50	3.88	2.26	1.44	-1.19
dRD+2/A0	4.33	10.50	25.47	9.19	5.42	0.97	8.12	6.47	-0.08	4.05	3.95	2.24	-0.46	3.42	1.73	8.91	5.47	6.79	6.36	3.84	4.34	4.10
I0/A0	19.08	18.51	-9.48	-9.77	-11.54	-4.17	-8.19	6.56	0.06	3.65	2.24	1.74	2.77	1.27	-0.50	-1.85	-2.52	-3.46	-2.84	-1.87	-3.34	-4.02
d(I0/A0)	11.84	-15.83	4.21	-7.74	-3.77	3.22	3.74	0.16	0.10	-0.96	1.23	-0.01	0.31	1.48	4.29	0.91	3.07	2.68	2.50	0.98	0.46	3.04
d(I+2/A+2)	16.17	3.45	-12.44	-4.61	0.57	1.04	-7.70	0.26	-1.13	2.53	3.76	1.42	2.58	1.18	0.23	-0.40	0.68	-2.85	-0.44	0.17	0.33	-2.22
D0/A0	16.09	11.58	-2.09	-0.26	0.09	3.72	2.94	9.01	4.02	6.69	6.21	5.72	5.85	4.00	2.00	-0.47	-0.63	1.42	2.21	3.23	5.30	8.06
d(D0/A0)	-6.72	-6.59	1.27	0.75	4.80	6.96	5.34	-0.88	-8.03	-2.74	-0.11	0.28	1.06	5.55	5.24	3.68	1.90	3.24	2.37	4.68	2.13	6.02
d(D+2/A+2)	14.80	7.20	-1.30	6.01	4.42	1.31	-6.66	6.06	4.80	2.50	8.92	3.48	0.73	2.96	-0.82	1.27	-0.36	0.60	6.89	4.21	9.77	9.72
dV+2/A0	0.30	0.13	0.21	-0.46	-0.02	0.19	-0.31	-1.16	-0.83	-0.07	-0.43	-0.21	0.06	0.10	-0.02	-0.35	0.05	-0.44	-0.41	0.02	-0.08	-0.66

(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	FF98 Mean	SE	T	FF98 T
Const	0.35	0.22	0.29	0.12	0.16	0.30	0.45	0.30	0.49	0.43	0.49	0.43	0.72	0.14	0.21	-0.31	-1.27	0.52	0.61	0.05	0.34	0.04	-0.06	-0.16	0.08	-0.70	-2.56
E0/A0	-1.61	-1.09	-2.64	-0.83	-2.86	-1.97	-2.15	-1.05	-1.50	-1.90	-1.51	-1.39	-3.16	-2.15	-1.56	3.05	-2.55	-4.93	-4.00	-2.61	-1.88	-5.10	0.91	2.29	0.76	1.19	3.18
dE0/A0	1.20	0.86	1.86	0.85	1.73	1.58	1.80	0.84	0.83	1.29	0.96	1.16	1.63	0.63	0.39	0.32	2.05	2.00	1.38	0.19	0.59	0.65	0.61	0.76	0.20	3.06	4.48
dE+2/A0	0.59	0.36	-0.20	-0.03	-0.84	-0.03	-0.08	-0.33	-0.56	0.13	-0.03	-0.12	0.11	-0.10	-0.75	2.40	-0.73	-0.27	-1.16	-0.61	-0.25	-1.69	0.47	1.16	0.18	2.57	4.14
dA0/A0	0.27	0.34	0.42	0.31	0.61	0.59	0.33	0.35	0.45	0.53	0.21	0.17	0.13	0.18	0.08	-0.90	-0.08	-0.14	0.91	0.26	0.23	0.23	0.37	0.54	0.05	6.86	10.04
dA+2/A0	0.52	0.29	0.40	0.21	1.04	0.49	0.25	0.06	0.22	0.29	0.18	0.10	1.30	1.59	0.65	-1.79	-0.32	-0.34	-0.18	1.57	1.19	-0.15	0.36	0.36	0.09	3.91	4.90
RD0/A0	3.59	3.62	4.08	1.85	6.18	4.03	4.03	3.58	6.92	6.40	5.99	3.35	4.41	4.01	7.36	-1.51	15.22	4.11	3.23	0.27	7.72	-1.72	4.41	4.12	0.48	9.23	6.72
dRD0/A0	0.52	2.07	-2.05	1.10	0.30	3.35	3.28	0.48	-0.36	-0.03	2.68	2.10	2.99	1.14	-2.38	2.89	13.86	4.40	-5.05	-2.65	0.39	3.00	1.79	4.80	0.66	2.71	3.98
dRD+2/A0	2.15	1.72	2.42	2.62	6.84	3.67	3.49	2.82	5.02	6.10	6.16	2.09	7.36	4.29	6.23	-1.34	-3.55	6.31	0.80	3.40	7.33	2.43	4.62	5.70	0.65	7.11	6.82
I0/A0	-4.27	-1.02	-1.20	-0.35	3.22	-1.31	-3.56	-2.75	-5.62	-2.76	-0.53	-0.30	-5.48	6.26	9.99	8.85	46.98	11.94	6.66	14.31	9.06	3.62	1.91	-3.36	1.48	1.30	-3.58
d(I0/A0)	0.67	-1.15	-0.24	0.42	-3.58	-2.48	-6.06	-2.63	-0.72	-1.82	-0.78	2.12	0.65	-3.22	-2.76	-4.67	-51.69	-0.04	0.03	-1.22	-0.73	-6.67	-1.61	0.11	1.32	-1.22	0.16
d(I+2/A+2)	-1.01	-1.85	2.12	-0.19	0.65	-3.23	-4.06	-1.03	-1.97	-0.81	0.18	-0.07	0.26	0.05	1.19	3.92	-2.03	0.85	5.23	0.61	0.34	2.60	0.10	-2.17	0.59	0.17	-2.19
D0/A0	7.02	4.86	10.30	8.51	11.98	10.13	9.20	7.33	6.81	9.47	10.18	12.74	10.42	11.07	10.42	6.46	24.95	16.88	11.68	8.67	13.48	15.52	7.56	5.92	0.81	9.33	8.40
d(D0/A0)	4.50	3.43	7.05	3.70	1.73	6.14	3.61	0.97	-1.15	-1.23	1.32	-4.44	1.64	-0.46	-1.86	-0.07	-1.35	0.36	0.51	1.17	-0.78	-0.34	1.24	2.62	0.53	2.33	3.26
d(D+2/A+2)	5.46	0.58	12.69	13.08	14.81	0.63	-0.13	1.18	5.41	6.45	-0.08	-0.19	4.21	0.54	-0.05	-16.93	-0.07	6.97	4.00	7.23	12.20	11.93	4.01	5.66	0.88	4.57	5.38
dV+2/A0	-0.22	-0.05	0.03	0.09	-0.21	-0.09	0.01	0.11	0.01	-0.11	0.01	0.03	-0.72	-0.88	-0.18	1.13	0.07	0.10	0.21	-1.08	-0.30	0.26	-0.14	-0.15	0.06	-2.31	-2.49

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.59	0.54	0.67	0.64	0.66	0.48	0.71	0.46	0.47	0.31	0.33	0.32	0.31	0.32	0.38	0.57	0.59	0.71	0.74	0.78	0.81	0.85
RSq	0.67	0.50	0.52	0.55	0.42	0.49	0.43	0.79	0.46	0.27	0.36	0.31	0.30	0.37	0.28	0.36	0.22	0.29	0.31	0.13	0.18	0.35

(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
S	0.89	0.78	0.91	0.79	1.52	1.01	1.15	0.91	1.28	1.19	1.47	1.53	2.19	1.69	2.23	29.59	8.51	8.15	7.36	6.34	2.61	2.66
RSq	0.18	0.16	0.22	0.21	0.20	0.22	0.18	0.24	0.26	0.26	0.20	0.20	0.56	0.55	0.37	0.18	0.98	0.60	0.44	0.33	0.46	0.65

ANOVA

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	558	611	828	1361	1482	1834	2007	2223	2408	2610	2656	2619	2534	2500	2443	2592	2794	2806	2942	2840	2926	2802
DF total	573	626	843	1376	1497	1849	2022	2238	2423	2625	2671	2634	2549	2515	2458	2607	2809	2821	2957	2855	2941	2817
SS regression	391	181	398	665	473	414	773	1,766	453	90	164	123	106	146	137	466	271	584	730	249	428	1,098
SS error	193	180	367	556	644	428	1,010	476	533	246	288	274	244	254	353	841	964	1,431	1,612	1,707	1,921	2,033
SS total	584	361	765	1,221	1,117	842	1,783	2,242	986	336	451	397	349	401	490	1,307	1,234	2,015	2,342	1,956	2,349	3,131
MS regression	26	12	27	44	32	28	52	118	30	6	11	8	7	10	9	31	18	39	49	17	29	73
MS error	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
F	75	41	60	108	73	118	102	549	137	64	101	78	73	96	63	96	52	76	89	28	43	101
P																						

(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	2802	2982	3183	3210	3227	3234	3366	3461	3677	3738	3962	4092	4011	4000	4135	4286	4164	4041	3853	3720	3670	3507
DF total	2817	2997	3198	3225	3242	3249	3381	3476	3692	3753	3977	4107	4026	4015	4150	4301	4179	4056	3868	3735	3685	3522
SS regression	495	335	729	542	1,868	901	999	904	2,113	1,835	2,077	2,417	24,567	13,705	11,843	849,093	16,959,366	409,662	161,157	74,024	21,401	46,647
SS error	2,231	1,793	2,623	2,023	7,421	3,293	4,433	2,862	6,022	5,264	8,512	9,520	19,213	11,432	20,616	3,753,118	301,853	268,587	208,461	149,303	25,043	24,746
SS total	2,726	2,128	3,352	2,566	9,289	4,195	5,431	3,765	8,135	7,099	10,589	11,936	43,780	25,137	32,459	4,602,211	17,261,219	678,250	369,618	223,327	46,445	71,393
MS regression	33	22	49	36	125	60	67	60	141	122	138	161	1,638	914	790	56,606	1,130,624	27,311	10,744	4,935	1,427	3,110
MS error	1	1	1	1	2	1	1	1	2	1	2	2	5	3	5	876	72	66	54	40	7	7
F	41	37	59	57	54	59	51	73	86	87	64	69	342	320	158	65	15,597	411	199	123	209	441
P																						

Formula 3 and 4 – All compustat firms

Formula3 AllCompustatFirms

d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Const	-0.11	-0.29	-0.20	0.08	-0.25	-0.35	-0.14	-0.37	-0.37	-0.28	-0.03	0.04	-0.05	-0.06	-0.06	0.04
dE0/A0	12.24	10.71	7.37	7.10	7.65	7.50	6.21	1.58	1.24	3.90	1.83	0.89	1.02	1.25	1.65	1.09
dE+2/A0	2.86	0.95	1.36	3.69	1.49	1.14	2.43	1.22	1.16	1.28	0.62	0.72	0.34	0.02	0.68	0.33
dA0/A0	0.12	0.44	1.20	0.51	0.34	-0.35	0.75	0.10	-0.64	-0.67	-0.24	0.00	-0.06	0.00	0.11	0.35
dA+2/A0	-0.37	-0.10	0.10	0.92	0.31	-0.12	0.22	0.81	0.66	0.23	-0.01	0.20	-0.02	0.00	0.24	0.64
dRD0/A0	5.96	16.84	5.89	1.81	11.60	-3.54	-1.95	2.28	-0.54	-3.92	-2.34	0.66	0.48	1.58	3.35	3.55
dRD+2/A0	3.75	-5.86	4.77	3.67	-1.74	-3.98	5.31	3.03	0.10	-1.49	-2.90	1.87	-0.73	1.39	0.50	6.59
dI0/A0	-13.10	-14.75	-19.41	-15.97	-9.47	-0.04	-19.16	-1.52	5.89	3.48	-2.53	-1.62	-1.92	-1.50	-0.99	-3.25
dI+2/A0	4.50	1.24	-6.78	-7.76	-1.08	3.77	-6.96	-0.93	6.21	4.14	2.56	-0.97	1.58	0.86	-0.58	-1.57
dD0/A0	-1.49	-7.14	10.99	10.92	9.81	6.56	5.48	1.70	-0.74	-13.40	-3.32	3.47	1.45	1.02	-0.06	-4.43
dD+2/A0	10.09	4.94	3.15	6.77	6.61	2.52	4.94	6.42	3.54	-8.71	-2.74	2.43	2.06	0.83	0.59	4.86
dV+2/A0	0.04	0.06	0.15	-0.46	-0.02	0.04	-0.12	-0.69	-0.60	-0.52	-0.05	-0.12	0.05	0.04	-0.07	-0.31
d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.366	0.368	0.536	0.534	0.557	0.539	0.587	0.483	0.529	0.582	0.309	0.239	0.248	0.25	0.31	0.491
RSq	0.478	0.419	0.4	0.503	0.268	0.223	0.3	0.577	0.191	0.169	0.096	0.149	0.136	0.137	0.188	0.305
ANOVA																
d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
DF regression	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
DF error	578.0	636.0	851.0	1,393.0	1,520.0	1,880.0	2,062.0	2,278.0	2,480.0	2,673.0	2,727.0	2,687.0	2,604.0	2,558.0	2,492.0	2,639.0
DF total	589.0	647.0	862.0	1,404.0	1,531.0	1,891.0	2,073.0	2,289.0	2,491.0	2,684.0	2,738.0	2,698.0	2,615.0	2,569.0	2,503.0	2,650.0
SS regression	71.0	62.1	162.7	402.5	172.4	157.0	304.9	723.7	163.5	184.4	27.6	27.0	25.2	25.4	55.4	279.5
SS error	77.5	86.2	244.1	397.0	471.6	546.0	709.8	531.1	692.8	904.5	259.9	154.1	160.5	159.6	239.1	636.3
SS total	148.5	148.3	406.8	799.5	644.0	703.0	1,014.6	1,254.8	856.3	1,088.9	287.5	181.1	185.7	185.0	294.5	915.8
MS regression	6.5	5.6	14.8	36.6	15.7	14.3	27.7	65.8	14.9	16.8	2.5	2.5	2.3	2.3	5.0	25.4
MS error	0.1	0.1	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.2
F	48.2	41.7	51.6	128.4	50.5	49.1	80.5	282.2	53.2	49.5	26.3	42.8	37.2	36.9	52.5	105.4

d(V0-A0)/A0	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Const	-0.09	-0.17	0.05	-0.05	-0.12	0.07	-0.08	-0.23	-0.01	-0.16	-0.01	0.13	0.01	-0.10	-0.08	0.15
dE0/A0	0.79	3.79	0.71	1.12	1.31	0.85	0.71	0.43	0.31	0.41	0.50	1.15	0.90	-0.14	0.66	0.41
dE+2/A0	0.30	1.57	0.25	0.24	1.07	0.13	0.13	-0.60	-0.17	-0.24	0.12	0.31	-0.09	-0.63	0.04	-0.05
dA0/A0	0.08	0.01	0.37	0.13	0.41	0.11	0.20	0.55	0.44	0.39	0.59	0.31	0.40	0.51	0.78	0.52
dA+2/A0	0.30	0.07	0.49	0.16	0.19	0.72	0.46	-0.27	0.28	0.39	0.76	0.52	0.53	0.31	0.16	0.34
dRD0/A0	4.90	15.61	3.36	-1.09	-1.39	1.09	2.13	7.82	-1.73	2.66	3.04	4.78	-0.12	-2.54	3.95	2.69
dRD+2/A0	4.47	-1.34	6.07	-1.06	3.58	0.78	-0.50	0.83	0.19	1.17	5.92	3.93	2.41	2.74	4.91	4.03
dI0/A0	0.37	-5.47	-3.30	-1.50	-5.80	-2.72	-1.47	-4.79	-3.42	-3.21	-7.23	-4.15	-8.26	-6.70	-6.29	-5.97
dI+2/A0	-1.41	-0.41	-2.58	-1.00	-0.68	-3.01	-1.72	3.75	-0.74	-4.04	-4.78	-5.05	-6.15	-3.70	-1.69	-4.14
dD0/A0	6.25	0.85	1.27	6.46	8.92	5.19	1.95	3.03	5.07	1.92	0.23	1.16	-0.83	-2.91	2.42	3.29
dD+2/A0	2.19	3.29	4.04	7.17	0.40	6.85	5.24	5.24	3.65	6.36	10.20	5.16	1.62	4.70	2.80	-0.18
dV+2/A0	-0.07	-0.01	-0.12	-0.05	-0.13	-0.35	-0.20	0.06	-0.02	-0.04	-0.24	-0.14	-0.05	-0.01	-0.01	-0.09
d(V0-A0)/A0	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.754	1.295	0.736	0.773	0.903	0.837	0.894	1.813	1.121	1.027	1.126	0.841	1.079	1.072	1.25	1.063
RSq	0.056	0.098	0.164	0.06	0.093	0.152	0.072	0.032	0.038	0.07	0.173	0.166	0.101	0.087	0.121	0.123
ANOVA																
d(V0-A0)/A0	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
DF regression	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
DF error	2,843.0	2,865.0	2,999.0	2,894.0	2,978.0	2,855.0	2,863.0	3,043.0	3,248.0	3,271.0	3,292.0	3,296.0	3,433.0	3,522.0	3,737.0	3,794.0
DF total	2,854.0	2,876.0	3,010.0	2,905.0	2,989.0	2,866.0	2,874.0	3,054.0	3,259.0	3,282.0	3,303.0	3,307.0	3,444.0	3,533.0	3,748.0	3,805.0
SS regression	96.1	519.7	319.2	109.8	248.3	357.3	177.0	331.9	160.4	260.0	870.7	463.2	447.4	386.9	803.1	598.9
SS error	1,615.3	4,804.3	1,623.5	1,729.7	2,426.3	2,000.0	2,289.2	10,001.6	4,081.2	3,452.3	4,171.2	2,329.3	3,998.0	4,045.4	5,837.3	4,285.2
SS total	1,711.4	5,324.0	1,942.7	1,839.5	2,674.5	2,357.3	2,466.2	10,333.5	4,241.6	3,712.3	5,041.9	2,792.5	4,445.3	4,432.3	6,640.4	4,884.1
MS regression	8.7	47.2	29.0	10.0	22.6	32.5	16.1	30.2	14.6	23.6	79.2	42.1	40.7	35.2	73.0	54.4
MS error	0.6	1.7	0.5	0.6	0.8	0.7	0.8	3.3	1.3	1.1	1.3	0.7	1.2	1.1	1.6	1.1
F	15.4	28.2	53.6	16.7	27.7	46.4	20.1	9.2	11.6	22.4	62.5	59.6	34.9	30.6	46.7	48.2

d(V0-A0)/A0	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	FF98 Mean	SE	T	FF98 T
Const	0.01	-0.17	-0.04	-0.02	-0.58	-0.84	0.40	1.20	-0.48	-0.36	0.07	-0.58	-0.10	-0.13	0.04	-2.27	-5.00
dE0/A0	0.06	0.09	-0.13	0.25	0.56	-0.99	-0.47	-2.65	-14.84	-1.35	-0.45	-0.87	1.51	3.46	0.61	2.47	6.85
dE+2/A0	-0.77	-0.40	-0.31	-0.16	-1.52	1.38	0.03	-1.01	1.63	-0.79	-0.17	-2.45	0.41	0.83	0.17	2.47	5.05
dA0/A0	0.53	0.73	0.49	-0.02	1.07	0.16	0.29	-0.33	1.93	1.34	0.35	0.53	0.34	0.16	0.07	4.66	1.79
dA+2/A0	0.30	0.05	1.04	1.08	-0.64	-2.74	-0.14	0.53	0.41	0.16	0.53	0.57	0.23	0.34	0.09	2.65	5.11
dRD0/A0	2.29	1.93	4.47	2.80	11.45	3.23	7.38	-3.73	-6.63	-2.69	-0.22	4.56	2.54	2.69	0.73	3.46	2.33
dRD+2/A0	5.19	2.05	6.15	5.58	11.76	2.83	-8.33	8.70	6.99	3.76	4.07	-2.07	2.25	2.96	0.58	3.89	3.72
dI0/A0	-1.40	-5.05	-0.56	-0.25	-3.35	-4.04	-2.43	-11.23	19.17	1.19	-2.17	-13.36	-4.30	-6.16	0.99	-4.33	-5.10
dI+2/A0	-2.76	-0.92	-2.20	-1.73	-2.72	3.16	4.96	-3.06	3.77	1.78	-0.33	-9.03	-1.10	-2.13	0.54	-2.04	-2.55
dD0/A0	4.16	1.40	4.77	4.33	-1.29	-1.02	-2.94	1.54	3.80	4.04	3.45	0.13	1.99	3.29	0.69	2.89	2.68
dD+2/A0	2.11	0.01	2.45	0.74	9.84	8.02	-6.22	-1.22	4.59	5.90	2.85	4.19	3.42	4.90	0.57	6.01	4.42
dV+2/A0	-0.02	0.01	-0.49	-0.62	0.09	0.75	0.03	-0.34	-0.23	-0.56	-0.05	-0.15	-0.13	-0.14	0.04	-3.36	-3.53
d(V0-A0)/A0	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008					
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0					
S	1.531	1.848	2.482	1.597	6.242	31.473	9.353	15.324	29.446	4.639	2.948	4.997					
RSq	0.109	0.088	0.273	0.364	0.154	0.084	0.552	0.323	0.27	0.19	0.049	0.141					
ANOVA																	
d(V0-A0)/A0	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008					
DF regression	11	11	11	11	11	11	11	11	11	11	11	11					
DF error	4,029.0	4,162.0	4,077.0	4,058.0	4,178.0	4,325.0	4,213.0	4,088.0	3,904.0	3,757.0	3,707.0	3,546.0					
DF total	4,040.0	4,173.0	4,088.0	4,069.0	4,189.0	4,336.0	4,224.0	4,099.0	3,915.0	3,768.0	3,718.0	3,557.0					
SS regression	1,154.0	1,367.2	9,443.2	5,918.9	29,650.2	390,437.2	453,528.1	458,171.7	1,254,828.8	18,988.3	1,653.2	14,518.8					
SS error	9,438.7	14,216.7	25,109.8	10,345.0	162,807.4	4,284,039.9	368,526.6	960,025.7	3,385,037.1	80,858.6	32,206.2	88,556.1					
SS total	10,592.7	15,583.9	34,553.0	16,263.9	192,457.6	4,674,477.2	822,054.7	1,418,197.4	4,639,866.0	99,846.8	33,859.4	103,074.9					
MS regression	104.9	124.3	858.5	538.1	2,695.5	35,494.3	41,229.8	41,652.0	114,075.3	1,726.2	150.3	1,319.9					
MS error	2.3	3.4	6.2	2.5	39.0	990.5	87.5	234.8	867.1	21.5	8.7	25.0					
F	44.8	36.4	139.4	211.1	69.2	35.8	471.3	177.4	131.6	80.2	17.3	52.9					

Formula4 AllCompustatFirms

d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Const	-0.08	-0.28	-0.15	0.15	-0.25	-0.35	-0.14	-0.38	-0.38	-0.33	-0.05	0.06	-0.04	-0.07	-0.08	0.02
dE0/A0	14.68	10.51	9.13	7.68	7.79	7.93	7.06	1.79	2.69	3.52	1.64	1.10	1.24	1.11	1.74	1.22
dE+2/A0	2.96	1.31	1.74	3.44	2.11	1.29	2.73	1.52	1.32	1.06	0.53	0.86	0.35	-0.19	0.76	0.32
dA0/A0	-0.28	0.17	0.98	0.37	0.22	-0.30	0.20	0.04	-0.56	-0.59	-0.30	-0.06	-0.05	-0.05	0.06	0.24
dA+2/A0	-0.36	-0.07	-0.17	0.61	0.34	-0.07	0.08	0.80	0.69	0.35	0.05	0.17	0.02	0.01	0.21	0.61
dRD0/A0	5.13	19.07	3.43	3.71	15.04	-3.35	-1.72	1.70	-1.79	-3.69	-2.49	0.90	0.45	1.56	3.54	4.14
dRD+2/A0	3.26	-3.75	10.00	4.05	-1.30	-4.50	5.76	2.73	0.01	-1.68	-2.84	1.97	-0.91	1.15	0.90	6.58
d(I0/A0)	-8.51	-9.90	-11.60	-14.34	-6.82	-3.60	-15.32	-2.94	1.63	2.12	-1.85	-0.63	-2.03	-0.61	0.40	-1.74
d(I+2/A+2)	5.00	0.98	-6.48	-6.93	3.44	3.07	-3.09	-0.19	5.81	0.46	2.66	0.85	1.79	1.58	0.55	-0.02
d(D0/A0)	-0.27	-0.89	7.73	6.15	1.94	-5.51	-2.46	-4.33	-3.83	-3.35	-0.15	2.47	1.29	3.65	3.88	2.60
d(D+2/A+2)	-0.34	9.03	-2.97	-3.15	2.71	-0.65	-12.06	2.91	0.08	-4.43	-2.31	0.87	0.36	4.81	0.44	3.36
dV+2/A0	0.10	0.07	0.18	-0.35	0.01	0.05	-0.13	-0.71	-0.59	-0.58	-0.06	-0.13	0.05	0.08	-0.07	-0.30
d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.374	0.377	0.543	0.553	0.553	0.548	0.596	0.485	0.525	0.591	0.319	0.246	0.243	0.25	0.316	0.485
RSq	0.495	0.449	0.383	0.416	0.269	0.219	0.258	0.57	0.197	0.133	0.078	0.128	0.14	0.248	0.192	0.317
ANOVA																
d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
DF regression	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
DF error	573	637	850	1396	1523	1878	2056	2272	2470	2671	2720	2685	2600	2558	2494	2638
DF total	584	648	861	1407	1534	1889	2067	2283	2481	2682	2731	2696	2611	2569	2505	2649
SS regression	78.7	73.6	155.8	304.3	171.4	158.1	253.1	708.7	166.8	143.0	23.3	24.0	24.9	53.0	59.4	287.6
SS error	80.2	90.5	251.0	427.6	466.3	564.3	729.6	534.0	680.7	931.9	276.1	163.0	153.3	160.3	249.4	619.3
SS total	159.0	164.1	406.8	731.9	637.7	722.3	982.7	1,242.7	847.6	1,074.9	299.4	187.0	178.2	213.3	308.9	906.9
MS regression	7.2	6.7	14.2	27.7	15.6	14.4	23.0	64.4	15.2	13.0	2.1	2.2	2.3	4.8	5.4	26.1
MS error	0.1	0.1	0.3	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.2
F	51.1	47.1	48.0	90.3	50.9	47.8	64.8	274.1	55.0	37.2	20.8	36.0	38.4	76.9	54.0	111.3
P																

d(V0-A0)/A0	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Const	-0.07	-0.16	0.09	-0.03	-0.09	0.09	-0.07	-0.22	0.00	-0.13	0.06	0.17	0.05	-0.08	-0.07	0.17
dE0/A0	0.95	4.05	1.04	1.29	1.63	1.00	0.90	0.53	0.58	0.47	0.73	1.22	0.97	0.03	0.76	0.50
dE+2/A0	0.43	1.79	0.40	0.34	1.16	0.20	0.28	-0.59	0.07	-0.20	0.30	0.36	-0.12	-0.50	0.05	0.05
dA0/A0	0.09	-0.22	0.22	0.11	0.17	0.01	0.12	0.44	0.33	0.32	0.30	0.10	0.21	0.33	0.65	0.39
dA+2/A0	0.22	0.10	0.38	0.11	0.18	0.65	0.43	-0.13	0.28	0.27	0.74	0.44	0.31	0.22	0.10	0.21
dRD0/A0	4.79	16.02	3.57	-0.84	0.75	1.40	2.07	7.96	-1.20	2.51	3.83	5.08	0.18	-2.23	4.37	2.89
dRD+2/A0	4.51	-1.24	6.33	-1.27	2.19	1.22	-0.41	0.20	0.32	1.07	5.81	3.95	3.15	3.02	4.95	4.24
d(I0/A0)	1.15	-5.52	-0.50	-1.48	-3.55	-0.96	-0.30	-3.21	-1.84	0.03	-4.24	-3.65	-5.06	-5.08	-5.80	-4.95
d(I+2/A+2)	0.15	-0.31	0.08	-0.66	0.98	0.09	0.78	1.62	2.65	0.25	1.35	0.31	-6.67	-3.36	-1.45	-1.86
d(D0/A0)	4.91	-0.07	1.53	4.45	6.08	4.17	3.31	3.52	6.62	2.95	1.19	2.41	0.01	0.15	2.04	2.81
d(D+2/A+2)	0.97	0.49	3.75	0.98	-0.30	6.48	2.84	0.46	3.69	5.01	9.08	1.21	0.29	6.00	3.77	3.15
dV+2/A0	-0.05	-0.05	-0.11	-0.03	-0.14	-0.37	-0.20	0.06	-0.03	0.00	-0.24	-0.13	-0.03	0.00	0.00	-0.09
d(V0-A0)/A0	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.757	1.295	0.741	0.766	0.864	0.844	0.902	1.807	1.113	1.041	1.136	0.844	1.07	1.086	1.245	1.064
RSq	0.052	0.101	0.151	0.052	0.087	0.144	0.073	0.029	0.039	0.06	0.161	0.149	0.087	0.076	0.124	0.112
ANOVA																
d(V0-A0)/A0	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
DF regression	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
DF error	2844	2859	2997	2888	2975	2858	2860	3040	3242	3261	3284	3294	3426	3528	3735	3795
DF total	2855	2870	3008	2899	2986	2869	2871	3051	3253	3272	3295	3305	3437	3539	3746	3806
SS regression	89.1	536.0	292.8	92.3	212.8	342.1	182.1	296.4	162.1	227.3	816.1	411.1	371.8	340.0	819.6	543.2
SS error	1,631.7	4,795.9	1,645.7	1,695.6	2,222.0	2,033.7	2,329.4	9,924.0	4,013.4	3,533.2	4,237.5	2,346.6	3,921.2	4,159.3	5,791.4	4,296.5
SS total	1,720.8	5,331.9	1,938.5	1,787.9	2,434.9	2,375.9	2,511.5	10,220.4	4,175.5	3,760.5	5,053.5	2,757.6	4,293.0	4,499.3	6,611.0	4,839.7
MS regression	8.1	48.7	26.6	8.4	19.3	31.1	16.6	26.9	14.7	20.7	74.2	37.4	33.8	30.9	74.5	49.4
MS error	0.6	1.7	0.5	0.6	0.7	0.7	0.8	3.3	1.2	1.1	1.3	0.7	1.1	1.2	1.6	1.1
F	14.1	29.0	48.5	14.3	25.9	43.7	20.3	8.3	11.9	19.1	57.5	52.5	29.5	26.2	48.1	43.6
P																

d(V0-A0)/A0	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	FF98 Mean	SE	T	FF98 T
Const	0.03	-0.12	-0.07	-0.04	-0.57	-0.96	0.85	1.00	-0.50	-0.33	0.04	-0.52	-0.09	-0.11	0.05	-1.84	-3.44
dE0/A0	0.28	-0.47	-1.66	0.05	0.27	-2.11	0.99	-2.86	-18.21	-1.14	-0.47	-0.80	1.62	4.13	0.70	2.30	6.13
dE+2/A0	-0.44	-0.51	-0.37	-0.49	-1.56	2.46	-0.90	-0.99	1.12	-0.48	-0.16	-2.52	0.48	1.11	0.18	2.71	4.75
dA0/A0	0.44	0.59	0.99	-0.03	0.60	1.55	0.05	-0.11	1.80	1.40	0.33	-0.35	0.25	0.00	0.07	3.31	0.03
dA+2/A0	0.19	0.02	1.04	1.04	-0.63	-1.10	-0.48	0.65	0.18	0.19	0.39	0.35	0.22	0.27	0.06	3.59	4.89
dRD0/A0	2.50	0.49	0.84	3.13	10.62	0.04	14.58	-3.45	-8.09	-3.50	1.21	3.74	2.70	3.77	0.82	3.28	2.66
dRD+2/A0	5.76	2.39	6.03	6.00	11.39	-2.27	-14.78	8.00	10.23	3.84	2.99	-1.82	2.21	3.08	0.69	3.22	3.92
d(I0/A0)	-4.45	-10.13	4.32	5.84	-8.35	-6.21	-17.70	-0.17	-0.34	-1.35	1.22	-7.89	-3.77	-5.88	0.75	-5.01	-4.66
d(I+2/A+2)	-3.25	-6.21	1.25	0.45	-5.93	17.23	-13.03	5.46	4.14	-1.27	-0.95	-6.68	-0.12	-0.60	0.70	-0.18	-0.54
d(D0/A0)	3.53	0.82	8.25	3.75	-0.02	0.73	-2.39	1.02	-0.23	-1.80	2.14	-0.03	1.61	2.29	0.47	3.42	2.31
d(D+2/A+2)	0.09	-0.10	8.45	0.08	-1.22	-12.84	-0.60	-7.44	21.02	-5.18	-0.86	5.24	1.21	0.05	0.83	1.46	0.04
dV+2/A0	-0.02	0.01	-0.47	-0.62	0.08	0.84	0.00	-0.36	-0.20	-0.58	-0.08	-0.20	-0.12	-0.14	0.04	-3.07	-3.26
d(V0-A0)/A0	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008					
Unusable Observat ons	0	0	0	0	0	0	1	0	0	0	0	0					
S	1.473	2.037	2.688	1.846	6.334	32.253	12.293	15.824	28.527	4.672	3.216	4.605					
RSq	0.112	0.097	0.283	0.307	0.162	0.202	0.834	0.307	0.317	0.192	0.082	0.207					
ANOVA																	
d(V0-A0)/A0	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008					
DF regression	11	11	11	11	11	11	11	11	11	11	11	11					
DF error	4024	4161	4081	4065	4192	4334	4203	4082	3892	3765	3717	3548					
DF total	4035	4172	4092	4076	4203	4345	4214	4093	3903	3776	3728	3559					
SS regression	1,105.4	1,844.6	11,651.4	6,148.7	32,509.5	1,138,497.3	3,182,410.3	452,977.7	1,471,274.2	19,475.0	3,446.9	19,692.8					
SS error	8,734.8	17,268.3	29,489.2	13,849.9	168,167.5	4,508,538.6	635,133.3	1,022,071.7	3,167,250.5	82,185.9	38,444.8	75,230.7					
SS total	9,840.2	19,112.9	41,140.5	19,998.7	200,677.0	5,647,035.9	3,817,543.6	1,475,049.4	4,638,524.7	101,660.8	41,891.7	94,923.5					
MS regression	100.5	167.7	1,059.2	559.0	2,955.4	103,499.8	289,310.0	41,179.8	133,752.2	1,770.5	313.4	1,790.3					
MS error	2.2	4.2	7.2	3.4	40.1	1,040.3	151.1	250.4	813.8	21.8	10.3	21.2					
F	46.3	40.4	146.6	164.1	73.7	99.5	1,914.5	164.5	164.4	81.1	30.3	84.4					
P																	

Formula 1 and 2 – NYSE, AMEX and NASDAQ

Formula1 NYSE,NASDAQ, AMEX

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Const	-1.28	-1.39	-1.17	-0.57	-0.61	-0.50	-0.54	-0.78	-0.70	-0.63	-0.50	-0.51	-0.47	-0.44	-0.46	-0.40	-0.26	-0.04
E0/A0	14.47	11.36	18.43	11.08	6.37	7.49	8.79	2.82	3.17	1.85	1.69	2.60	2.36	1.60	3.37	4.84	2.40	2.38
dE0/A0	-0.86	1.07	-6.79	-0.77	-0.78	-2.94	-1.16	-0.51	-0.13	-0.36	0.19	-0.30	-0.18	0.72	0.12	-1.29	0.50	-0.38
dE+2/A0	2.62	2.00	0.32	3.55	1.25	1.65	4.42	1.74	2.10	0.85	1.73	1.48	0.24	0.16	1.88	0.85	-0.29	0.53
dA0/A0	1.05	1.41	1.76	0.72	1.52	0.90	0.94	0.48	0.76	0.51	0.54	0.42	0.32	0.39	0.30	0.65	0.57	0.34
dA+2/A0	-0.73	-0.24	0.11	0.94	0.63	-0.09	0.71	1.23	1.10	0.41	0.61	0.27	-0.13	-0.01	0.24	0.63	-0.01	0.61
RD0/A0	6.40	6.11	2.70	9.10	12.90	7.37	9.07	6.75	4.41	3.86	2.42	3.45	2.00	2.57	1.85	0.89	0.78	1.30
dRD0/A0	2.92	-0.58	6.36	-1.57	8.52	-1.55	-3.10	-2.18	0.46	2.93	5.83	0.30	2.63	0.68	0.54	7.32	4.18	5.93
dRD+2/A0	4.05	6.65	26.09	10.01	5.92	0.31	8.74	5.80	12.88	4.72	4.32	2.59	-0.81	1.50	2.96	7.00	5.00	6.52
I0/A0	12.90	21.68	4.12	-3.84	1.64	-3.46	-6.29	7.17	3.75	5.30	3.78	2.24	2.74	2.62	-0.16	-1.70	-2.35	-4.30
dI0/A0	-0.81	-29.14	-8.59	-10.51	-20.29	-1.65	-3.08	-3.26	-4.29	-5.18	-4.92	-1.86	-2.16	-3.21	-0.17	-2.29	-1.82	0.79
dI+2/A0	6.15	-0.31	-12.92	-4.69	-11.43	-2.71	-12.92	-4.21	-5.18	-1.99	-2.50	-0.30	0.29	-0.47	-1.68	-1.53	-1.49	-3.66
D0/A0	9.45	8.49	-1.50	0.28	6.95	3.11	2.36	5.55	6.20	6.56	4.80	4.54	3.96	2.28	-0.63	-3.38	0.26	-1.03
dD0/A0	-1.08	-4.33	9.36	12.69	18.70	9.59	16.60	7.20	2.21	1.26	2.75	2.03	3.52	7.41	9.64	0.44	1.98	6.21
dD+2/A0	15.22	11.68	3.89	15.78	12.67	3.07	5.00	4.13	10.16	5.07	6.39	7.40	5.74	4.18	-0.64	8.49	1.19	4.55
dV+2/A0	0.20	0.12	0.17	-0.55	-0.04	0.22	-0.29	-1.10	-0.88	-0.21	-0.52	-0.28	0.13	0.08	-0.10	-0.27	0.15	-0.28

(V0-A0)/A0	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Const	0.05	0.20	0.35	0.29	0.12	0.05	0.13	-0.10	0.11	0.08	0.11	0.07	0.32	0.24	0.44	0.35	0.36
E0/A0	2.80	0.41	0.24	1.92	2.94	2.60	1.48	1.97	2.27	1.57	1.22	1.88	0.28	1.51	0.46	-0.87	-0.41
dE0/A0	-1.62	-0.12	0.98	0.58	0.21	0.21	0.97	0.36	0.94	0.92	0.80	0.18	1.01	0.40	0.75	1.61	2.19
dE+2/A0	0.80	0.86	0.66	1.72	1.68	1.68	0.77	1.04	1.95	1.38	0.89	0.46	0.65	1.08	0.46	-0.13	1.30
dA0/A0	0.61	0.29	0.28	0.17	0.34	0.31	0.38	0.57	0.91	0.89	0.88	0.72	0.84	1.08	0.65	0.52	0.97
dA+2/A0	0.57	0.38	0.41	0.72	0.10	0.06	0.19	0.32	0.61	0.38	0.33	0.07	0.10	0.37	0.26	0.19	1.06
RD0/A0	3.47	1.20	3.37	3.19	3.54	2.13	2.95	2.90	5.02	4.29	3.71	4.78	7.23	8.08	5.58	5.25	11.08
dRD0/A0	3.96	6.89	3.64	-0.01	1.32	5.18	0.92	0.48	0.81	5.28	9.15	-0.23	-1.19	-3.58	0.91	1.73	-0.57
dRD+2/A0	7.71	3.85	5.16	4.11	3.21	1.82	-0.17	4.67	6.80	4.40	2.31	1.00	4.40	4.65	5.84	0.28	8.08
I0/A0	-5.37	-5.53	-7.70	-6.56	-6.73	-3.01	-3.22	-2.10	-5.02	-3.99	-2.76	-3.83	-6.17	-6.21	-6.85	-4.58	-5.89
dI0/A0	0.87	0.69	-1.31	1.37	0.09	-0.35	-1.57	-3.62	-5.23	-6.37	-10.41	-7.48	-8.67	-10.11	-8.11	-5.76	-8.62
dI+2/A0	-5.43	-3.40	-3.89	-4.13	-2.87	-1.24	-2.03	-6.63	-9.09	-7.14	-6.30	-3.21	-5.24	-8.93	-4.66	-2.85	-12.24
D0/A0	-3.04	0.51	1.68	0.68	3.10	3.32	5.58	8.05	7.10	7.51	8.80	5.64	5.12	8.23	11.80	15.01	9.70
dD0/A0	7.30	4.60	7.40	4.15	-1.48	5.35	8.11	0.31	-0.58	6.34	1.37	0.79	-0.22	-2.98	-0.31	-4.42	-4.45
dD+2/A0	4.74	8.68	0.27	9.91	1.29	5.76	7.61	10.32	9.18	7.34	4.81	2.09	2.44	-5.69	-4.26	5.38	0.00
dV+2/A0	-0.17	-0.09	-0.04	-0.47	0.04	0.01	0.10	0.05	-0.22	-0.08	-0.02	0.12	0.09	-0.03	0.04	0.07	-0.43

(V0-A0)/A0	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	FF98 Mean	SE	T	FF98 T
Const	0.26	0.32	0.13	0.38	0.40	0.42	0.25	0.30	0.06	-0.13	-0.17	0.07	-1.74	-2.82
E0/A0	1.60	1.13	0.43	1.07	0.00	0.68	1.31	0.57	0.36	3.10	1.80	0.61	5.12	2.61
dE0/A0	0.61	0.70	0.37	0.88	0.61	0.49	-0.12	0.51	0.53	0.02	0.43	0.21	0.11	2.43
dE+2/A0	2.79	1.73	0.10	-0.02	0.00	0.39	1.30	1.61	0.45	1.20	0.80	0.15	8.22	3.08
dA0/A0	0.43	0.44	0.26	0.55	0.80	0.69	0.22	0.45	0.30	0.64	0.66	0.05	12.01	12.21
dA+2/A0	1.28	0.53	0.19	0.35	0.16	0.45	0.92	1.40	0.24	0.41	0.45	0.06	6.34	5.48
RD0/A0	5.85	8.30	3.77	7.73	6.26	6.45	4.42	7.01	3.45	4.89	4.29	0.41	11.82	7.24
dRD0/A0	1.17	4.16	0.85	-0.01	2.21	-2.27	1.93	0.30	0.13	1.88	4.30	0.47	4.03	3.74
dRD+2/A0	9.98	9.95	1.90	4.81	5.71	4.70	4.74	9.20	2.75	5.37	5.66	0.66	8.14	6.86
I0/A0	-6.18	-6.02	0.01	-5.37	-5.95	-5.91	-1.88	-5.05	-0.11	-1.73	-1.17	0.87	-2.00	-1.54
dI0/A0	-4.94	-4.55	-3.08	-2.75	-11.59	-9.89	-6.85	-5.57	-5.01	-5.26	-4.21	0.84	-6.22	-5.94
dI+2/A0	-8.61	-5.57	-1.24	-10.57	-4.47	-9.37	-3.36	-6.24	-3.90	-4.64	-4.57	0.59	-7.89	-5.24
D0/A0	8.89	9.58	9.31	6.70	7.86	6.15	7.29	10.14	7.71	5.24	4.22	0.62	8.48	5.42
dD0/A0	-1.60	-5.42	1.96	0.38	2.42	6.89	1.57	0.76	-2.70	3.22	6.63	0.81	3.98	6.08
dD+2/A0	8.62	1.98	1.81	2.25	6.10	3.64	4.87	8.30	3.27	5.33	8.10	0.67	7.96	9.98
dV+2/A0	-0.88	-0.13	0.05	0.02	0.08	0.02	-0.67	-0.72	0.02	-0.15	-0.16	0.05	-3.14	-2.62

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Unusable Observations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.60	0.57	0.72	0.67	0.70	0.50	0.73	0.53	0.48	0.32	0.32	0.31	0.31	0.27	0.38	0.55	0.52	0.56
RSq	0.65	0.54	0.54	0.59	0.44	0.55	0.47	0.76	0.54	0.32	0.45	0.41	0.34	0.43	0.36	0.38	0.29	0.31

(V0-A0)/A0	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unusable Observations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.59	0.73	0.82	0.72	0.69	0.59	0.66	0.70	0.88	0.79	0.83	0.74	1.02	1.03	1.05	1.19	1.57	0.98	1.13	0.89	1.09	1.12	1.13	0.81	1.12	0.73
RSq	0.39	0.17	0.20	0.32	0.27	0.31	0.33	0.64	0.36	0.35	0.31	0.32	0.31	0.28	0.27	0.27	0.42	0.67	0.34	0.20	0.32	0.27	0.26	0.50	0.42	0.23

ANOVA

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	437	482	648	1049	1151	1380	1515	1590	1701	1807	1841	1825	1783	1752	1711	1721	1777	1768
DF total	452	497	663	1064	1166	1395	1530	1605	1716	1822	1856	1840	1798	1767	1726	1736	1792	1783
SS regression	285.2	182.0	392.1	674.7	444.4	415.6	723.1	1,459.8	457.1	88.7	156.0	118.8	88.3	96.8	134.2	317.3	195.7	255.4
SS error	155.2	155.0	331.6	466.5	564.4	341.0	816.2	451.9	393.4	187.3	188.0	173.1	168.2	128.6	242.2	525.5	473.7	563.1
SS total	440.4	337.1	723.7	1,141.2	1,008.8	756.6	1,539.4	1,911.7	850.4	276.0	344.0	291.9	256.5	225.4	376.3	842.7	669.4	818.6
MS regression	19.0	12.1	26.1	45.0	29.6	27.7	48.2	97.3	30.5	5.9	10.4	7.9	5.9	6.5	8.9	21.2	13.0	17.0
MS error	0.4	0.3	0.5	0.4	0.5	0.2	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3
F	53.5	37.7	51.1	101.1	60.4	112.1	89.5	342.4	131.8	57.0	101.9	83.5	62.4	87.9	63.2	69.3	48.9	53.5
P																		

(V0-A0)/A0	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	1813	1757	1837	1804	1792	1907	2086	2168	2215	2238	2316	2364	2452
DF total	1828	1772	1852	1819	1807	1922	2101	2183	2230	2253	2331	2379	2467
SS regression	402.7	183.0	310.7	435.8	308.8	297.7	460.0	1,885.6	971.4	763.5	727.1	614.2	1,137.9
SS error	634.9	927.7	1,244.0	921.5	856.7	653.3	918.6	1,065.3	1,703.2	1,404.9	1,601.7	1,298.2	2,559.0
SS total	1,037.5	1,110.7	1,554.7	1,357.3	1,165.5	951.0	1,378.6	2,950.9	2,674.5	2,168.3	2,328.8	1,912.4	3,696.9
MS regression	26.8	12.2	20.7	29.1	20.6	19.8	30.7	125.7	64.8	50.9	48.5	40.9	75.9
MS error	0.4	0.5	0.7	0.5	0.5	0.3	0.4	0.5	0.8	0.6	0.7	0.5	1.0
F	76.7	23.1	30.6	56.9	43.1	57.9	69.6	255.8	84.2	81.1	70.1	74.6	72.7

(V0-A0)/A0	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	2453	2481	2552	2565	2643	2746	2817	2749	2683	2596	2643	2717	2748
DF total	2468	2496	2567	2580	2658	2761	2832	2764	2698	2611	2658	2732	2763
SS regression	1,002.5	996.4	1,348.6	4,524.9	5,035.8	1,789.2	550.4	1,509.1	1,235.2	1,193.2	1,756.5	2,430.2	450.0
SS error	2,592.4	2,711.3	3,624.7	6,341.3	2,527.4	3,522.8	2,224.6	3,259.0	3,339.8	3,337.6	1,751.2	3,398.7	1,480.3
SS total	3,595.0	3,707.8	4,973.3	10,866.2	7,563.2	5,312.0	2,775.0	4,768.1	4,575.0	4,530.8	3,507.7	5,829.0	1,930.3
MS regression	66.8	66.4	89.9	301.7	335.7	119.3	36.7	100.6	82.3	79.5	117.1	162.0	30.0
MS error	1.1	1.1	1.4	2.5	1.0	1.3	0.8	1.2	1.2	1.3	0.7	1.3	0.5
F	63.2	60.8	63.3	122.0	351.1	93.0	46.5	84.9	66.2	61.9	176.7	129.5	55.7

Formula2 NYSE,NASDAQ, AMEX

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Const	-1.40	-1.31	-0.92	-0.53	-0.64	-0.54	-0.57	-0.87	-0.67	-0.61	-0.50	-0.53	-0.49	-0.44	-0.48	-0.42	-0.25	-0.05
E0/A0	15.17	10.58	18.75	11.76	9.73	8.35	9.94	3.46	4.88	2.54	2.30	3.01	2.82	1.89	3.64	5.67	2.69	2.97
dE0/A0	-0.49	2.43	-5.71	-0.91	-0.88	-2.96	0.00	-0.44	-1.08	-0.41	0.15	-0.21	0.13	0.84	0.20	-1.36	0.80	-0.61
dE+2/A0	0.86	2.29	0.14	3.81	2.61	1.88	5.02	2.10	2.09	1.04	2.03	1.60	0.42	0.28	1.88	1.40	-0.30	0.65
dA0/A0	0.84	0.84	1.63	0.68	1.17	0.87	0.86	0.33	0.50	0.30	0.32	0.27	0.25	0.30	0.30	0.55	0.40	0.36
dA+2/A0	-0.43	-0.14	-0.30	0.86	0.42	-0.14	0.40	1.13	0.97	0.30	0.61	0.32	-0.12	-0.02	0.20	0.50	-0.03	0.51
RD0/A0	6.19	4.76	2.63	9.78	12.40	7.91	9.31	6.34	4.21	3.39	2.20	3.52	2.02	2.08	1.58	0.50	0.63	1.22
dRD0/A0	2.69	2.41	4.87	-0.49	10.65	-2.27	-3.28	-2.48	0.67	3.06	6.04	0.48	2.42	1.64	1.28	7.86	4.28	5.66
dRD+2/A0	4.74	9.56	32.49	9.44	5.42	0.29	8.93	5.92	14.29	5.24	4.50	2.32	-0.78	1.90	3.59	7.80	5.15	6.53
I0/A0	15.64	16.33	-8.45	-7.33	-9.24	-4.86	-10.08	6.30	0.05	2.97	1.95	1.73	2.33	1.09	-1.42	-3.25	-3.10	-5.15
d(I0/A0)	0.60	-15.02	6.07	-8.01	-7.22	3.18	4.88	-0.02	0.22	-1.16	-0.33	0.22	-0.57	-0.03	3.82	0.06	0.51	2.96
d(I+2/A+2)	12.50	7.09	-11.18	-6.40	-1.60	2.03	-2.80	-0.42	-1.59	0.88	1.41	2.63	0.99	0.40	-0.49	-1.65	0.30	-1.87
D0/A0	12.58	10.54	-3.30	1.27	6.25	3.78	2.82	8.22	5.13	6.31	6.06	6.85	5.93	5.05	1.62	-2.26	0.62	0.02
d(D0/A0)	-4.53	-6.99	6.28	2.11	-1.65	5.08	5.15	-2.80	-9.42	-3.44	-2.01	-1.91	0.84	5.04	5.19	4.07	-2.04	0.35
d(D+2/A+2)	14.18	12.54	-2.49	5.17	8.59	0.54	-6.10	5.36	5.00	3.06	6.77	9.72	0.22	3.31	-3.41	-0.59	-1.74	2.15
dV+2/A0	0.25	0.13	0.23	-0.53	-0.01	0.22	-0.27	-1.14	-0.87	-0.16	-0.52	-0.27	0.13	0.08	-0.11	-0.29	0.15	-0.28

(V0-A0)/A0	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Const	0.04	0.20	0.37	0.28	0.12	0.08	0.13	-0.05	0.16	0.10	0.17	0.13	0.40	0.35	0.53	0.41	0.44
E0/A0	2.78	0.48	0.41	2.46	2.78	3.02	1.99	2.68	2.96	1.83	2.15	2.65	0.81	2.04	0.64	-0.38	-0.23
dE0/A0	-1.39	0.02	1.10	0.71	0.27	0.26	0.88	0.26	0.96	1.06	0.67	0.33	1.02	0.42	0.74	1.33	2.12
dE+2/A0	0.73	1.03	0.80	2.21	1.63	1.82	0.86	1.23	2.33	1.47	1.22	1.08	0.76	1.35	0.41	-0.17	1.46
dA0/A0	0.55	0.29	0.21	0.18	0.30	0.31	0.29	0.33	0.59	0.69	0.57	0.55	0.57	0.82	0.45	0.38	0.76
dA+2/A0	0.49	0.28	0.28	0.63	0.04	-0.01	0.19	0.22	0.55	0.30	0.16	-0.10	-0.03	0.01	0.14	0.13	0.84
RD0/A0	3.77	1.25	3.32	3.23	3.48	2.10	2.93	2.69	4.85	4.44	3.56	5.14	7.16	7.85	5.28	5.43	11.15
dRD0/A0	3.37	6.64	3.91	-0.54	1.61	5.19	1.08	0.90	1.81	5.53	9.32	-0.02	-0.77	-2.99	1.79	1.63	-0.14
dRD+2/A0	8.04	4.20	5.46	4.01	3.39	1.87	-0.36	4.66	6.80	4.61	2.05	1.57	4.60	5.65	6.15	0.32	9.02
I0/A0	-5.01	-5.30	-8.49	-7.71	-6.76	-4.11	-3.67	-2.77	-4.56	-3.52	-4.59	-5.73	-10.54	-9.82	-10.14	-8.23	-9.98
d(I0/A0)	4.29	3.55	1.77	5.89	2.01	1.03	1.93	1.71	1.34	-1.46	-4.55	-2.40	-0.15	-4.90	-1.91	3.12	-0.56
d(I+2/A+2)	-0.59	0.65	-1.00	0.64	-0.93	-0.71	3.33	-0.87	0.69	-1.88	-3.94	-4.67	-0.25	-4.77	-6.12	-4.78	-9.61
D0/A0	-1.04	2.52	2.39	3.00	3.14	3.06	6.12	5.99	6.56	9.05	7.64	4.99	4.85	6.21	10.06	14.01	8.58
d(D0/A0)	2.34	2.91	4.90	5.77	3.17	4.44	6.70	2.31	-1.71	5.78	1.46	2.43	0.53	-0.97	3.56	0.37	1.48
d(D+2/A+2)	5.63	5.45	0.08	10.84	7.91	-0.08	8.18	8.48	8.08	10.93	3.12	-0.46	3.34	3.16	1.78	2.90	-1.71
dV+2/A0	-0.14	-0.05	-0.03	-0.47	0.05	0.02	0.11	0.06	-0.22	-0.07	0.00	0.09	0.10	-0.04	0.04	0.07	-0.42

(V0-A0)/A0	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	FF98 Mean	SE	T	FF98 T
Const	0.30	0.35	0.15	0.41	0.42	0.43	0.28	0.31	0.08	-0.10	-0.16	0.07	-1.40	-2.56
E0/A0	2.07	1.34	0.83	0.91	0.06	0.72	1.40	0.84	0.71	3.59	2.29	0.63	5.75	3.18
dE0/A0	0.55	0.75	0.30	0.91	0.62	0.48	-0.11	0.60	0.42	0.11	0.76	0.20	0.55	4.48
dE+2/A0	3.09	1.87	0.09	0.04	0.02	0.25	1.33	1.81	0.54	1.34	1.16	0.16	8.40	4.14
dA0/A0	0.29	0.29	0.18	0.48	0.61	0.62	0.15	0.34	0.16	0.49	0.54	0.04	11.16	10.04
dA+2/A0	1.16	0.45	0.20	0.18	0.08	0.29	0.86	1.32	0.17	0.32	0.36	0.06	5.33	4.90
RD0/A0	6.11	8.39	3.96	7.56	6.39	6.32	4.49	6.92	3.45	4.82	4.12	0.42	11.47	6.72
dRD0/A0	0.80	4.19	0.88	0.27	2.36	-2.31	1.92	0.35	0.26	2.10	4.80	0.47	4.47	3.98
dRD+2/A0	10.80	10.84	1.80	4.85	5.94	5.36	4.63	10.00	2.87	5.83	5.70	0.79	7.39	6.82
I0/A0	-7.49	-5.66	-1.29	-6.83	-6.86	-7.30	-4.33	-5.29	-1.59	-3.68	-3.36	0.88	-4.16	-3.58
d(I0/A0)	2.42	-0.11	1.34	0.59	-6.50	-2.40	-2.45	2.43	2.09	-0.04	0.11	0.59	-0.07	0.16
d(I+2/A+2)	0.46	1.15	-2.03	-8.19	-1.65	-7.42	-1.60	1.35	-0.64	-1.21	-2.17	0.61	-1.97	-2.19
D0/A0	6.83	8.23	8.53	7.11	7.36	7.15	7.49	10.58	7.97	5.59	5.92	0.56	10.04	8.40
d(D0/A0)	1.56	-2.23	2.91	4.37	6.87	7.82	2.15	3.25	-0.75	1.61	2.62	0.57	2.82	3.26
d(D+2/A+2)	8.22	0.70	2.63	5.18	7.76	5.40	4.32	12.15	5.90	4.37	5.66	0.69	6.33	5.38
dV+2/A0	-0.89	-0.12	0.05	0.05	0.09	0.03	-0.66	-0.72	0.04	-0.14	-0.15	0.05	-2.92	-2.49

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Unusable Observations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.60	0.56	0.71	0.68	0.69	0.50	0.75	0.54	0.49	0.32	0.32	0.31	0.31	0.27	0.39	0.51	0.52	0.57
RSq	0.65	0.53	0.51	0.56	0.44	0.55	0.46	0.76	0.52	0.30	0.44	0.40	0.34	0.42	0.35	0.41	0.28	0.30

(V0-A0)/A0	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unusable Observations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.61	0.72	0.83	0.72	0.69	0.59	0.67	0.71	0.89	0.80	0.83	0.75	1.02	1.03	1.04	1.19	1.58	0.97	1.14	0.87	1.09	1.12	1.14	0.81	1.12	0.72
RSq	0.36	0.15	0.19	0.32	0.27	0.30	0.33	0.33	0.35	0.34	0.30	0.31	0.30	0.26	0.26	0.27	0.41	0.67	0.33	0.21	0.31	0.27	0.25	0.50	0.41	0.23

ANOVA

(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	434	477	643	1050	1145	1376	1505	1588	1697	1806	1844	1820	1776	1749	1709	1723	1779	1765
DF total	449	492	658	1065	1160	1391	1520	1603	1712	1821	1859	1835	1791	1764	1724	1738	1794	1780
SS regression	288.0	170.8	341.0	609.6	437.3	413.7	698.1	1,485.2	442.4	80.2	152.8	118.2	88.1	95.0	140.8	318.6	189.1	242.0
SS error	154.6	151.7	326.8	487.2	549.2	343.8	837.3	470.8	403.5	186.4	192.0	175.4	169.8	130.7	256.6	452.4	480.1	573.0
SS total	442.6	322.5	667.9	1,096.9	986.5	757.5	1,535.4	1,956.0	845.8	266.7	344.9	293.6	257.9	225.7	397.4	771.0	669.2	814.9
MS regression	19.2	11.4	22.7	40.6	29.2	27.6	46.5	99.0	29.5	5.3	10.2	7.9	5.9	6.3	9.4	21.2	12.6	16.1
MS error	0.4	0.3	0.5	0.5	0.5	0.2	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3
F	53.9	35.8	44.7	87.6	60.8	110.4	83.7	334.0	124.0	51.8	97.8	81.8	61.4	84.7	62.5	80.9	46.7	49.7

(V0-A0)/A0	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	1811	1756	1832	1798	1787	1906	2084	2160	2214	2231	2310	2364	2448
DF total	1826	1771	1847	1813	1802	1921	2099	2175	2229	2246	2325	2379	2463
SS regression	374.7	165.8	299.5	437.3	315.2	289.5	453.1	542.3	930.2	735.8	677.9	599.5	1,110.8
SS error	674.0	908.5	1,247.6	922.8	844.6	666.5	929.5	1,082.0	1,735.4	1,432.6	1,574.8	1,321.2	2,552.7
SS total	1,048.7	1,074.3	1,547.1	1,360.1	1,159.9	956.0	1,382.5	1,624.2	2,665.6	2,168.4	2,252.6	1,920.8	3,663.5
MS regression	25.0	11.1	20.0	29.2	21.0	19.3	30.2	36.2	62.0	49.1	45.2	40.0	74.1
MS error	0.4	0.5	0.7	0.5	0.5	0.3	0.4	0.5	0.8	0.6	0.7	0.6	1.0
F	67.1	21.4	29.3	56.8	44.5	55.2	67.7	72.2	79.1	76.4	66.3	71.5	71.0

(V0-A0)/A0	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DF regression	15	15	15	15	15	15	15	15	15	15	15	15	15
DF error	2448	2477	2545	2562	2640	2739	2815	2744	2683	2595	2643	2725	2740
DF total	2463	2492	2560	2577	2655	2754	2830	2759	2698	2610	2658	2740	2755
SS regression	901.7	948.5	1,327.0	4,364.3	5,047.1	1,767.6	556.7	1,437.9	1,208.5	1,153.8	1,732.1	2,417.0	425.6
SS error	2,611.0	2,679.6	3,608.0	6,393.7	2,504.6	3,535.4	2,126.7	3,232.0	3,333.3	3,396.2	1,738.3	3,434.3	1,407.7
SS total	3,512.7	3,628.0	4,935.0	10,757.9	7,551.7	5,303.0	2,683.4	4,669.9	4,541.8	4,550.0	3,470.4	5,851.4	1,833.3
MS regression	60.1	63.2	88.5	291.0	336.5	117.8	37.1	95.9	80.6	76.9	115.5	161.1	28.4
MS error	1.1	1.1	1.4	2.5	0.9	1.3	0.8	1.2	1.2	1.3	0.7	1.3	0.5
F	56.4	58.5	62.4	116.6	354.7	91.3	49.1	81.4	64.9	58.8	175.6	127.9	55.2

Formula 3 and 4 – NYSE, AMEX and NASDAQ

Formula3 NYSE,NASDAQ, AMEX

d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Const	-0.13	-0.32	-0.20	0.10	-0.27	-0.37	-0.16	-0.38	-0.38	-0.29	-0.03	0.02	-0.04	-0.09	-0.09	0.01	-0.06	-0.05	0.10	0.04	-0.05	0.09
dE0/A0	13.09	12.05	7.63	7.29	8.07	8.36	7.27	1.25	0.73	4.21	2.02	1.00	1.15	1.49	2.41	2.18	1.75	4.23	1.90	2.62	2.25	1.74
dE+2/A0	3.76	0.76	1.38	3.26	1.08	1.32	3.01	1.19	1.44	1.64	0.66	0.76	0.21	0.06	1.07	0.51	0.70	1.96	0.75	0.35	1.01	0.76
dA0/A0	0.21	0.45	1.23	0.22	0.28	-0.44	0.73	0.11	-0.60	-0.59	-0.27	0.08	-0.10	0.08	0.15	0.34	0.24	0.02	0.31	-0.16	0.39	0.16
dA+2/A0	-0.49	-0.07	0.12	0.92	0.52	-0.14	0.19	0.84	0.71	0.33	0.04	0.20	-0.14	0.04	0.21	0.67	0.15	0.17	0.39	0.24	0.20	0.49
dRD0/A0	10.72	14.88	5.38	2.37	10.16	-2.72	-0.92	3.46	0.33	-6.70	-0.93	-0.10	-0.52	1.10	1.57	6.66	2.89	-0.17	3.61	-7.22	-2.56	1.11
dRD+2/A0	2.22	-4.53	4.50	3.52	-1.62	-4.07	4.87	2.42	0.06	-0.52	-3.14	1.64	-1.54	0.70	1.81	6.05	3.69	2.69	5.91	2.54	3.29	1.64
dI0/A0	-12.79	-16.67	-20.14	-11.07	-8.77	2.10	-20.04	-1.59	4.76	2.66	-3.23	-2.46	-1.83	-2.50	-2.03	-5.30	-2.98	-6.14	-2.45	-1.36	-5.62	-3.11
dI+2/A0	4.54	3.17	-8.10	-7.09	-2.07	3.63	-6.71	-1.02	5.29	2.70	2.03	-1.11	1.32	0.52	-0.74	-1.98	-0.88	-1.35	-4.48	-0.24	-5.10	-3.25
dD0/A0	-3.78	-9.11	14.45	13.08	8.85	6.30	7.15	2.99	2.90	-14.63	-2.99	3.23	2.11	0.24	1.13	-5.03	5.15	-3.59	-0.19	5.28	6.11	3.49
dD+2/A0	11.92	4.71	2.78	8.68	9.55	2.37	4.01	8.56	6.57	-10.58	-4.36	3.11	1.98	1.05	-1.17	4.34	0.35	1.67	2.58	6.47	0.50	6.65
dV+2/A0	0.05	0.06	0.15	-0.48	-0.04	0.05	-0.13	-0.71	-0.65	-0.54	-0.05	-0.11	0.15	0.03	-0.07	-0.30	-0.06	-0.12	-0.09	-0.14	-0.04	-0.20

d(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	FF98 Mean	SE	T	FF98 T
Const	-0.08	-0.12	0.03	-0.13	-0.01	0.10	-0.04	-0.16	-0.11	0.10	-0.01	-0.08	-0.04	-0.12	-0.25	-0.42	-0.04	0.04	-0.05	-0.04	-0.12	-0.39	-0.10	-0.13	0.02	-4.69	-5.00
dE0/A0	2.19	1.14	2.60	1.36	1.97	2.36	2.37	2.02	1.85	0.64	2.33	1.61	2.43	1.27	1.94	0.84	1.10	1.17	1.96	1.35	1.17	0.83	2.98	3.46	0.44	6.73	6.85
dE+2/A0	0.65	0.39	0.80	0.62	1.27	1.47	0.54	0.64	0.60	0.48	0.33	0.04	1.58	1.00	-1.93	-0.42	-0.21	-0.26	1.31	0.47	1.09	0.67	0.88	0.83	0.14	6.20	5.05
dA0/A0	0.03	0.21	0.27	0.49	0.69	0.39	0.58	0.74	0.72	0.85	0.69	0.49	0.85	0.39	0.79	0.52	0.43	1.23	0.58	0.53	0.41	0.31	0.34	0.16	0.06	5.62	1.79
dA+2/A0	0.22	0.20	0.23	0.25	0.48	0.24	0.34	0.08	0.14	0.28	0.31	0.06	0.81	1.17	0.96	0.36	0.36	0.55	0.38	0.48	0.95	0.47	0.34	0.34	0.05	6.85	5.11
dRD0/A0	1.57	0.48	-3.56	2.85	5.42	6.17	-1.60	-0.55	3.35	2.48	5.50	4.50	8.04	3.11	-3.47	-1.76	1.22	1.29	2.50	2.10	5.78	0.09	2.00	2.69	0.65	3.09	2.33
dRD+2/A0	0.40	-1.20	-1.42	1.78	5.59	4.74	3.53	2.31	5.26	4.54	4.47	1.75	9.21	6.66	2.18	5.77	4.13	6.44	2.25	1.54	9.66	5.25	2.66	2.96	0.48	5.57	3.72
dI0/A0	-0.39	-2.72	-3.23	-5.24	-7.14	-3.80	-10.01	-10.62	-11.67	-13.19	-9.95	-9.04	-14.56	-7.14	-13.73	-12.53	-7.30	-0.38	-6.20	-10.04	-3.91	-0.89	-6.46	-6.16	0.87	-7.42	-5.10
dI+2/A0	-0.72	0.17	-0.76	-2.37	-3.35	-1.86	-5.56	-2.60	-5.12	-6.61	-5.49	-0.41	-9.64	-9.26	-14.96	-6.17	-6.21	-19.33	-5.78	-3.54	-2.68	-2.77	-3.09	-2.13	0.72	-4.32	-2.55
dD0/A0	4.80	2.10	4.48	1.95	1.09	3.16	-3.31	0.21	-0.32	4.88	6.65	1.91	1.73	2.03	-1.02	-4.48	4.75	8.64	7.12	1.84	2.59	3.34	2.21	3.29	0.79	2.81	2.68
dD+2/A0	0.74	1.04	3.70	9.41	9.66	5.85	4.06	0.64	6.94	-3.42	1.20	6.85	-0.99	4.24	4.18	5.45	1.55	3.19	1.83	1.86	3.51	2.70	3.32	4.90	0.62	5.39	4.42
dV+2/A0	-0.04	-0.04	0.00	0.00	-0.19	-0.08	-0.07	0.02	0.03	-0.04	-0.04	0.04	-0.36	-0.73	-0.18	-0.11	0.01	0.00	-0.05	-0.21	-0.54	-0.32	-0.14	-0.14	0.03	-4.21	-3.53

d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.38	0.39	0.57	0.53	0.56	0.56	0.63	0.51	0.53	0.59	0.32	0.24	0.26	0.23	0.32	0.46	0.50	0.72	0.46	0.57	0.76	0.62
RSq	0.50	0.45	0.39	0.51	0.31	0.24	0.31	0.59	0.24	0.18	0.09	0.17	0.18	0.18	0.22	0.35	0.11	0.15	0.33	0.18	0.12	0.20

d(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.73	0.54	0.62	0.58	0.77	0.66	0.85	0.73	0.89	0.86	1.03	1.16	1.52	1.01	2.22	1.93	1.00	5.37	0.92	0.77	1.11	0.91
RSq	0.11	0.09	0.19	0.25	0.27	0.25	0.16	0.16	0.22	0.16	0.17	0.13	0.28	0.53	0.18	0.07	0.18	0.01	0.17	0.20	0.26	0.21

ANOVA

d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
DF regression	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
DF error	453	501	667	1074	1179	1416	1545	1630	1747	1854	1882	1867	1827	1791	1742	1759	1816	1804	1854	1794	1873	1841
DF total	464	512	678	1085	1190	1427	1556	1641	1758	1865	1893	1878	1838	1802	1753	1770	1827	1815	1865	1805	1884	1852
SS regression	65.5	60.8	139.2	319.5	165.5	137.0	270.5	595.4	150.6	137.1	19.7	21.6	28.2	20.9	49.5	198.0	53.5	167.2	190.6	128.2	147.3	174.7
SS error	66.8	75.4	219.6	304.4	367.0	440.5	603.5	421.8	486.3	637.6	189.5	106.8	125.3	96.5	173.5	373.4	447.1	924.8	388.0	571.9	1,091.7	707.9
SS total	132.3	136.2	358.7	623.8	532.4	577.5	874.0	1,017.2	636.9	774.7	209.2	128.5	153.5	117.3	223.0	571.3	500.6	1,092.0	578.7	700.1	1,239.0	882.5
MS regression	6.0	5.5	12.7	29.0	15.0	12.5	24.6	54.1	13.7	12.5	1.8	2.0	2.6	1.9	4.5	18.0	4.9	15.2	17.3	11.7	13.4	15.9
MS error	0.1	0.2	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.5	0.2	0.3	0.6	0.4
F	40.3	36.7	38.4	102.5	48.3	40.0	62.9	209.2	49.2	36.2	17.8	34.4	37.4	35.2	45.2	84.8	19.8	29.6	82.8	36.6	23.0	41.3
P																						

d(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DF regression	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
DF error	1826	1952	2123	2215	2265	2287	2363	2410	2502	2504	2526	2602	2615	2690	2793	2868	2798	2731	2641	2689	2768	2798
DF total	1837	1963	2134	2226	2276	2298	2374	2421	2513	2515	2537	2613	2626	2701	2804	2879	2809	2742	2652	2700	2779	2809
SS regression	124.6	58.4	182.9	251.2	488.1	333.2	336.9	248.1	566.6	354.5	542.1	510.0	2,371.0	3,129.9	2,983.9	832.7	606.5	1,065.8	456.5	388.4	1,215.6	606.9
SS error	973.6	577.1	807.0	746.9	1,331.6	986.1	1,718.5	1,272.2	1,969.4	1,832.5	2,695.3	3,473.1	6,022.5	2,753.3	13,792.4	10,713.8	2,777.9	78,631.8	2,223.7	1,576.1	3,403.5	2,324.4
SS total	1,098.2	635.5	989.9	998.1	1,819.6	1,319.3	2,055.4	1,520.3	2,536.0	2,187.0	3,237.4	3,983.1	8,393.5	5,883.2	16,776.3	11,546.6	3,384.4	79,697.6	2,680.1	1,964.5	4,619.1	2,931.2
MS regression	11.3	5.3	16.6	22.8	44.4	30.3	30.6	22.6	51.5	32.2	49.3	46.4	215.5	284.5	271.3	75.7	55.1	96.9	41.5	35.3	110.5	55.2
MS error	0.5	0.3	0.4	0.3	0.6	0.4	0.7	0.5	0.8	0.7	1.1	1.3	2.3	1.0	4.9	3.7	1.0	28.8	0.8	0.6	1.2	0.8
F	21.2	17.9	43.7	67.7	75.5	70.2	42.1	42.7	65.4	44.0	46.2	34.7	93.6	278.0	54.9	20.3	55.5	3.4	49.3	60.2	89.9	66.4
P																						

Formula4 NYSE,NASDAQ, AMEX

d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Const	-0.10	-0.34	-0.15	0.18	-0.27	-0.37	-0.17	-0.38	-0.38	-0.34	-0.04	0.05	-0.04	-0.10	-0.11	0.01	-0.05	-0.04	0.13	0.07	-0.03	0.11
dE0/A0	14.55	12.32	10.03	8.33	8.44	8.63	8.58	1.52	3.06	3.69	1.83	1.33	1.36	1.44	2.41	2.29	2.01	4.07	2.05	2.82	2.44	2.03
dE+2/A0	2.86	0.84	1.66	3.71	1.74	1.34	3.69	1.60	1.66	1.32	0.48	0.94	0.24	0.12	1.00	0.78	0.66	2.05	0.69	0.49	1.17	1.08
dA0/A0	-0.10	0.10	1.08	0.19	0.12	-0.33	0.14	0.05	-0.59	-0.58	-0.37	-0.01	-0.06	0.04	0.09	0.19	0.13	-0.18	0.15	-0.26	0.26	0.09
dA+2/A0	-0.33	0.04	-0.24	0.64	0.58	-0.10	0.04	0.81	0.72	0.43	0.06	0.17	-0.12	0.02	0.19	0.52	0.11	0.12	0.31	0.22	0.01	0.41
dRD0/A0	10.44	15.87	3.27	4.29	13.07	-2.67	-0.84	2.69	-1.09	-6.26	-0.90	0.19	-1.03	1.24	1.67	6.89	2.56	-1.43	3.64	-6.90	-2.07	0.87
dRD+2/A0	2.55	-2.56	12.10	4.03	-1.29	-4.62	5.12	2.50	0.00	-0.19	-2.85	1.82	-1.56	0.82	2.11	6.51	3.74	2.69	6.24	2.52	3.63	1.78
d(I0/A0)	-15.57	-5.40	-9.31	-13.97	-4.53	-1.52	-14.56	-3.17	0.67	2.32	-2.86	-1.27	-2.56	-1.93	0.39	-4.40	-0.66	-5.08	0.77	0.14	-4.63	-0.88
d(I+2/A+2)	4.96	5.52	-6.87	-9.31	3.34	3.37	0.01	-0.75	5.80	0.54	1.54	1.43	1.63	1.32	0.56	-1.65	0.78	-0.69	-1.21	1.64	-2.20	0.56
d(D0/A0)	0.95	0.97	11.49	4.83	2.04	-4.60	-0.51	-5.21	-2.37	-0.70	-0.38	1.49	1.35	4.29	5.79	3.70	6.03	-7.63	-0.95	1.03	4.30	4.40
d(D+2/A+2)	1.69	13.04	-4.23	-4.38	3.75	-0.43	-14.89	3.52	1.36	-3.71	-4.37	1.20	0.13	5.30	-0.20	1.78	-0.97	-2.46	2.24	4.37	-0.12	6.45
dV+2/A0	0.07	0.07	0.17	-0.40	-0.01	0.06	-0.14	-0.74	-0.65	-0.63	-0.07	-0.12	0.15	0.03	-0.07	-0.29	-0.03	-0.11	-0.08	-0.11	-0.03	-0.21

d(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	FF98 Mean	SE	T	FF98 T
Const	-0.08	-0.11	0.05	-0.10	0.07	0.15	0.00	-0.13	-0.09	0.12	0.00	-0.09	-0.05	-0.07	-0.19	-0.40	-0.02	0.03	-0.05	-0.05	-0.12	-0.38	-0.09	-0.11	0.02	-3.78	-3.44
dE0/A0	2.19	1.12	2.77	1.55	2.38	2.48	2.69	2.41	1.91	0.74	2.63	1.69	2.42	1.45	2.19	0.90	1.13	1.16	1.94	1.47	1.39	0.88	3.29	4.13	0.48	6.78	6.13
dE+2/A0	0.64	0.52	0.88	0.70	1.46	1.44	0.59	0.85	0.64	0.59	0.31	0.07	1.55	1.24	-1.93	-0.41	-0.11	-0.28	1.18	0.48	1.20	0.68	0.96	1.11	0.15	6.60	4.75
dA0/A0	0.04	0.17	0.12	0.35	0.35	0.25	0.30	0.53	0.49	0.65	0.50	0.37	0.63	0.22	0.48	0.32	0.30	1.29	0.57	0.41	0.38	0.30	0.21	0.00	0.05	3.86	0.03
dA+2/A0	0.21	0.19	0.25	0.24	0.50	0.23	0.21	0.00	0.03	0.05	0.17	0.04	0.66	1.07	0.74	0.25	0.26	0.24	0.28	0.42	0.86	0.44	0.27	0.27	0.04	6.06	4.89
dRD0/A0	1.87	0.38	-3.42	3.29	6.11	6.26	-2.24	-0.45	3.48	3.03	5.92	4.58	8.22	2.87	-3.33	-1.16	1.57	1.58	2.26	2.32	5.48	-0.06	2.09	3.77	0.68	3.08	2.66
dRD+2/A0	0.28	-1.12	-1.52	1.39	5.23	4.71	3.38	2.46	5.44	5.22	4.54	1.67	9.70	7.69	4.00	5.82	4.25	7.19	2.41	1.56	10.65	5.45	3.08	3.08	0.53	5.79	3.92
d(I0/A0)	0.73	-1.99	-1.58	-2.51	-3.09	-1.29	-5.82	-6.23	-7.85	-9.61	-5.85	-7.09	-9.13	-2.06	-4.87	-10.82	-5.00	-2.09	-1.37	-6.53	0.42	1.32	-4.10	-5.88	0.65	-6.33	-4.66
d(I+2/A+2)	1.57	0.50	3.68	1.17	4.14	2.29	-6.15	-5.23	-0.71	-3.83	-4.23	0.03	-9.14	0.42	-5.03	-8.25	-1.94	-29.33	-4.14	-2.64	0.22	-0.48	-1.29	-0.60	0.86	-1.50	-0.54
d(D0/A0)	6.30	3.66	5.85	2.72	-0.25	4.04	-2.14	0.81	0.19	2.37	4.91	2.87	6.38	4.90	3.72	-3.04	5.95	11.61	7.45	1.91	4.25	0.63	2.40	2.29	0.59	4.06	2.31
d(D+2/A+2)	4.63	0.33	4.70	4.14	7.74	5.57	4.82	0.09	5.48	2.14	-1.39	-3.27	3.27	10.18	1.55	5.86	3.64	3.75	3.23	1.34	5.45	3.20	1.94	0.05	0.68	2.84	0.04
dV+2/A0	-0.03	-0.04	0.00	0.01	-0.19	-0.07	-0.05	0.02	0.05	-0.04	-0.03	0.04	-0.36	-0.74	-0.15	-0.10	0.02	0.01	-0.04	-0.21	-0.53	-0.32	-0.13	-0.14	0.03	-3.91	-3.26

d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.38	0.40	0.59	0.57	0.56	0.57	0.63	0.51	0.52	0.60	0.33	0.25	0.25	0.23	0.33	0.45	0.50	0.71	0.48	0.55	0.77	0.63
RSq	0.48	0.48	0.37	0.45	0.31	0.23	0.28	0.57	0.25	0.14	0.08	0.15	0.19	0.20	0.23	0.34	0.10	0.14	0.30	0.17	0.10	0.18

d(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unusable Observat ons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	0.73	0.55	0.62	0.58	0.77	0.66	0.84	0.73	0.90	0.86	1.04	1.16	1.51	1.01	2.23	1.94	0.99	5.36	0.93	0.77	1.13	0.91
RSq	0.12	0.09	0.19	0.22	0.25	0.24	0.16	0.16	0.20	0.13	0.16	0.12	0.27	0.54	0.17	0.06	0.17	0.01	0.16	0.19	0.26	0.20

ANOVA

d(V0-A0)/A0	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
DF regression	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
DF error	448	499	663	1078	1179	1412	1536	1625	1742	1855	1883	1866	1823	1789	1739	1762	1820	1801	1853	1791	1868	1836
DF total	459	510	674	1089	1190	1423	1547	1636	1753	1866	1894	1877	1834	1800	1750	1773	1831	1812	1864	1802	1879	1847
SS regression	60.8	73.1	136.5	281.3	159.1	137.3	233.2	579.8	155.3	109.7	17.1	19.2	27.9	23.0	53.8	187.0	52.0	145.5	174.7	111.4	129.0	160.1
SS error	65.7	79.5	228.2	348.3	362.8	456.2	600.7	430.1	476.5	672.3	203.3	112.0	116.9	94.9	185.7	360.0	458.9	897.3	418.3	547.8	1,107.7	719.6
SS total	126.5	152.6	364.8	629.6	521.9	593.5	833.8	1,010.0	631.7	782.0	220.4	131.2	144.8	117.9	239.6	547.0	510.9	1,042.8	593.0	659.2	1,236.7	879.8
MS regression	5.5	6.6	12.4	25.6	14.5	12.5	21.2	52.7	14.1	10.0	1.6	1.7	2.5	2.1	4.9	17.0	4.7	13.2	15.9	10.1	11.7	14.6
MS error	0.1	0.2	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.2	0.3	0.6	0.4
F	37.7	41.8	36.1	79.1	47.0	38.6	54.2	199.1	51.6	27.5	14.4	29.1	39.6	39.4	45.8	83.2	18.7	26.5	70.4	33.1	19.8	37.1

d(V0-A0)/A0	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DF regression	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
DF error	1823	1949	2119	2205	2259	2279	2355	2412	2496	2496	2524	2591	2611	2687	2785	2867	2793	2733	2640	2689	2776	2788
DF total	1834	1960	2130	2216	2270	2290	2366	2423	2507	2507	2535	2602	2622	2698	2796	2878	2804	2744	2651	2700	2787	2799
SS regression	126.2	54.2	189.9	208.1	454.7	311.1	313.2	241.6	492.3	285.5	503.1	482.3	2,238.8	3,181.0	2,918.8	707.5	544.5	1,110.1	423.9	372.3	1,211.2	581.6
SS error	970.4	578.4	801.3	750.2	1,338.5	985.4	1,650.1	1,295.6	2,005.3	1,858.7	2,701.5	3,504.5	5,984.1	2,732.4	13,807.7	10,731.4	2,740.9	78,558.9	2,276.6	1,591.2	3,512.7	2,313.3
SS total	1,096.5	632.6	991.1	958.3	1,793.2	1,296.5	1,963.3	1,537.2	2,497.5	2,144.3	3,204.6	3,986.9	8,222.9	5,913.4	16,726.5	11,438.9	3,285.4	79,668.9	2,700.5	1,963.5	4,723.9	2,894.9
MS regression	11.5	4.9	17.3	18.9	41.3	28.3	28.5	22.0	44.8	26.0	45.7	43.8	203.5	289.2	265.3	64.3	49.5	100.9	38.5	33.8	110.1	52.9
MS error	0.5	0.3	0.4	0.3	0.6	0.4	0.7	0.5	0.8	0.7	1.1	1.4	2.3	1.0	5.0	3.7	1.0	28.7	0.9	0.6	1.3	0.8
F	21.5	16.6	45.7	55.6	69.8	65.4	40.6	40.9	55.7	34.9	42.7	32.4	88.8	284.4	53.5	17.2	50.4	3.5	44.7	57.2	87.0	63.7

Statistics from Data set Extraction

Statistics from Data Extraction AllCompustat Firms

Counter statistics:

Counter	Total	Included
Could not Calculate Book Equity	32046	0
Could not calculate E, ET or V *	62654	0
Dropped observations	111723	0
FYR changed *	9699	0
Missing Compustat and CRSP price data	80685	0
Missing data for AT *	30724	0
Missing data for DVC *	31396	0
Missing data for IB *	30535	0
Missing data for LT *	32046	0
Missing data for price or number of shares && listed on an exchange	50616	0
Missing data for price or number of shares && listed on NYSE, AMEX or NASDAQ	36291	0
Missing data for price or number of shares *	80685	0
Missing data for TXT *	30791	0
Missing data for XINT *	60554	0
Missing XRD data	164800	77513
MKVALUE is 0 for one of the years of observation resulting in Infinite BookToMarket-ratio *	13	0
Not five years of data available *	8919	0
Number of Datalines included	139866	139866
Paying Dividends All Three Years of observation	89024	60188
Paying Dividends	106736	68786
Unable to Convert Text to Number Format for D, I, RD or A variable *	63068	0
Used Compustat CSHPRI and prcc_f	170904	139866
Observations 1964	300	61
Observations 1965	2476	634
Observations 1966	2642	713
Observations 1967	2791	946
Observations 1968	2881	1537
Observations 1969	3011	1666
Observations 1970	3180	2061
Observations 1971	3202	2251
Observations 1972	3297	2483
Observations 1973	3556	2715
Observations 1974	3583	2927
Observations 1975	4174	2961
Observations 1976	5510	2925
Observations 1977	5420	2829
Observations 1978	5211	2777
Observations 1979	5101	2711
Observations 1980	5027	2843
Observations 1981	5009	3063
Observations 1982	5019	3078
Observations 1983	4985	3225
Observations 1984	5305	3090
Observations 1985	5457	3221
Observations 1986	5538	3100
Observations 1987	5833	3111
Observations 1988	6181	3303
Observations 1989	6405	3526
Observations 1990	6681	3535
Observations 1991	6931	3553
Observations 1992	7081	3549
Observations 1993	7310	3700
Observations 1994	7772	3791
Observations 1995	8045	4008
Observations 1996	8006	4053
Observations 1997	8211	4282
Observations 1998	7968	4398
Observations 1999	7585	4312
Observations 2000	7592	4264
Observations 2001	7628	4348
Observations 2002	7608	4463
Observations 2003	7639	4335
Observations 2004	7458	4202
Observations 2005	7166	4008
Observations 2006	6834	3853
Observations 2007	6656	3808
Observations 2008	6283	3647
Observations 2009	41	0

Statistics from Data Extraction NYSE, NASDAQ, AMEX

Counter statistics:

Counter	Total	Included
Could not Calculate Book Equity	32046	0
Could not calculate E, ET or V *	62654	0
Dropped observations	155235	0
FYR changed *	9699	0
Missing Compustat and CRSP price data	80685	0
Missing data for AT *	30724	0
Missing data for DVC *	31396	0
Missing data for IB *	30535	0
Missing data for LT *	32046	0
Missing data for price or number of shares && listed on an exchange	50616	0
Missing data for price or number of shares && listed on NYSE, AMEX or NASDAQ	36291	0
Missing data for price or number of shares *	80685	0
Missing data for TXT *	30791	0
Missing data for XINT *	60554	0
Missing XRD data	164800	52065
MKVALUE is 0 for one of the years of observation resulting in Infinite BookToMarket-ratio *	13	0
Not five years of data available *	8919	0
Not NYSE, NASDAQ or AMEX *	96359	0
Number of Datalines included	96354	96354
Paying Dividends All Three Years of observation	89024	49236
Paying Dividends	106736	55155
Unable to Convert Text to Number Format for D, I, RD or A variable *	63068	0
Used Compustat CSHPRI and prcc_f	170904	96354
Observations 1964	300	45
Observations 1965	2476	506
Observations 1966	2642	560
Observations 1967	2791	743
Observations 1968	2881	1187
Observations 1969	3011	1293
Observations 1970	3180	1557
Observations 1971	3202	1685
Observations 1972	3297	1792
Observations 1973	3556	1918
Observations 1974	3583	2027
Observations 1975	4174	2045
Observations 1976	5510	2028
Observations 1977	5420	1981
Observations 1978	5211	1950
Observations 1979	5101	1901
Observations 1980	5027	1920
Observations 1981	5009	1979
Observations 1982	5019	1975
Observations 1983	4985	2014
Observations 1984	5305	1951
Observations 1985	5457	2032
Observations 1986	5538	1993
Observations 1987	5833	1989
Observations 1988	6181	2118
Observations 1989	6405	2309
Observations 1990	6681	2385
Observations 1991	6931	2446
Observations 1992	7081	2466
Observations 1993	7310	2556
Observations 1994	7772	2613
Observations 1995	8045	2697
Observations 1996	8006	2711
Observations 1997	8211	2728
Observations 1998	7968	2797
Observations 1999	7585	2806
Observations 2000	7592	2904
Observations 2001	7628	2994
Observations 2002	7608	3090
Observations 2003	7639	3015
Observations 2004	7458	2938
Observations 2005	7166	2851
Observations 2006	6834	2889
Observations 2007	6656	2971
Observations 2008	6283	2999
Observations 2009	41	0

A.5 Top Federal Income Tax Rates Since 1913

	Top Regular Rates		Above	Capital	
Year	Wages & Other Earned	Unearned except cap gains	Taxable Inc. (joint) of	Gains Max	Capital Gains Taxation
1913-15	7%	7%	$ 500,000	15%	Realized gains taxed same as other income
1916	15%	15%	2,000,000	15%	"
1917	67%	67%	2,000,000	67%	"
1918	77%	77%	1,000,000	77%	"
1919-21	73%	73%	1,000,000	73%	"
1922	58%	58%	200,000	12.5%	Maximum rate
1923	43.5%	43.5%	200,000	12.5%	"
1924	46%	46%	500,000	12.5%	"
1925-28	25%	25%	100,000	12.5%	"
1929	24%	24%	100,000	12.5%	"
1930-31	25%	25%	100,000	12.5%	"
1932-33	63%	63%	1,000,000	12.5%	"
1934-35	63%	63%	1,000,000	31.5%	Sliding exclusion of 70%>10 yrs; 0%<1 yr.
1936-37	78%	78%	2,000,000	39%	"
1938-40	78%	78%	2,000,000	30%	Excl. 50%>2yrs; 67% 18-24mo; 0%<18mo; 30%Max
1941	80%	80%	2,000,000	30%	"
1942-43	88%	88%	200,000	25%	Exclusion 50% > 6 months; 25% maximum
1944-45	94%	94%	200,000	25%	"
1946-47	86.5%	86.5%	200,000	25%	"
1948-49	82.1%	82.1%	200,000	25%	"
1950	84.4%	84.4%	200,000	25%	"
51-64	91%	91%	200,000	25%	"
64-67	70%	70%	200,000	25%	"
1968	75.3%	75.3%	200,000	26.9%	Transition
1969	77%	77%	200,000	27.5%	"
1970	50%	70%	200,000	32.3%	"
1971	50%	70%	200,000	34.3%	"
1972-75	50%	70%	200,000	36.5%	50% exclusion, minimum tax effects
1976-77	50%	70%	203,200	39.9%	"
1978	50%	70%	203,200	39%	"
1979-80	50%	70%	215,400	28%	60% exclusion
1981	50%	70%	215,400	23.7%	50% or 60% exclusion, etc.,transition
1982	50%	50%	85,600	20%	60% exclusion
1983	50%	50%	109,400	20%	"
1984-86	50%	50%	168,900	20%	"
1987	38.5%	38.5%	90,000	28%	Maximum rate
1988-90*	28%/33%	28%/33%	*	28%/33%	Realized gains taxed same as other income
1991-92	31.9%	31.9%	84,100	28.9%	Maximum rate
1993-96	43.7%	40.8%	255,100	29.2%	"
1997-2000	43.7%	40.8%	275,000	21.2%	"
2001	43.2%	40.3%	297,350	21.2%	"
2002	42.7%	39.8%	307,050	21.2%	18% top capital gains rate in rare cases
2003-05	39.0%	36.1%	319,200	16.1%	Reduced maximum rate, which also applied to dividends
2006-07	38.6%	35.7%	343,100	15.7%	"
2008-09	38.3%	35.4%	365,300	15.4%	"
2010-12	37.9%	35.0%	379,300	15%	"
2013-on	44.6%	44.6%	390,100	25%	21.2% income tax plus 3.8% Medicare tax; also on dividends
*1988-90	28%	28%	31,050	28%	
detail:	[illegible]	[illegible]	[illegible]	3%	
	28%	28%	155,780	28%	

(top brackets are in nominal dollars)

Notes:

1. 1991-2009 and post 2010 rates include the tax-rate effects of the personal exemption phase-out and the partial itemized deduction disallowan enacted in 1990. These provisions began to be phased out in 2006, were eliminated in 2010-12, and are scheduled to be reinstated in 2013.
2. 1993-2012 top regular rates on earned income include the 2.9% Medicare tax.
3. 2013-on top rates include the 3.8% Medicare tax on most earned and unearned income for high-income taxpayers enacted in 2010, and the scheduled expiration of the Bush tax cuts after 2012.
4. The definition of taxable income varied very substantially over the years. Taxable income is always substantially below actual income.
5. For multi-year periods with indexed tax brackets (post-1984) the top-bracket starting points are the averages for the periods.

Citizens for Tax Justice, November 2011.

A.6 Compustat Code List

No#	Item	Code	
DATA6	Assets - Total (MM$)	AT	Assets - Total
DATA54	Common Shares Used to Calculate EPS (MM)	CSHPRI	Common Shares Used to Calculate Earnings Per Share – Basic
DATA21	Dividends - Common (MM$)	DVC	Dividends Common/Ordinary
DATA18	Income Before Extraordinary Items (MM$)	IB	Income Before Extraordinary Items
DATA51	Investment Tax Credit (Income Acct)(MM$)	ITCI	Investment Tax Credit (Income Account)
DATA181	Liabilities - Total (MM$)	LT	Liabilities - Total
DATA199	Price -- Fiscal Year -- Close ($&c)	PRCC_F	Price Close - Annual - Fiscal Year
DATA130	Preferred Stock - Carrying Value (MM$)	PSTK	Preferred/Preference Stock (Capital) - Total
DATA10	Preferred Stock - Liquidating Value(MM$)	PSTKL	Preferred Stock – Liquidating Value
DATA56	Preferred Stock - Redemption Value (MM$)	PSTKRV	Preferred Stock – Redemption Value
DATA50	Deferred Taxes (Income Account) (MM$)	TXDI	Income Taxes - Deferred
DATA35	Deferred Tax & Invest Tax Credit...(MM$)	TXDITC	Deferred Taxes and Investment Tax Credit
DATA16	Income Taxes - Total (MM$)	TXT	Income Taxes - Total
DATA15	Interest Expense (MM$)	XINT	Interest and Related Expense - Total
DATA46	Research and Development Expense (MM$)	XRD	Research and Development Expense