AN INVESTIGATION OF LEVERAGE, CONTRARIAN
OVEREXTRAPOLATION AND THE P/E EFFECT

by

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Abstract

The most common explanation for the superior returns of undervalued stocks is that market extrapolation of recent results too far into the future results in profitable opportunities for those “contrarian” investors who take advantage of the market’s mistake before it corrects itself. An opposing view is that because a security’s price impounds expected returns, those stocks which are riskier and will therefore be accorded high discount rates should ceteris paribus appear to be undervalued, and should thus exhibit positive excess returns over most periods. We review the evidence for both arguments and then test whether various types of leverage are priced, in the belief that leverage risk may be a factor behind the excess-returns of undervalued stocks. We find only weak evidence that leverage risk is priced, and it is clearly not priced sufficiently to be a causal factor in value-investing. We then focus our attention on a dataset in which the contrarian explanation does not hold because share price and cashflow have moved opposite to one another from previous periods, whereas for the contrarian explanation to hold price must move in the same direction as cashflows but by too much. We find the value-investing effect to be just as strong in the non-contrarian subsets as in the universe of all firms and thus conclude that the effect is not contrarian in nature but is instead consistent with market rationality, where myriad forms of risk are initially reflected in firm price and are eventually reflected in realized returns.
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Introduction

Much research by finance academics in recent years has focussed upon certain anomalies which were often first noticed and investigated by practitioners. The January effect, the day-of-the-week effect, the small-firm effect, the Price-to-Earnings (P/E) effect, and the Book-to-Market effect constitute what are probably the most well-known of these supposed anomalies. These anomalies provide simple methods with which to consistently outperform the market and most strikingly are based upon publicly available information and persist even after their discovery, thereby contradicting the semi-strong form of market efficiency. Moreover, even when correcting for certain types of risk, the strategies’ results remain quite impressive. The question which then arises is whether the market prices equities in a rational manner, or whether the anomalies and their effects are indeed contrarian in nature and based purely on market over-reaction to certain information.

This paper examines the P/E effect and the closely-related Price-to-Cashflow (P/C) effect and adds to the evidence that the market prices securities rationally and that these two anomalies are related to risk rather than market-overshooting. In the process, we find that another tenet in the field of finance is on a somewhat shaky foundation.

The tenet is that of book measures of leverage and their relevance. It is initially thought that the P/E effect could possibly be disguising a leverage effect. After all, increased leverage should lead to riskier equity and such an easily measurable risk in turn should be priced. However, after running a battery of tests we conclude that most

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1 For a more complete overview of known anomalies, their relationships with one another and their international aspects, see Hawawini and Keim (1995), Jacobs and Levy (1988) and Ziemba (1994).
measures of leverage based only upon accounting measures have little effect upon subsequent returns; using only one particular measure do we find leverage to be priced. The novelty of the approach we use is that attention is focussed upon measures of leverage which include interest payments, as they have the most immediate effect on cashflows accruing to shareholders. The choice of variables will be discussed later in the paper.

The rest of the paper is organized as follows. Section 1 discusses the data set. Section 2 analyzes past research in the area. Section 3 discusses the rationale for the leverage measures and then presents results. Section 4 discusses in turn both the contrarian explanation for the P/E and P/C effects and the efficient-markets explanation, then presents evidence that supports the latter. Section 5 examines potential problems with the analysis. Section 6 concludes.

1. Data

The companies analyzed are those traded on the NYSE and AMEX. The annual report variables for the study are obtained from the COMPSTAT database, including the research tapes. The variables consist of the following, with the annual data item number following in brackets: net sales (12), operating income before depreciation (13), depreciation and amortization (14), interest expense (15), income before extraordinary items (18), book value of common equity (60), and book value of assets (6). The earnings variable (income) is calculated after interest expense and income taxes, but before preferred dividends and extraordinary items; as previous research indicates that the P/E
and P/C effects are invariant to the exclusion of preferred dividends, we thus choose to use the earnings variable the least “removed” from the interest expense variable. Cashflow is then defined as earnings plus depreciation and amortization.

To be included in the study each firm must report non-null values for net sales and book value of assets for the given year. Next, firms with negative or null book values of common equity are removed. Finally, firms reporting null values for operating income before depreciation, depreciation and amortization, interest expense or earnings are eliminated from the sample. In the context of the COMPUSTAT data, null refers to missing data rather than a value of zero. For example, many firms that report no interest expenses are included in the sample set. What the previous restrictions do is essentially limit us to those firms with something resembling a full set of annual statements on COMPUSTAT, which is not too unrealistic a requirement. To the criticism that the results may not generalize to the whole universe of equities we reply first that an investor can still condition upon obtaining accounting data from COMPUSTAT and thus the results are still meaningful for these investors, and secondly that we have yet to find the perfect data source; in the absence of one, we have to work with the second-best alternative.

Due to the vagaries of the UBC data library system, the data up to and including fiscal year 1984 is obtained from the 1985 COMPUSTAT tape and for the years thereafter is obtained from the 1994 COMPUSTAT tape. This dichotomy fortunately allows us to informally test one of the claims that research using existing tapes for past data allows bias to creep into the results. Specifically, the argument goes that when one forms portfolios
based on the accounting information contained on that particular year's tapes (fiscal 1984 data from the 1985 tape, for example), the resulting portfolios do not exhibit the same returns in the anomalous variables as portfolios formed using the information from that year contained on the more recent tapes (1984 data but coming from the 1994 tapes, for example). The charge then reduces to one that the COMPUSTAT data was either not available at the time (although later tapes make it appear that it was) or that the data has been corrected or altered in the interim between its original publication and the most recent tape. Though we are neither able to confirm nor deny the first part of the charge, we informally test the second portion by randomly choosing about 35 to 40 firms per year from five years previous to 1984, and then compare their accounting numbers with those for the same firms and years but coming from the 1994 tape rather than the 1985 tape. Of the roughly 200 firms, only about ten exhibit any difference between the two sources for any of the seven variables, and the differences are always trivial, in the order of one or two percent. Thus any existing bias in the results must be due to missing data at the original time, rather than the altering of it thereafter.

The market data is taken from CRSP monthly tapes. In addition to the monthly returns, each firm's standard industrial classification, calendar-yearend capitalization and share code is obtained (the CRSP codes are HSICCD, CAP and SHRCDD, respectively). Firms with SIC codes between 6000 and 6799 inclusive are excluded for two reasons. First, since all such firms are classified as depository institutions, including them presents problems with using an interest-payment based measure of leverage, or any measure of leverage for that matter. Whereas for non-financial firms the interest expense is of
secondary consideration in comparison with the cost-of-goods-sold, it assumes far greater importance for financial firms and can easily constitute the largest and most important expense for such firms. Put simply, leverage means something different for financial firms than for firms in the real economy. Secondly, Chan, Jegadeesh and Lakonishok (1995) (hereafter CJL) find that financial firms are far less likely to report most accounting variables on COMPUSTAT, and their exclusion actually reduces some of the overall difference in returns between the CRSP and COMPUSTAT data sets.

Next, the shares of all non-domestic firms and those of non-primary domestic firms are eliminated. Such shares are identified by a CRSP share code value greater than eleven. Once again CJL provide justification for this action in that it reduces the difference in returns between CRSP and COMPUSTAT.

The data from the two sources is then merged using CUSIP identifiers, with the COMPUSTAT data from fiscal year t matched to 12 monthly holding periods for each firm, starting in July of year t+1 and ending with the return of June of year t+2. The choice of July for portfolio formation is not at all arbitrary but is necessitated by the fact that the COMPUSTAT data for fiscal year t contains results for firms with fiscal years up to the end of May of year t+1. This in turn gives only one month between the fiscal yearend and the day of portfolio formation for those firms with yearends in May, which in some cases is not enough time for the investor to obtain the relevant accounting data. However, this problem is probably rather trivial; fiscal yearends tend to be concentrated in the late months of the calendar year, fewer than 10% of firms have fiscal yearends between
February and May, and of those only a small number fail to report within the legally mandated 90 day period.

During the 1-year holding period securities within each portfolio are equally weighted and the portfolios are rebalanced every month. Unlike Lakonishok, Shleifer and Vishny (1994) (hereafter LSV) we do not deal with a firm whose returns go missing during the year by replacing its returns with some other returns until the end of the holding period, but simply rebalance the next month on the basis of fewer firms. And firms whose returns start in the middle of the holding period are excluded from that period and can only enter at the subsequent July.

The period studied contains annual report data from fiscal 1966 to 1992, and therefore returns from July 1967 to June of 1994. This period is chosen not only because the P/E and P/C effects are well documented for it but also because of reports that earlier COMPUSTAT data suffers from a bias towards large, successful firms. Even the first few years from 1966 onwards present somewhat of a bias in the COMPUSTAT data, in so far as COMPUSTAT’s reporting of NYSE and AMEX firms during that time is somewhat incomplete. However, our results are generally robust to any subset of the entire period.

2. Existing research

A. Risk and Leverage

A belief widely held by financial economists for the last forty years is that there exists a positive relationship between risk and return. If we look at financial institutions, we realize that this principle has been put into practice for several centuries: the riskier
borrower gets charged a higher interest rate for any given size of loan. Transferring the idea to the stock market has been a somewhat of a challenge. For many years the relationship between risk and return appeared to hold, where risk was defined as variance (as per the original Markowitz article) or as Beta (as per the Capital Asset Pricing Model). Why the profession originally defined risk so narrowly is obvious: a narrow, definable definition of risk allows us to use powerful statistical methods to test a particular hypothesis. Why risk has continued to be defined so narrowly is somewhat of a mystery; Beta for an individual stock is defined as the covariance between the stock return and the market return divided by the variance of the market return. This in turn is just the coefficient from the time-series regression of the stock return on the market return. Disregarding for the moment the definition of the market and the rest of the Roll critique, we see immediately that Beta measures a stock’s exposure to the market and nothing else. If everyone held only the market, Beta might almost suffice as a measure of risk. But few investors (large funds included) hold portfolios highly representative of the market, and for this reason alone other measures of risk should at the very least be included in any asset pricing model. If investors are exposed to other types of risk, why should their exposure to only one kind be priced?

This in turn leads to the discussion of leverage and the risk it implies. By almost any measure an increase in the leverage of a firm should ceteris paribus increase the riskiness of that firm’s equity. The simplest manner in which to see this uses the idea of a firm’s equity as a call on its assets with a strike price proportional to the firm’s debt. The higher the debt load the higher the striking price of the firm’s equity and thus the riskier it
is. For practical purposes, one can also view such risk as being closely related to bankruptcy risk, and in the cross-section of firms we expect those which are more highly leveraged to have riskier equity and thus exhibit higher returns. Note that various other risk factors can and certainly do exist but we focus on leverage not only because we believe it to be an important factor in the pricing of securities, but also because we believe we can improve upon past measures of leverage.

B. Value Investing - The P/E and P/C effects

The following is a brief summary of the P/E and P/C effects. Basically, the ratio of share price to earnings per share has long been thought of as a measure of the “value” of a particular stock relative to other stocks, and can thus used as a guide for adding undervalued and removing overvalued stocks from one’s portfolio. Specifically, those firms with low P/E ratios are said to be undervalued and vice versa for those with high P/E ratios. The process of constructing portfolios based upon low P/E ratios is commonly referred to as value investing or as contrarian investing, contrarian because the investor performs the opposite action as the rest of the market. For example, low P/E stocks have been priced low relative to their earnings by the market and the contrarian strategy is to choose them, in the belief that it is in this particular subset of firms that the market has irrationally overshot by the greatest amount.

Though originally trumpeted by Ben Graham, the value-investing method was brought to light for most investors by Dreman, whose 1977 book maintained that superior returns accrued to those who followed this strategy. One of the first conclusive tests of
this hypothesis is by Basu (1977), who follows his original paper with one indicating that the superior returns exhibited by stocks with low P/E ratios existed over and above the superior returns exhibited by small firms. Reinganum (1981) reaches the exact opposite conclusion, that the size effect subsumes the P/E effect. In a multivariate setting with several other anomalous variables, Jacobs and Levy (1988) find that the effects coexist. Suffice it to say that the research has sometimes provided uncertain results.

Recent work confirms the existence of the P/E effect and identifies other variables which appear to be even more powerful at predicting returns. Fama and French (1992) provide evidence that the ratio of the book value of a firm's equity to the market value of its equity is positively related to future returns, and is stronger than either the P/E effect or the size effect. Lakonishok, Shleifer and Vishny show the predictive power of the P/C ratio to be even stronger than that of P/E, and Bhandari (1988) illustrates the predictive power of a firm's leverage, where he defines leverage as the ratio of the book value of debt to the market value of a firm's equity. Most importantly, the results of each paper indicate that each of these predictor variables possesses predictive powers far greater than that of the single-Beta CAPM. What then is behind such predictive power?

Two explanations essentially span the range. The first is that the contrarian view is correct and that the market systematically underprices the equities of firms with disappointing recent results, thereby enabling shareholders of those firms to receive an excess return when the firms' operating results eventually improve and the market corrects its mistake by pricing the equities higher relative to the firms' earnings. This view is explored in detail by LSV. Probably the most convincing argument in the paper concerns
the fact that within the subset of “undervalued” stocks, those which subsequently exhibit the highest returns are also those which experienced the lowest five-year growth of sales up to the time of portfolio formation. The converse holds for the most highly valued firms, namely that those with the highest recent sales growth in turn exhibit the worst returns in the future. These results appear to confirm the contrarian view of the world: of the undervalued firms, those whose results clearly mark them as the worst “losers” subsequently show the highest stock returns, and vice versa for the firms who are clearly the best “winners.”

Contrarian effects have been noted elsewhere in the literature (DeBondt and Thaler, 1985 and 1987) but they have been limited to stocks who are defined as winners or losers only on the basis of past returns, without any reference to the underlying cashflows of the firm. However, the investor psychology behind the effects is assumed to be the same, namely that the returns to firms which have been losers (winners) in the recent past are in excess of (below) that which normally could be expected because the market has irrationally underpriced (overpriced) the said firms.

In direct contradiction to the contrarian hypothesis lies the hypothesis closest to most financial economists’ hearts, the efficient markets hypothesis. Though strictly speaking one can earn an excess return by following value strategies, such a return can hardly be referred to as an excess return if it is all due to the bearing of risk. For the reasons alluded to earlier we should not restrict ourselves only to the CAPM as a measure of risk. Since all the value measures use some normalization of the price per share, and

2 Jagannathan and Wang (1996) use a three-factor CAPM with a human-capital factor and a business-cycle factor to obtain impressive results over and above the traditional static CAPM, the APT and the
since the price of a security is just the sum of its expected cashflows discounted at some rate of return, the high returns accruing to undervalued firms could be due either to incorrect market estimates of future cashflows or to a high discount rate accorded such firms, an idea first examined in Berk (1992). If the latter is the case the high returns of undervalued stocks are not at all anomalous but rather are due to the bearing of a very general form of risk, which in turn implies that the markets are indeed efficient and price securities rationally.

Berk explains why scaled measures of price or market value should tend to provide better explanations of returns than market value alone, thereby providing rationale for the Fama-French empirical results, and in a subsequent paper shows that the size effect is best described as a market-value effect. The reason is simply that if a firm’s market value (price per share time shares outstanding) is the sum of its discounted expected cashflows, then if two firms have the same expected cashflows but the cashflows of the first are riskier they will be discounted at a higher rate and thus the firm will have a smaller market value than the firm with the less risky cashflows. In other words, when size is measured using market value we expect to see higher returns accruing to portfolios of smaller firms; the discount rate is impounded in the market value. But when Berk constructs portfolios based on measures of size other than market value, measures such as sales, book value of assets and number of employees, the size effect significantly reduced. More importantly, within each market value quintile the size of a firm (using non-market measures) is significantly positively related to return.

Fama and French (1995) three-factor model. Quite possibly the CAPM is not dead but has only been horribly mis-specified in previous tests.
As for why the scaled measures of market value are even better predictors than market value alone, he explains that the normalization of market value of equity by the book value of equity, earnings, cashflow, or book value of debt controls for the firm's "real" size and consequent expected cashflows. A firm can have a low market value either because it has large expected cashflows which are discounted at a high rate (a large firm), or because it has small expected cashflows discounted at any rate (i.e. is a small firm). Market value by itself is a noisy statistical measure because of this, and one cannot easily use it to separate the former from the latter. But by normalizing via some annual report data, we easily separate the former from the latter. For a given size (given as any of the earnings, cashflow, book debt or book equity measures), those firms with the lowest market values are discounted the most heavily and thus should experience the highest future returns.

Further evidence against the contrarian explanation is given by Fama and French (1995), who examine the dynamics of the valuation measures. In particular, the ratio of earnings per share one year ahead to current price (the inverse of the P/E ratio) for an entire portfolio of stocks (which is calculated as the value-weighted total of earnings divided by the value-weighted total of market value) tends to vary little for several years after the portfolio formation. If the contrarian explanation were correct then for a portfolio of undervalued firms (firms with high ratios of current earnings or current book value to price) the market would have underestimated their future earnings and thereby priced their stocks rather low. Sometime after portfolio formation the market would recognize its error regarding the earnings of the undervalued firms and the increased
realized earnings of such firms in the future would increase the $E_{t+1}/P_t$ ratio. Another way of explaining this is that if the market systematically underestimates the earnings of undervalued firms then the higher-than-estimated future realizations of earnings for such firms should be reflected by a change in the ratio of future earnings to current price, where current price still reflects the market's incorrect extrapolation of low past earnings. Likewise, the ratio of future earnings to current price should decrease in the years after portfolio formation for the highly valued firms, those with low current earnings/current price ratios. But the invariance of the $E_{t+1}/P_t$ ratios for 5 years after the initial portfolio formation suggests that the undervalued firms are systematically priced to provide high returns; they are consistently riskier, and therefore portfolios consisting of them consistently outperform the market.

Weighing in with evidence that seemingly supports the contrarian view are Dreman and Berry (1995), who find that quarterly earnings surprises have asymmetric effects on low and high P/E stocks. Specifically, negative surprises are followed by quarterly and yearly returns which are substantially lower for high P/E stocks than low P/E stocks and positive surprises are followed by returns which are far higher for low P/E stocks than high P/E stocks. This seems to indicate that the market does not expect any good earnings news from low P/E firms nor any bad news from high P/E firms, and thus moves quite markedly in the event of either. Essentially, low (high) P/E stocks appear to have low (high) expected cashflows impounded in their prices.

But does this really support the contrarian view of the world? No, for the very same reason that the rational versus contrarian debate has heretofore remained unresolved:
new information can be expected to affect both expected cashflows and discount rates so as to move price in the same direction. If for example a low P/E stock is subject to a positive earnings surprise, not only would its expected future cashflows increase, but one would also expect its discount rate to decrease. Either of the effects individually would drive up the stock’s price, so the price rise cannot *ceteris paribus* be attributed to just the expected-cashflows portion of price.

In light of this, the asymmetric effects of earnings surprises on low and high P/E stocks could be completely due to changes in discount rates and need not even be related to expected-cashflows! If two firms have equal expected cashflows but one has a very high discount rate whereas the other has a very low rate, the former will have a very low P/E ratio and the latter’s P/E will be quite high. In the case of a positive earnings surprise, there is substantial room for the discount rate of the low P/E stock to decrease, thereby inducing strong upwards price movement. However, for the high P/E stock there is very little room for the discount rate to move until it becomes negative and so only a small upwards price movement can occur.

For example, if the initial discount rates for the low and high P/E stocks are 20 and 5 percent, respectively, then after a positive earnings surprise the rate for the “undervalued” stock can easily decrease to 14 or 15 percent (pushing up price substantially) and yet remain high enough to ensure that it outperforms the high P/E stock for the next several years, which is what is observed empirically. The discount rate of the high P/E stock, however, cannot possibly decrease by more than 5 percent without becoming negative. Moreover, if the positive earnings surprise cuts the discount rate of
either firm by about one quarter of its allowable range then we would expect that of the high P/E stock to decrease only to about 3.75 percent or so; the concomitant price increase would be quite small in comparison to that of the low P/E stock.

The same logic applies to negative earnings surprises. The discount rate of the high P/E stock, being quite low, can increase by a substantial amount whereas the already-high rate of the low P/E stock will only have a bit of upwards leeway before it starts becoming unreasonable. We would thus expect to see a strong downwards price movement by the former but only a slight movement by the latter. This in turn is completely consistent with the evidence in Dreman and Berry.

And the astute reader will have realized by now that the P/E and P/C effects may very well be caused simultaneously by contrarian-style market-overshooting and efficient-markets-style differential discount rates. Because we normally believe expected cashflows and discount rates to adjust so as to have the same effect upon price, the only way to test either explanation is to isolate a subset of firms wherein one explanation does not hold. This is reserved for Section 4.

3. Leverage Measures and Results

A. Measures and Rationale

The leverage-based explanation for P/E effect is that if leverage risk is priced then those firms with more leverage will have lower market values and hence lower P/E ratios, and the positive excess returns attributable to such stocks are in turn due to leverage risk rather than any type of mispricing.
A second potential link between leverage and P/E ratio arises if the firm is attempting to maximize its total value by using interest payments to shield itself from corporate income tax. Berens and Cuny (1995) indicate that firms with high real growth rates can have lower debt ratios than those with lower growth rates but still achieve full tax shielding. This in turn implies that the oft-observed low returns accruing to high P/E firms ("growth" firms) should at least be correlated with the low leverage levels of such firms. Unfortunately, correlation is not causation and this explanation unfortunately does not help to explain the P/E effect: its link between P/E ratios and leverage does not concern leverage risk, but only the fact that stocks with high P/E ratios are usually referred to as growth firms and the a priori fact that high P/E firms usually underperform the market. But it nonetheless suggests that leverage should at least appear to be priced.

Very early into the project it becomes clear to us that a more meaningful measure of leverage must be used than just the book value of debt scaled by some other variable. The reason is that Bhandari's claim that leverage has explanatory and predictive power over and above that of the CAPM is contradicted by another claim. Recall that he defines leverage as the ratio of the book value of debt to the market value of equity. Immediately one becomes suspicious because the definition relies, as do all the other "anomalous" variables, upon the presence of market value of equity. More importantly, the variable often touted as the best for predicting returns is that of the ratio of the book value of equity to the market value of equity. If the ratios of both book debt/market value and book equity/market value are both positively related to returns, then the former is not possibly measuring leverage! If it were, the two results could not possibly simultaneously
coexist, with the former indicating that increased leverage is positively related to return and the latter that decreased leverage is positively related to return. In light of this problem the Bhandari leverage measure appears not to be measuring leverage but rather is controlling for real size and expected cashflows.

One reason for the irrelevance of the book-debt leverage measure deals with statistical noise, but the reason we also suspect is that the book value of debt is essentially unrelated to the period-by-period operating results of the firm. The portion of debt which most affects a firm's results is that which is manifested as interest expenses. A firm which cannot service its interest payments is bankrupt, and its owners lose their claim to any residual profit. For this reason leverage measures should incorporate interest expenses, which act as the "striking price" for the firm's equity.

One interest-based leverage measure is the ratio of interest expenses to earnings (I/E), another is the ratio of interest expenses to cashflows (I/C), a third is the ratio of interest expenses to operating income before depreciation (I/OIBDP), a fourth (which incorporates balance-sheet in addition to income-statement data) is the ratio of interest expenses to the book value of assets (I/BVA). A fifth is the ratio if interest expenses to market value (I/P), which is only added to see if we can "induce" some relationship between interest expenses and returns. After all, if market value is negatively related to return then by dividing interest expenses by market value, one ought to observe a positive relationship between returns and the resulting variable unless the numerator is positively correlated with the denominator.
B. Informal Results

Each year the firms are sorted into 10 portfolios based (in ascending order) upon the ratio of their market value at the end of fiscal year $t$ to their earnings for the same fiscal year (total market value to total earnings is the same ratio as that of price per share to earnings per share, except that to simplify things we multiply both numerator and denominator of the latter by total shares outstanding to allow us to work with the former). Firms with negative earnings for the year are excluded from this sort. Starting in July of year $t+1$, the monthly returns of each portfolio are calculated by equally weighting the returns of each of the portfolios component firms. The portfolios are rebalanced each month and so are (weakly) smaller in every subsequent month because some of the firms drop out of the sample. The returns themselves are calculated up to the end of June of year $t+2$, at which time new portfolios are formed based upon the P/E ratios from fiscal year $t+1$, etc. This gives us monthly results for each of 27 years, with the returns beginning in July of 1967 and running to the end of June of 1994. The average monthly returns emanating from simple sorts on the basis of P/E ratios are given in the first row of Table 1.

In the second row of Table 1 are the returns resulting from a simple sort of firms into deciles based upon their interest-expense to earnings (I/E) ratio. Once again, firms with negative earnings are excluded from the sample.

The results from sorts based on the ratio of market value to total cashflows, which is the same as the ratio of price-per-share to cashflow-per-share, are presented in row 3. Firms with negative cashflow are excluded. Because we define cashflow as earnings plus
depreciation and amortization (which is never negative), fewer firms have negative cashflows than have negative earning and thus the size of the portfolios is somewhat larger than in the first two rows. Essentially, some firms with negative earnings may enter if their depreciation is sufficiently large to give them positive cashflows for the year.

The fourth row of Table 1 is reserved for the results of simple sorts based on each firm's interest-expense to cashflow (I/C) ratio, and the fifth for the results from sorts based on the ratio of interest expenses to operating income before depreciation (I/OIBDP). The sixth row contains the results from simple sorts based on the firms' interest-expense to book-value-of-assets (I/BVA) ratios, and the seventh the results from sorts based upon each firm's interest-expense to market value (I/P) ratio. In each row, the value of the sort variable is increasing as one moves from the left side to the right side of the table.

It is easily seen that the P/E and P/C effects are present in the sample. For the former, the average monthly return for the decile of the lowest P/E firms was 1.66 percent versus 0.94 percent for the highest decile. More importantly, with the exception of the third lowest portfolio returns are monotonically decreasing as the P/E ratio of the portfolio increases. The spread of returns and the monotonicity exhibited when the sort variable is the P/C ratio is even more impressive; the returns range from 1.79 percent for the low P/C decile to 0.66 percent for the highest decile and are all monotonically decreasing in the P/C ratio, thereby reaffirming the LSV contention that the P/C ratio is an even better predictor of returns than the P/E ratio.
Table 1: Average Monthly Returns (in percent), July 1967 - June 1994, for Portfolios Formed on Various Value or Leverage Measures

At the beginning of each July firms are sorted into 10 deciles using the following variables: a) P/E - the ratio of a firm’s market value to its earnings, b) I/E - the ratio of a firm’s total interest expenses to its earnings, c) P/C - the ratio of a firm’s market value to its cashflow, d) I/C - the ratio of a firm’s interest expenses to its cashflow, e) I/OIBDP - the ratio of a firm’s interest expenses to its operating income before depreciation, f) I/BVA - the ratio of a firm’s interest expenses to the book value of its assets, and g) I/P - the ratio of a firm’s interest expenses to its market value. The return of each portfolio over the next 12 months is then recorded by equally weighting the returns of all firms within it, and the numbers in the cells represent the average of these monthly returns for the months of July 1967 to June 1994 inclusive. Each row shows the average monthly return (in percent) for this period for deciles formed using only the variable in the left-most column of that row. Market value for returns starting in July of year \( t+1 \) is measured at the end of December of year \( t \), and all other variables come from the firm’s annual report for fiscal year \( t \). Cashflow is defined as earnings plus depreciation and amortization.

<table>
<thead>
<tr>
<th>Sort Variable</th>
<th>Lowest</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/E</td>
<td>1.667</td>
<td>1.494</td>
<td>1.521</td>
<td>1.337</td>
<td>1.273</td>
<td>1.248</td>
<td>1.153</td>
<td>1.079</td>
<td>0.992</td>
<td>0.941</td>
</tr>
<tr>
<td>I/E</td>
<td>1.204</td>
<td>1.147</td>
<td>1.288</td>
<td>1.167</td>
<td>1.211</td>
<td>1.304</td>
<td>1.273</td>
<td>1.259</td>
<td>1.344</td>
<td>1.423</td>
</tr>
<tr>
<td>P/C</td>
<td>1.793</td>
<td>1.629</td>
<td>1.516</td>
<td>1.409</td>
<td>1.324</td>
<td>1.283</td>
<td>1.171</td>
<td>1.083</td>
<td>0.922</td>
<td>0.662</td>
</tr>
<tr>
<td>I/C</td>
<td>1.228</td>
<td>1.176</td>
<td>1.299</td>
<td>1.229</td>
<td>1.272</td>
<td>1.322</td>
<td>1.280</td>
<td>1.268</td>
<td>1.268</td>
<td>1.416</td>
</tr>
<tr>
<td>I/OIBDP</td>
<td>1.241</td>
<td>1.174</td>
<td>1.332</td>
<td>1.250</td>
<td>1.310</td>
<td>1.315</td>
<td>1.286</td>
<td>1.294</td>
<td>1.314</td>
<td>1.416</td>
</tr>
<tr>
<td>I/BVA</td>
<td>1.186</td>
<td>1.197</td>
<td>1.216</td>
<td>1.274</td>
<td>1.298</td>
<td>1.374</td>
<td>1.278</td>
<td>1.270</td>
<td>1.170</td>
<td>1.394</td>
</tr>
<tr>
<td>I/P</td>
<td>1.056</td>
<td>1.105</td>
<td>1.171</td>
<td>1.198</td>
<td>1.287</td>
<td>1.239</td>
<td>1.381</td>
<td>1.320</td>
<td>1.458</td>
<td>1.666</td>
</tr>
</tbody>
</table>

The last row of the table indicates that we are able to induce a strong positive relationship by scaling interest payments by share price. More surprisingly, the effect of each of the book-based leverage measures is very weak. The range of returns for the high-leverage versus low-leverage portfolios is 1.42 versus 1.20 percent for the I/E measure, 1.42 versus 1.23 percent for the I/C measure, 1.42 versus 1.24 percent for I/OIBDP, and 1.39 versus 1.18 percent for the I/BVA measure. Though each of these spreads is positive, it is apparent from the table that only a weak relationship exists between the leverage measures and return. Only in the case of the I/BVA measure does
the portfolio of the least leveraged firms exhibit the lowest return of all the deciles, and even for that measure the relationship is not by any means monotonic.

If anything, the only reason for the presence of the small spread probably has to do with the extra bit of return that accrues to the most highly leveraged firms. We can see that for each of the four book-based leverage variables a discrete jump in returns exists between the second-highest and the highest decile. Were it not for this jump the spread between the high and low leverage portfolios would be negligible and in one case negative. As it is, after observing the spread and monotonicity when sorting by P/C or P/E, we conclude that when it is defined using interest-expense-based measures leverage is only barely priced.

Table 2 gives the results for the same sort variables as Table 1, but rather than the average monthly return presents the average annual return, which is just the twelve monthly returns of each year compounded. Table 3 gives the compound annual return rather than the average monthly return.

Table 2: Average Annual Returns (in percent), July 1967 - June 1994, for Portfolios Formed on Various Value or Leverage Measures
At the beginning of each July firms are sorted into 10 deciles using the same variables as in Table 1. The monthly returns for the next twelve months are calculated as in Table 1 and then formed into annual returns by compounding. Table 2 presents the average annual return for each decile over the 27 annual holding periods starting in July 1967 and ending June 1994.

<table>
<thead>
<tr>
<th>Sort Variable</th>
<th>Lowest</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/E</td>
<td>22.41</td>
<td>19.97</td>
<td>20.32</td>
<td>18.00</td>
<td>17.15</td>
<td>16.84</td>
<td>15.56</td>
<td>14.73</td>
<td>13.34</td>
<td>13.74</td>
</tr>
<tr>
<td>I/E</td>
<td>15.93</td>
<td>15.28</td>
<td>17.12</td>
<td>15.68</td>
<td>16.43</td>
<td>17.53</td>
<td>17.39</td>
<td>16.95</td>
<td>18.15</td>
<td>19.68</td>
</tr>
<tr>
<td>P/C</td>
<td>24.35</td>
<td>21.63</td>
<td>20.16</td>
<td>19.02</td>
<td>17.89</td>
<td>17.33</td>
<td>15.86</td>
<td>14.83</td>
<td>12.64</td>
<td>9.58</td>
</tr>
<tr>
<td>I/C</td>
<td>16.28</td>
<td>15.59</td>
<td>17.38</td>
<td>16.42</td>
<td>17.03</td>
<td>17.82</td>
<td>17.43</td>
<td>17.16</td>
<td>17.34</td>
<td>19.35</td>
</tr>
<tr>
<td>I/OIBDP</td>
<td>16.51</td>
<td>15.58</td>
<td>17.77</td>
<td>16.86</td>
<td>17.63</td>
<td>17.75</td>
<td>17.34</td>
<td>17.50</td>
<td>17.44</td>
<td>19.73</td>
</tr>
<tr>
<td>I/BVA</td>
<td>15.74</td>
<td>15.86</td>
<td>16.26</td>
<td>17.17</td>
<td>17.46</td>
<td>18.50</td>
<td>17.39</td>
<td>17.09</td>
<td>16.11</td>
<td>19.13</td>
</tr>
<tr>
<td>I/P</td>
<td>14.04</td>
<td>15.04</td>
<td>15.75</td>
<td>16.13</td>
<td>17.27</td>
<td>16.80</td>
<td>18.89</td>
<td>17.53</td>
<td>19.66</td>
<td>22.65</td>
</tr>
</tbody>
</table>
We see from Table 2 that the differences between the returns of the high and low P/E and P/C deciles are comparable to those in LSV, though our sample appears to also contain higher returns for all deciles. This is probably due to slightly different time-frame and to the different inclusion criteria we employ.

Table 3: Compound Annual Returns (in percent), July 1967 - June 1994, for Portfolios Formed on Various Value or Leverage Measures

At the beginning of each July firms are sorted into 10 deciles using the same variables as in Table 1. The monthly returns for the next twelve months are calculated as in Table 1 and then formed into annual returns by compounding. The compound total return for each portfolio is then calculated by compounding each annual result for the 27 annual periods under study, and Table 3 presents the compound annual return for each decile over the 27 annual holding periods starting in July 1967 and ending June 1994.

<table>
<thead>
<tr>
<th>Sort Variable</th>
<th>Lowest</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/E</td>
<td>19.24</td>
<td>17.28</td>
<td>17.80</td>
<td>15.14</td>
<td>14.15</td>
<td>13.71</td>
<td>12.33</td>
<td>11.12</td>
<td>9.82</td>
<td>8.70</td>
</tr>
<tr>
<td>P/C</td>
<td>20.73</td>
<td>19.08</td>
<td>17.67</td>
<td>16.09</td>
<td>14.86</td>
<td>14.10</td>
<td>12.46</td>
<td>11.20</td>
<td>8.83</td>
<td>5.34</td>
</tr>
<tr>
<td>I/P</td>
<td>11.07</td>
<td>11.69</td>
<td>12.57</td>
<td>12.83</td>
<td>14.14</td>
<td>13.54</td>
<td>15.48</td>
<td>14.65</td>
<td>16.27</td>
<td>17.79</td>
</tr>
</tbody>
</table>

The inferences hold regardless of the manner in which returns are expressed.

C. Formal Results

As interesting as the above results may be, they should be confirmed by a formal testing means before any inferences are made. The method utilized is that of the Fama-MacBeth univariate regression and Fama-Macbeth coefficient. Starting in July of year t+1, each month for one year the returns of all active firms are regressed on each of the
explanatory variables separately, where the explanatory variables (regressors) date from fiscal year $t$. Each of the 27 years thus yields a series of 12 coefficients for every regressor used. The coefficients for each regressor are in turn joined to form a time series of 324 coefficient "observations" for every regressor, and for each time series the null hypothesis that the series equals zero can be tested against the alternative that it is not. If the series consists of $n$ observations of the coefficient $x$, where the $x$'s are independent and identically distributed Normal ($\mu$, $\sigma^2$) variables, and if the series has a sample mean of $X$ and a sample standard deviation $s$, then the test statistic

$$\frac{X - H_o}{s/\sqrt{n}}$$

is distributed as a $t$-statistic with $n-1$ degrees of freedom. $H_o$ is merely the hypothesized value of $X$ under the null hypothesis, and so assumes the value of zero for our purposes. Since the students' $t$-distribution converges asymptotically to the standard normal distribution and since we are dealing with upwards of three hundred observations of $x$, we just utilize the critical values of the standard normal distribution for hypothesis testing.

Since the P/C effect seems to be stronger than the P/E effect and since there are more firms with positive cashflows than with positive earnings, we decide to focus on valuation and leverage measures utilizing the former. As such, the explanatory variables or regressors used include the P/C ratio, the I/C ratio, the I/BVA ratio and the I/P ratio. We also use the natural logarithm of the P/C ratio as a regressor.

To this list we add 2 more leverage variables, D/BVE (the ratio of the book value of debt to the book value of equity) and D/MV (the ratio of the book value of debt to the
market value of equity, which is the same as book debt per share divided by price per share). Note that the latter variable is that used by Bhandari and that the only difference between the two is that the first scales the debt by book equity whereas the second scales by the market value of equity.

The results from the FM univariate regressions are presented in Table 4 and generally confirm those obtained through the sorts. The P/C ratio is negatively related to returns, though not as strongly as is indicated by the sorts. A surprising result is that the I/BVA variable appears to be positively related to return, with a t-statistic even larger in magnitude than that of the P/C variable. Using a formal test, leverage appears to be (weakly) priced.

Table 4: Time-series Average Slopes (in percent), Standard Errors and T-Statistics from Monthly Regressions of Stock Returns on Various Value and Leverage Measures

The regressions are month-by-month cross-sectional Fama-MacBeth (FM) univariate regressions of the monthly return of all firms on each of the value and leverage measures separately. The coefficient is the average of the monthly regression slopes and the t-statistic is this average divided by its time-series standard error, which in turn is the standard deviation of the series divided by the square root of the number of observations in the series. The p-values are 2-tailed and are calculated under the assumption that the t-statistic is normally distributed. The explanatory variables are: a) P/C - the ratio of a firm's market value to its cashflow, b) log P/C - the natural logarithm of the P/C ratio, c) I/C - the ratio of a firm's interest expenses to its cashflow, d) I/OIBDP - the ratio of a firm's interest expenses to its operating income before depreciation, e) I/BVA - the ratio of a firm's interest expenses to the book value of its assets, f) I/P - the ratio of a firm's interest expenses to its market value, g) D/BVE - the ratio of a firm's book value of debt to the book value of its equity, and h) D/MV - the ratio of a firm's book value of debt to the market value of its equity. Market value for returns starting in July of year t+1 is measured at the end of December of year t, and all other variables come from the firm's annual report for fiscal year t. Cashflow is defined as earnings plus depreciation and amortization. Returns are measured monthly from July of year t+1 to June of year t+2, and each return from said period is regressed onto a value or leverage measure from fiscal year t.

<table>
<thead>
<tr>
<th>Regressor</th>
<th>P/C</th>
<th>Log P/C</th>
<th>I/C</th>
<th>I/OIBDP</th>
<th>I/BVA</th>
<th>I/P</th>
<th>D/BVE</th>
<th>D/MV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Coeff</td>
<td>-.00828</td>
<td>-.451</td>
<td>.0717</td>
<td>.000155</td>
<td>4.254</td>
<td>2.057</td>
<td>.0146</td>
<td>.1007</td>
</tr>
<tr>
<td>Std. Error</td>
<td>.00464</td>
<td>.0817</td>
<td>.0634</td>
<td>.000614</td>
<td>2.041</td>
<td>.676</td>
<td>.0158</td>
<td>.0299</td>
</tr>
<tr>
<td>T-Statistic</td>
<td>-1.78</td>
<td>-5.51</td>
<td>1.13</td>
<td>.25</td>
<td>2.08</td>
<td>3.04</td>
<td>.926</td>
<td>3.37</td>
</tr>
<tr>
<td>P-Value (2-tail)</td>
<td>.075</td>
<td>&lt;.002</td>
<td>.2584</td>
<td>.8026</td>
<td>&lt;.002</td>
<td>.3524</td>
<td>&lt;.002</td>
<td></td>
</tr>
</tbody>
</table>
The regressions again uncover the role of market-induced leverage, in that both D/MV and I/P have positive and significant coefficients. Yet when we normalize book debt by book equity instead of market equity we again find no significant relationship between leverage and return. This merely confirms the suspicions stemming from the positive relationships between return and not only book debt to market value but also book equity to market value.

As per the earlier results, I/P is positively related to return but given the lack of any relationship between return and either of the I/C or I/OIBDP variables, it is likely that the I/P results are mainly due more to the market value in the denominator than the interest expense in the numerator.

The other surprising result evident in Table 4 is the extremely strong negative relationship between return and the log of P/C. The t-statistic associated with this monotonic transformation of P/C is more than three times larger than that for P/C in its raw form! Yet were we to form portfolios based upon either measure we would generate identical returns. The likely explanation for this is that least-squares imposes a linear constraint upon what is not necessarily a linear relationship, and using the natural logarithm loosens the constraint somewhat.

For example, if for the sake of simplicity we let price equal E(C)/(1+E(r)) where E is the expectation operator, C is cashflow and r is return, then regressing realized return on log P/C is the same as regressing it on \[\log E(C) - \log(1+E(r)) - \log (C)\], which is linear in a non-linear but monotonic transformation of one plus the expected rate of return.
Empirically it appear that this relationship is less non-linear in expected return than the regression of return on the P/C ratio, which is the same as the regression of return on E(C)/[(1+E(r))*C].

In light of the above results it is almost a moot point whether the P/C effect is proxying for a leverage effect. To obtain even more evidence on this point, the each year's P/C variables are regressed upon the corresponding I/C and I/BVA leverage variables. Returns are then regressed on the residuals from these two regressions. Bear in mind that the residuals from the first two regressions contain the part of P/C which is orthogonal or linearly unrelated to I/C and I/BVA, respectively. If P/C is in fact proxying for leverage we expect the relationship between return and the part of P/C orthogonal to leverage to be weaker than the original relationship between return and P/C. The results of the two regressions of return on the residuals are given in Table 5.

<table>
<thead>
<tr>
<th>Regressor - Portion of P/C orthogonal to:</th>
<th>I/C</th>
<th>I/BVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Coefficient</td>
<td>-.012</td>
<td>-.0081</td>
</tr>
<tr>
<td>Standard Error</td>
<td>.00526</td>
<td>.00459</td>
</tr>
<tr>
<td>T-Statistic</td>
<td>-2.29</td>
<td>-1.76</td>
</tr>
<tr>
<td>P-Value (2-tail)</td>
<td>.022</td>
<td>.0784</td>
</tr>
</tbody>
</table>
We see from the table that the results are almost unchanged from the original regression of return on P/C, which yielded an average coefficient of -.00828 and a t-statistic of -1.78. The explanatory power of P/C is certainly not reduced more than a trivial amount with respect to I/BVA, and in fact increases when controlling for the effect of I/C! This in concert with the previous battery of tests indicates that though leverage may be priced, it is probably not a factor which influences P/C or P/E ratios.

4. Contributions to the Understanding of Value-Investing and Contrarian-Investing

A. Background and Theory

With a strong P/C effect having been observed in this and other data sets and with leverage risk apparently not contributing to it, the question again turns to its cause. Financial theory predicts that the price of a security is a series of discounted expected cashflows, where the expected cashflows are those which are to accrue to shareholders. The P/C ratio in turn is just price per share scaled by accounting cashflows per share. So the difference between the two explanations for the effect boils down to the following: whereas the contrarian view holds that the market has incorrectly estimated the expected-cashflows portion of the price and will eventually realize its mistake, the efficient market proponents maintain that the price is low not because of any systematic mistake in estimating cashflows but rather because of the high discount rate accorded the said cashflows. Section 2.B discussed the existing research in some detail, with the conclusion that the evidence is slowly swinging towards the efficient-market explanation; but in Section 3 a very measureable type of risk was seen to be absent from prices, a result which
suggests that maybe the contrarian view still has some validity. The following should show that the contrarian explanation is indeed based upon some shaky foundations.

Previous tests of the contrarian versus efficient-market explanations focus upon the performance of firms over time, as measured by annual report data. Our approach is no different except that it focusses on a subgroup of firms for which the implications of the contrarian view are quite clear.

Because the contrarian view is predicated on market overreaction or overshooting, it can easily be expressed in a dynamic framework; no firm is just underpriced in a vacuum in the contrarian world, but rather will be underpriced due to recent information and the changes that information has upon the market’s expectations. As stated in LSV, any truly contrarian strategy relies on taking advantage of market over-extrapolation of past results into the future. By definition one cannot extrapolate from a point observation but must instead have at least two observations from which to form a pattern. This in turn implies that the changes in accounting information in turn drive the market’s under- or overpricing of firms, and by simply looking at a subset of firms with particular changes in certain variables we can test the contrarian view of the world. And if we form portfolios based only on a single ratio, the only variables that matter are those in the ratio.

We are referring to that subset of firms for which price per share and cashflow per share have moved in opposite directions to one another from a previous period. The contrarian view of overshooting does not hold for this group of firms: if cashflows have decreased but prices have increased, how can the market have overshot the price? Overshooting by the usual definition can only occur when price moves in the same
direction as cashflow but by too much! So by isolating a group of firms wherein the two variables move in opposite directions we effectively eliminate the contrarian explanation for any P/C effect. The question then is whether or not the P/C effect exists in the subset, and if so if it is at all weaker than in the entire universe of firms. If it does not exist in the subset then the contrarian explanation is in all likelihood correct; but if it exists then the risk-based explanation, where risk is manifested in higher discount rates, is most likely correct.

B. Informal Results

For each year $t$ of the sample starting with fiscal 1967, those firms which are included in the previous year's sample and report a negative value for the variable

$$\frac{(MV_t - MV_{t-1})}{(C_t - C_{t-1})}$$

are separated from the rest of the sample. In the above expression $MV_t$ represents market value for fiscal year $t$ (price per share multiplied by shares outstanding) and $C_t$ represents total cashflow for the same fiscal year $t$. When the expression is negative the firm's price per share and cashflow per share have moved in opposite directions from the previous period, and we thereby can test for the existence of the P/C effect in a non-contrarian group of firms.

As in the earlier sorts, for each fiscal year $t$ the firms are sorted into groups based (in ascending order) on the P/C ratios they report that year, but because of the substantially smaller sample size we decide to sort into only five groups instead of ten. The monthly equally weighted returns for each group are calculated from July of year $t+1$
to June of year \( t+2 \) and the portfolios are then re-formed. We again decide to rebalance each month during the year, so as to take account of the firms which drop out of the sample during that time period. This process yields monthly returns for each of 26 years, starting in July of 1968 and running to June of 1994. The results of this ordering are presented in Table 6 along with the corresponding results when the sample of all firms is sorted into quintiles rather than deciles.

Table 6: Average Monthly, Average Annual and Compound Annual Returns (all in percent) from Portfolios Formed on P/C, for A) Firms where P and C have Moved in Opposite Directions Since the Previous Reporting Period: July 1968 - June 1994, and B) Entire Sample of Firms, July 1968 - June 1994

At the beginning of each July of year \( t+1 \) a subset of firms is created by selecting firms for which the variable \((\text{MV}_t - \text{MV}_{t-1})/\text{C}_t\) is negative, where \( \text{MV}_t \) is market value measured at the end of December of fiscal year \( t \) and \( \text{C}_t \) is cashflow for the same fiscal year \( t \), and where cashflow is defined as earnings plus depreciation and amortization. The firms within each year's subset are then sorted on the basis of P/C, which is defined as the ratio of \( \text{MV}_t \) to \( \text{C}_t \). The return of each portfolio over the next 12 months is then recorded by equally weighting the returns of all firms within it, and the numbers in the first row of cells represent the average of these monthly returns for the months of July 1968 to June 1994 inclusive. The annual return for each holding period is calculated by compounding the 12 monthly returns during the period. The third row of cells presents the average annual return for each portfolio for the 26 periods. The fifth row presents the compound annual return for the 26 periods. Rows two, four and six show the corresponding results over the same period but for the entire sample of firms rather than just the non-contrarian subset.
We observe from Table 6 that the evidence is not kind to the contrarian hypothesis. Regardless of the way return is measured, it decreases in a monotonic manner as P/C increases. Moreover, the returns accompanying the various quintiles are not materially different than those of the entire sample of firms for the same 26 years, as presented in rows two, four and six.

Further evidence is garnered by changing the time horizon and utilizing the subset of firms whose market value and cashflows have moved in opposite directions over the previous two year period. In this case we have returns for 25 years for the subset of firms for which the expression

\[(MV_t - MV_{t-2}) / (C_t - C_{t-2})\]

is negative during fiscal year t. The results of forming portfolios based on ascending P/C ratios for this subgroup of firms are presented in Table 7.
Table 7: Average Monthly, Average Annual and Compound Annual Returns (all in percent) from Portfolios Formed on P/C, for A) Firms where P and C have Moved in Opposite Directions Since 2 Reporting Periods Ago: July 1969 - June 1994, and B) All Firms, July 1969 - June 1994

At the beginning of each July of year \( t+1 \) a subset of firms is created by selecting firms for which the variable \( \frac{(MV_t - MV_{t-2})}{(C_t - C_{t-2})} \) is negative, where \( MV_t \) is market value measured at the end of December of fiscal year \( t \) and \( C_t \) is cashflow for the same fiscal year \( t \), and where cashflow is defined as earnings plus depreciation and amortization. The firms within each year’s subset are then sorted on the basis of P/C, which is defined as the ratio of \( MV_t \) to \( C_t \). The return of each portfolio over the next 12 months is then recorded by equally weighting the returns of all firms within it, and the numbers in the first row of cells represent the average of these monthly returns for the months of July 1969 to June 1994 inclusive. The annual return for each holding period is calculated by compounding the 12 monthly returns during the period. The third row of cells presents the average annual return for each portfolio for the 25 periods. The fifth row presents the compound annual return for each period. Rows two, four and six show the corresponding results over the same period but for the entire sample of firms rather than just the non-contrarian subset.

<table>
<thead>
<tr>
<th>Firm Type</th>
<th>Average Monthly</th>
<th>Average Annual</th>
<th>Compound Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Contrarian</td>
<td>Non-Contrarian</td>
<td>Non-Contrarian</td>
</tr>
<tr>
<td></td>
<td>All Firms</td>
<td>All Firms</td>
<td>All Firms</td>
</tr>
<tr>
<td>Lowest</td>
<td>1.64</td>
<td>21.77</td>
<td>18.63</td>
</tr>
<tr>
<td>2</td>
<td>1.47</td>
<td>19.81</td>
<td>16.91</td>
</tr>
<tr>
<td>3</td>
<td>1.32</td>
<td>17.70</td>
<td>14.79</td>
</tr>
<tr>
<td>4</td>
<td>1.14</td>
<td>15.54</td>
<td>12.12</td>
</tr>
<tr>
<td>Highest</td>
<td>0.82</td>
<td>11.60</td>
<td>7.56</td>
</tr>
</tbody>
</table>

Finally, we look at the subset of firms whose market value and cashflows have moved in opposite directions over the previous three year period. In this case we have returns for 24 years for the subset of firms for which the expression

\[
\frac{(MV_t - MV_{t-3})}{(C_t - C_{t-3})}
\]

is negative during fiscal year \( t \). The results of forming portfolios based on ascending P/C ratios for this subgroup of firms are presented in Table 8.
Table 8: Average Monthly, Average Annual and Compound Annual Returns (all in percent) from Portfolios Formed on P/C, for A) Firms where P and C have Moved in Opposite Directions Since 3 Reporting Periods Ago: July 1970 - June 1994, and B) All Firms, July 1970 - June 1994

At the beginning of each July of year t+1 a subset of firms is created by selecting firms for which the variable \((MV_t - MV_{t+3})/(C_t - C_{t+3})\) is negative, where \(MV_t\) is market value measured at the end of December of fiscal year t and \(C_t\) is cashflow for the same fiscal year t, and where cashflow is defined as earnings plus depreciation and amortization. The firms within each year’s subset are then sorted on the basis of P/C, which is defined as the ratio of \(MV_t\) to \(C_t\). The return of each portfolio over the next 12 months is then recorded by equally weighting the returns of all firms within it, and the numbers in the first row of cells represent the average of these monthly returns for the months of July 1970 to June 1994 inclusive. The annual return for each holding period is calculated by compounding the 12 monthly returns during the period. The third row of cells presents the average annual return for each portfolio for the 24 periods. The fifth row presents the compound annual return for the 24 periods. Rows two, four and six show the corresponding results over the same period but for the entire sample of firms rather than just the non-contrarian subset.

<table>
<thead>
<tr>
<th>Firm Type</th>
<th>P/C Quintile</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lowest</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly</td>
<td>Non-Contrarian</td>
<td>1.80</td>
<td>1.70</td>
<td>1.61</td>
</tr>
<tr>
<td>All Firms</td>
<td></td>
<td>1.84</td>
<td>1.64</td>
<td>1.49</td>
</tr>
<tr>
<td>Average</td>
<td>Non-Contrarian</td>
<td>23.79</td>
<td>22.32</td>
<td>20.52</td>
</tr>
<tr>
<td>Annual</td>
<td>All Firms</td>
<td>24.18</td>
<td>21.62</td>
<td>19.76</td>
</tr>
<tr>
<td>Compound</td>
<td>Non-Contrarian</td>
<td>20.80</td>
<td>20.12</td>
<td>18.70</td>
</tr>
<tr>
<td>Annual</td>
<td>All Firms</td>
<td>21.78</td>
<td>19.46</td>
<td>17.17</td>
</tr>
</tbody>
</table>

The results of Tables 7 and 8 are hardly any kinder to the contrarian philosophy than those of Table 6. The difference in returns between the high and low P/C portfolios diminishes somewhat in Table 8 for both the non-contrarian sample and the entire sample, mainly because the high P/C firms do not turn in such dismal returns as they do in the sample of all firms. However, all three sets of results show the P/C effect alive and well in sets of firms where no market overshooting can possibly have occurred! And the
difference between the non-contrarian and entire-sample quintiles is immaterial for each subset. Therefore the only explanation for the strong P/C effect in each of these subsets is that they contain firms whose expected cashflows are discounted at different rates of return.

C. Formal Tests

As in Section 2, FM univariate regressions are run each month to augment the informal results. Each month from July of year $t+1$ to June of year $t+2$, the returns of firms in each non-contrarian subset are regressed on their P/C ratios as measured in fiscal year $t$, and are also (separately) regressed on the natural logarithms of the same P/C ratios. Firms with negative P/C ratios are excluded from the sample. The process is undertaken for the firms with market value moving opposite to cashflow for both the previous one, two and three-year periods. The coefficients are then formed into three time-series and subjected to the same tests for statistical significance as are used for the entire sample of firms in the year, in section 3.c. They are also tested for any significant difference from the coefficients reported in section 3.c. So that the results are not contaminated by the inclusion in the “whole sample” series of coefficients from years when the “subset” series was not yet formed, in the case of the first subset (P moves against C from one period earlier) the first twelve coefficients are dropped from the “whole sample” series, for the second subset (P moves against C from two periods earlier) the first twenty-four coefficients from the “whole sample” series are dropped and for the third subset (P moves
against C from three periods earlier) the first thirty-six coefficients from the “whole sample” series are dropped.

If the sample mean for one series is \( X_1 \) and for a second series is \( X_2 \), if the sample variances for the series are \( s_1^2 \) and \( s_2^2 \) respectively, and if the series consist of \( n_1 \) and \( n_2 \) observations respectively, then even without assuming that the true variances of the series equal one another we can construct the test statistic

\[
\frac{(X_1 - X_2) - H_o}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}
\]

which is asymptotically distributed at a standard normal variate and where \( H_o \) is the hypothesized difference between the means of the series. In this case the null hypothesis is that there is no difference between the means of the series, where \( X_1 \) and \( X_2 \) represent the means of the coefficient series of the entire sample and the sample wherein share price and cashflow per share move in opposite direction, respectively. Thus \( H_o \) is set to zero. Table 9 reports the results from the FM regressions: we first test the null that the mean of each subset series is zero, and then test the null that no difference exists between between the means of the “whole sample” series and each of the 3 subset series.

The evidence presented in Table 9 indicates that the coefficients from the FM regressions of return on P/C and its logarithm are statistically significant for all three subsets of firms, and moreover are not significantly different than the corresponding coefficients for the set of all firms\(^3\). This only provides more support for the claim that a

\(^3\) Footnote: for the one instance in which the coefficient for the entire sample differs form that of the subset, namely in Subset 3 for the regressor P/C, since the test is constructed by subtracting the subset coefficient (which is negative) from the whole-sample coefficient (which is also negative), the strong
strong P/C effect exists in the subset. Since we find such strong evidence of the P/C effect in a subsamples where market overshooting and over-extrapolation of a contrarian nature is for the most part absent, the only available conclusion is that higher discount rates drive the subsequent high returns for portfolios of low P/C firms. Why the firms are consistently accorded such high discount rates is next to impossible to determine "scientifically," but we can easily posit that risk has something to do with it. We do not refer only to Beta or variance as measures of risk but allow many more highly intangible forms to enter. For whatever reason, though, if the firms gain an excess return because of the high discount rates impounded in their prices rather than because of incorrectly-extrapolated expected cashflows impounded in the same prices, and if the discount rates are higher due to higher perceived risk, we can conclude that the market is still efficient in the semi-strong form; on a risk-adjusted basis one cannot beat the market using publicly available information.

positive coefficient for the test statistic only indicates that the coefficient for the subset is more strongly negative than for the entire sample.
Table 9: Time-series Average Slopes (in percent), Standard Errors and T-Statistics from Monthly Regressions of Stock Returns on P/C and Log P/C, for Each of 3 Subsets of Firms where P and C Move Against Each Other from Previous Periods
The regressions are month-by-month cross-sectional Fama-MacBeth (FM) univariate regressions of the monthly return of all firms on each of P/C and the Log P/C separately. The coefficient is the average of the monthly regression slopes and the t-statistic is this average divided by its time-series standard error, which in turn is the standard deviation of the series divided by the square root of the number of observations in the series. The p-values are 2-tailed and are calculated under the assumption that the t-statistic is normally distributed. The explanatory variables are: a) P/C - the ratio of a firm’s market value to its cashflow, and b) Log P/C - the natural logarithm of the P/C ratio. Market value for returns starting in July of year t+1 is measured at the end of December of year t, and cashflow comes from the firm’s annual report for fiscal year t. Cashflow is defined as earnings plus depreciation and amortization. Returns are measured monthly from July of year t+1 to June of year t+2, and each return from the said period is regressed onto P/C or Log P/C from fiscal year t.
The first 2 columns of results are for firms for which (MV_t-MV_{t+1})/(C_t-C_{t+1}) is negative, the middle 2 columns of results are for firms for which (MV_t-MV_{t+2})/(C_t-C_{t+2}) is negative, and the final 2 columns of results are for firms for which (MV_t-MV_{t+3})/(C_t-C_{t+3}) is negative. MV_t is market value measured at the end of December of fiscal year t and C_t is cashflow for the same fiscal year t. Row 5 of the results gives the t-statistic for the test that the average coefficient for the subset is different than the associated coefficient for the sample of all firms.

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Subset 1 (1-period Δ P/C)</th>
<th>Subset 2 (2-period Δ P/C)</th>
<th>Subset 3 (3-period Δ P,C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P/C</td>
<td>Log P/C</td>
<td>P/C</td>
</tr>
<tr>
<td>Average Coefficient</td>
<td>-0.0209</td>
<td>-0.456</td>
<td>-0.0186</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.0105</td>
<td>0.0952</td>
<td>0.0074</td>
</tr>
<tr>
<td>T-Statistic (Coeff=0)</td>
<td>-2.06</td>
<td>-4.79</td>
<td>-2.51</td>
</tr>
<tr>
<td>P-Value (2-tail)</td>
<td>0.0394</td>
<td>&lt;=0.002</td>
<td>0.012</td>
</tr>
<tr>
<td>T-Stat (All-Subset=0)</td>
<td>1.09</td>
<td>0.21</td>
<td>1.10</td>
</tr>
<tr>
<td>P-Value (2-tail)</td>
<td>0.2758</td>
<td>0.8336</td>
<td>0.2714</td>
</tr>
</tbody>
</table>

D. Tests Against a Different Base

It can be questioned whether we should be comparing the results from the non-contrarian subsets with those of the entire sample or just those of subsets in which the strict contrarian hypothesis holds (i.e. price and cashflow move together from previous
periods). Since the sample of all firms includes the non-contrarian firms and two other small subsamples in addition to those firms for which price and cashflow move in the same direction, we might expect there to be less difference between it and the non-contrarian subset than between the non-contrarian subset and the subset where the contrarian explanation can hold (hereafter referred to as the contrarian subset). In other words if there is a large difference between the non-contrarian and contrarian subsets, the entire sample reflects some average of the two main subsets and thus is a weaker base from which to test our hypothesis. With this in mind, we separate those firms for which

\[
\frac{(MV_t - MV_{t-1})}{(C_t - C_{t-1})}
\]

is positive (the contrarian explanation can hold for this group, because share price and cashflow per share move in the same direction) and form portfolios based on P/C ratios. The results are displayed in Table 10.

It is clear from Table 10 that the inferences are not affected by the use of the contrarian subset rather than the entire sample of firm. If anything, the inferences are bolstered by Table 10: the differences between the contrarian and non-contrarian subsets are just as trivial as those between the latter and the entire sample of firms.

---

4 The 4 subsets in any given year consist of those firms for which a) price and cashflow move together, b) price and cashflow move against one another, c) one or both of price and cashflow variables does not move at all, or d) no results were available from the previous year.

5 This is only because we test two different hypotheses in this section. The first, that the P/C effect exists in the contrarian-free subset, requires no basis for comparison. The second, that the P/C effect in the contrarian-free subset is significantly different than that for some other base portfolio, requires us to define a base portfolio. We can thus define the base as either the sample of all firms or the sample of firms for which the contrarian explanation can hold.
Table 10: Average Monthly, Average Annual and Compound Annual Returns (all in percent) from Portfolios Formed on P/C, for Firms where P and C have Moved in the Same Direction Since the Previous Reporting Period: July 1968 - June 1994

At the beginning of each July of year t+1 a subset of firms is created by selecting firms for which the variable \((MV_t - MV_{t-1})/(C_t - C_{t-1})\) is positive, where \(MV_t\) is market value measured at the end of December of fiscal year t and \(C_t\) is cashflow for the same fiscal year t, and where cashflow is defined as earnings plus depreciation and amortization. The firms within each year’s subset are then sorted on the basis of P/C, which is defined as the ratio of \(MV_t\) to \(C_t\). The return of each portfolio over the next 12 months is then recorded by equally weighting the returns of all firms within it, and the numbers in the first row of cells represent the average of these monthly returns for the months of July 1968 to June 1994 inclusive. The annual return for each holding period is calculated by compounding the 12 monthly returns during the period. The second row of cells presents the average annual return for each portfolio for the 26 periods. The third row presents the compound annual return for the 26 periods.

<table>
<thead>
<tr>
<th>Return Type</th>
<th>Lowest</th>
<th>2</th>
<th>P/C Quintile</th>
<th>3</th>
<th>4</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Monthly</td>
<td>1.65</td>
<td>1.42</td>
<td>1.27</td>
<td>1.08</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Average Annual</td>
<td>21.69</td>
<td>19.15</td>
<td>17.17</td>
<td>15.06</td>
<td>11.82</td>
<td></td>
</tr>
<tr>
<td>Compound Annual</td>
<td>18.97</td>
<td>16.30</td>
<td>13.99</td>
<td>11.30</td>
<td>7.66</td>
<td></td>
</tr>
</tbody>
</table>

To provide further evidence we run FM regressions of return on (separately) P/C and log P/C for the purely contrarian subset and then test the hypothesis that the difference between the mean coefficient and that of non-contrarian subsets is zero: this is identical to the tests in Table 9, except that we substitute the mean coefficient from the contrarian subset for that of the entire sample. The asymptotic t-statistic is -1.047 for the P/C ratio and -0.046 for the natural log of the P/C ratio. In both cases the coefficient of the purely contrarian subset is more negative (higher in absolute value) but not significantly different than that of the non-contrarian subset. Because of the similarity of results using either the contrarian subset or the entire sample, we use only the latter to compare with the 2-year and 3-year contrarian-free subsets. An alternative explanation is
that the inclusion of the non-contrarian firms in the entire sample seems not to muddy the entire sample.

E. Hope for the Contrarians?

But wait: in Section 2B it was asserted that changes in discount rates alone can have substantial effects on stock-price movements. After all, they do for the bond market. Ironically, this could in turn salvage the contrarian explanation of the P/C effect. Consider the example wherein realized cashflows decrease but price increases. Once we allow for changes in discount rates, we see that it is possible for price to increase because expected cashflows decrease in tandem with realized cashflows but for the same reason the discount rate decreases by more than enough to offset the said decrease in expected cashflows. And if expected cashflows can be shown to move in the same direction as actual cashflows, then the subsets of stocks utilized in this section are not, strictly speaking, free of contrarian influence and the inferences reached are less conclusive.

Since we have all along assumed that for the most part expected cashflows are proxied for by realized cashflows, to test whether this is true for this section's subsets we must test for changes in discount rates.

For contrarian effects to possibly exist in the 3 subsets, we expect to see lower returns accruing to firms whose price has increased while cashflow has decreased (because discount rates for these firms will have decreased substantially while expected cashflows have declined), and would conversely expect to see higher returns accruing to firms whose price has decreased while cashflow has increased (discount rates for these firms must have
increased substantially to more than offset the effect of higher expected cashflows). Table 11 presents the results of forming 2 portfolios each year within each subset to test for the existence of the contrarian effects.

Table 11 seems to indicate that there may yet be a glimmer of hope for the contrarian explanation; particularly for Subset 2, returns for firms whose market value has declined while cashflows have increased are somewhat larger than for firms where the opposite occurs. However, extreme caution should be used in interpreting these results; in some of the years prior to 1975, many of the portfolios formed for the above test contain a trivial number of firms (in one case the portfolio is made up of only 2 firms, and so we can hardly say that it is diversified). Table 12 repeats the tests of Table 11 but looks only at results for fiscal years after and including 1975.

Table 11: Average Monthly, Average Annual and Compound Annual Returns (in percent) of Portfolios Formed on the Basis of Changes in Market Value Relative to Changes in Cashflow

At the beginning of each July of year \( t+1 \) three subsets of firms are created by selecting firms for which the variables \((MV_T-MV_{t-1})/(C_t-C_{t-1})\), \((MV_T-MV_{t-2})/(C_t-C_{t-2})\), and \((MV_T-MV_{t-3})/(C_t-C_{t-3})\), respectively, are negative. \( MV_t \) is market value measured at the end of December of fiscal year \( t \) and \( C_t \) is cashflow for the same fiscal year \( t \). Cashflow is defined as earnings plus depreciation and amortization. Within each subset, those firms for which \( MV_t \) increased (from \( MV_{t-1} \) for the first subset, from \( MV_{t-2} \) for the second and from \( MV_{t-3} \) for the third) are separated from those for which it decreased. In the table, an increase in \( MV \) is represented by an increase in \( P \). The return of each portfolio over the next 12 months is then recorded by equally weighting the returns of all firms within it, and the numbers in the first row of cells represent the average of these monthly returns for the months of July 1968 to June 1994 inclusive for Subset 1, for July 1969 to June 1994 inclusive for Subset 2 and for July 1970 to June 1994 inclusive for Subset 3. The second row presents the average annual return, which is calculated by compounding the 12 monthly returns for each portfolio. Row three gives the compound annual return.

<table>
<thead>
<tr>
<th></th>
<th>Subset 1 (1-period Δ P,C)</th>
<th>Subset 2 (2-period Δ P,C)</th>
<th>Subset 3 (3-period Δ P,C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio defined by:</td>
<td>( P↑,C↓ )</td>
<td>( P↓,C↑ )</td>
<td>( P↑,C↓ )</td>
</tr>
<tr>
<td>Avg. Monthly Return</td>
<td>1.22</td>
<td>1.32</td>
<td>1.07</td>
</tr>
</tbody>
</table>
Table 12 eliminates this line of argument for the contrarian contention, indicating that within each subset returns are equal regardless of the sign of the change in market value.

Table 12: Average Monthly, Average Annual and Compound Annual Returns (in percent) of Portfolios Formed on the Basis of Changes in Market Value Relative to Changes in Cashflow: Fiscal 1975 Onwards

At the beginning of each July of year t+1 three subsets of firms are created by selecting firms for which the variables \((MV_{t+1}/C_{t+1})\), \((MV_{t}/MV_{t+2}/C_{t+2})\), and \((MV_{t}/MV_{t+3}/C_{t+3})\), respectively, are negative. \(MV_t\) is market value measured at the end of December of fiscal year t and \(C_t\) is cashflow for the same fiscal year t. Cashflow is defined as earnings plus depreciation and amortization. Within each subset, those firms for which \(MV_t\) increased (from \(MV_{t-1}\) for the first subset, from \(MV_{t-2}\) for the second and from \(MV_{t-3}\) for the third) are separated from those for which it decreased. In the table, an increase in \(MV\) is represented by an increase in \(P\). The return of each portfolio over the next 12 months is then recorded by equally weighting the returns of all firms within it, and the numbers in the first row of cells represent the average of these monthly returns for the months of July 1976 to June 1994 inclusive for each subset. The second row presents the average annual return, which is calculated by compounding the 12 monthly returns for each portfolio. Row three gives the compound annual return.

<table>
<thead>
<tr>
<th></th>
<th>Subset 1 (1-period Δ P,C)</th>
<th>Subset 2 (2-period Δ P,C)</th>
<th>Subset 3 (3-period Δ P,C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio defined by:</td>
<td>(P↑,C↓)</td>
<td>(P↓,C↑)</td>
<td>(P↑,C↓)</td>
</tr>
<tr>
<td>Avg. Monthly Return</td>
<td>1.49</td>
<td>1.65</td>
<td>1.57</td>
</tr>
<tr>
<td>Comp. Annual Return</td>
<td>17.33</td>
<td>19.57</td>
<td>18.46</td>
</tr>
</tbody>
</table>

Lest we overstate our case, we also point out that the prediction of the efficient market proponents is less than perfectly clear when it comes to the non-contrarian subsets. The entire reason share price is normalized by current cashflow per share is that the latter is to proxy for expected future cashflows, so that we can thereby isolate firms which are accorded high discount rates. But if discount rates remain roughly constant (Tables 11 and 12), then expected cashflows are moving opposite to current cashflows and our
choice of a variable with which to normalize price is suspect. The way out of this slight
conundrum is to recall that the efficient markets explanation holds that extreme discount
rates tend to remain far from the mean for extended periods of time; hence the excess
returns of low P/C stocks for more than 5 years after portfolio formation. Because of this,
expected cashflows can move opposite to realized cashflows temporarily while the (high)
discount rate of low P/C stocks remains high.

But even if the efficient markets explanation is less than perfect, in the case of
invariant discount rates the contrarian explanation is practically absent from the three
subsets. As such, we report the inferences in sections B and C as valid.

5. Conclusions and Criticisms

A. Potential Flaws with the Research

We attempt to critique our results in the hopes of either finding them intact or
determining directions for new research.

One of the criticisms concerns the use of market values from the end of calendar
years instead of the fiscal yearend or at the time of portfolio formation. Part of our use of
the December market values is necessitated by a flaw in our data retrieval program, which
when it gives us the number of shares outstanding at the end of June does not take into
account any stock distributions from the previous December. Checks by hand verify that
the number of stock splits in the intervening six months is large enough to introduce some
errors in any results using the June market values. Note that using fiscal yearend results
also gives some mis-timed market values, because many firms are late filing their annual reports.

Even when using June market values some distortion can clearly occur. If one firm has a fiscal yearend of March and another's falls in September, then by the end of June of year t the market value of the first firm has had only 3 months in which to adjust to annual report information whereas for the second it has had 9 months (and has therefore almost certainly adjusted). However, is the market value in June necessarily reflective of the information reported 9 months earlier? If both firms report on time, then the market value of the first firm which properly "reflected" the information contained in its annual report has probably already changed in the intervening 9 months. In this scenario, the end-of-June market value is probably more reflective of the information contained in the annual reports of the firm with its yearend in March, conditional on its results being released before the end of June.

What we are basically want is for the market value to reflect the information contained in the most recent annual report. But we end up trading off the late-reporting tendencies of some firms (which means that market value will not incorporate their results at all) against those firms who report very early in the period (which means that market value has "moved on" since the time of the report). But Fama and French (1992) show their results to be invariant to the choice of fiscal yearend or calendar yearend, so perhaps we should not worry too much about our results in the pure cross-section.

Section 4 is another matter altogether. Its basic premise rests on the construction of subsets of firms wherein the contrarian explanation of the P/C effect cannot hold. If a
firm's fiscal yearend lies after December, though, and we use December market values, then conceivably a firm's market value could increase while reported cashflows decreased only because expectations in December of the subsequent cashflows severely overestimated them and did not impound their decrease. Market value measured after the earnings were reported would, however, correctly reflect the decrease in earnings. So is Section 4 invalidated?

Hardly. If the annual report were the only source of information about any firm, then (notwithstanding the fact that few firms report after December but before May) Section 4's results could be questioned. But this is not the case. Not only are firms listed on the NYSE and AMEX exchanges required to file annual reports (10-K's) but they are required to file quarterly financial statements (the 10-Q's), and myriad company and industry information is available in the time between the financial statements. Because of this, the chance for the market to fail completely to anticipate the earnings decline is rather slim; if the firm reports annually in February, for example, then the quarterly statements from the previous November will tend to give at least some indication of the impending February results.

Another part of Section 4 which could conceivably pose problems concerns new issues of equity. Regardless of its change in earnings, if a firm issues new equity between December of one year and the next it would in most cases also increase its market value but not cashflow in the interim (the exception being where the assets from the new equity issue are profitably deployed within the year). In this scenario the increase in market value is not tied to the decrease in cashflow, so such a firm's stock price is not necessarily free
of overshooting effects. We believe this problem to be quite irrelevant, however. In most years between one quarter and one third of the firms have market value and cashflow move in opposite directions, which is far larger than the number of firms issuing new equity every year.

Another question concerns the bias from not using firms with negative earnings (when sorting on P/E) or negative cashflows (when sorting on P/C). Though Fama and French (1992) and Ettredge and Fuller (1991) indicate that firms with negative earnings subsequently show some of the highest returns, we believe that there is nothing about our exclusion of such firms which weakens our results. And if we normalize price by earnings or cashflows so as to proxy for expected cashflow, then we have no theory to deal with firms with negative cashflows. We deal with this potential bias by stating our results to be valid conditional upon the exclusion of firms with negative earnings or cashflows. Quite simply, the effect we are investigating has been defined earlier by others who also excluded negative-earnings firms; in attempting to explain the effect that others discovered we must first deal with those firms which clearly exhibit the effect and for which we have a theory.

A more likely source of bias is that from microstructure effects. Ball, Kothari and Shanken (1995) show the contrarian results of DeDondt and Thaler to be highly sensitive to such effects, so much so that adding $1/8 to the initial price of all securities dramatically diminishes the difference between the median return of the loser and winner portfolios. We do not, however, believe this to be a problem for our study. Though it is true that ceteris paribus low P/C firms will have low share prices and therefore returns that are highly
sensitive to transaction costs, other things need not be held equal. A low P/C firm can be so due to low share price and/or low earnings per share. And more importantly, our results are not at all contingent on the differences between only the high and low deciles or quintiles. The relationships hold in a monotonic manner throughout the entire range, which would not be the case if microstructure effects were behind them.

The most serious problem concerns whether the data set we use is representative of that which the investor would have faced in any given year. In other words the tests may not be truly ex-ante in nature. As mentioned in Section 1 we informally verified that the information reported for each firm is hardly changed from year to year. The problem then mainly concerns the backfilling by COMPUSTAT of its tapes. When they add a firm to their coverage COMPUSTAT often adds 5 years of past data for that firm, so that on the new tape it mistakenly appears as though an investor had access to the data for the past five years. LSV deal with this problem by requiring a firm to have at least five years of results before they include it in the data set, but subsequent research by CJL indicates that this procedure itself introduces upwards bias! Probably the only way around this conundrum is to look at each year’s COMPUSTAT tape separately.

This is exactly the procedure followed by Banz and Breen (1986), who then indicate that the P/E effect is no longer significant. However, they fail to examine the raw returns for portfolios formed on the basis of P/E but first sort the sample into size (as measured by market value) quintiles, and within each quintile formed five portfolios using P/E ratios. But when Basu (1983) uses the same procedure the P/E effect shrinks by nearly half. The average monthly return of the low P/E portfolio minus that of the high
P/E portfolio decreases from 0.66 percent to 0.39 percent when market value is held constant. Moreover, since market value is a (noisy) measure of the discount rate, sorting by it should remove some of the variation due to different P/E ratios. In light of this, the Banz and Breen findings are inconclusive though they highlight the potential problems associated with using data which was not all available to the public at the time of portfolio formation.

CJL also indicate that the biases introduced through using the current COMPUSTAT tapes does not materially affect results. For the largest 20% (by market capitalization) of NYSE-AMEX firms they find the ratio of book equity to market equity to be positively related to return, and in their sample the accounting data from any firms missing from COMPUSTAT is hand-gathered. Within the set of firms whose information is hand-gathered the effect appears to be even stronger than in the COMPUSTAT sample.

Oppenheimer and Schlarbaum (1981) verify the validity of the P/E effect using Moody’s *Handbook of Common Stocks* and Standard and Poor’s *Security Owner’s Stock Guide*, relying not at all on the COMPUSTAT tapes. And more recently, Haugen and Baker (1995) find the P/E, P/C and book equity/market equity ratios to be significant predictors of return using a database that was commercially available at the time of investment.

We thus believe our findings to be robust to data-set concerns.
B. Conclusions

Using the last 27 years' worth of data for firms listed on the NYSE and AMEX, we find that accounting-based measures of leverage are only slightly useful for predicting returns. The inference holds whether income-statement or balance-sheet leverage measures are both used. Only for the most highly leveraged firms is leverage priced at all, and even then the statistical evidence is not overwhelming. Moreover, it is clear that leverage risk is not the factor behind the excess returns to undervalued stocks.

We furthermore find evidence to contradict the claim that the value-investing effect is due to market overshooting or overextrapolation of recent results. In subsets of firms for which the contrarian explanation of the effects is largely absent, the P/C effect still appears to hold with roughly the same strength as for the entire population of firms. This adds strength to the claims by Berk (1994) and Fama and French (1995) that such effects, along with the book equity to market equity effect, are due to firms being assigned high discount rates rather than to the market systematically making pricing errors. As such it also adds to the view that the semi-strong form of market efficiency holds and was only seen not to hold because whereas existing asset-pricing models do a poor job of defining risk, risk in its myriad forms is already impounded in prices.
Bibliography


