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# Is Residual Income Really Uninformative About Stock Returns?

**by**

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## Abstract:

Prior research found that Residual Income (RI) is, at best, minimally informative about stock returns relative to Earnings, despite strong support for RI in theory and among practitioners. We examine three possible explanations for this puzzle. First, the empirical literature ignores some salient feature of practice or theory. Second, the market does not fully impound all of the information from residual income into current returns. Third, the theory abstracts away some real world feature captured in prior empirical results. We find that while the incremental contribution of RI to earnings is modest in explaining current returns, conditioning on whether or not RI increased or decreased affects the relationship between earnings and returns. Further, the market only partially impounds the information in residual income into current returns. A strategy of going long on firms with the greatest increase in RI and short on firms with the greatest decrease in RI generates significant positive excess returns that persist after controlling for risk factors. Our results are consistent with the first two explanations above. Specifically, benchmarking earnings versus the cost of capital is an important feature of how accountants interpret residual income; incorporating this feature of residual income increases the information content of earnings. Furthermore, our results on future returns indicate that tests of the association of changes in RI with current returns present only a partial picture of the usefulness of RI.

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## 1. Introduction

This paper re-examines the association between residual income and stock returns. Ittner and Larcker (2001) discuss this research as part of their review of the literature on “Shareholder Value Management.” Central to this literature is debate over which measures of performance organizations should use to incentivize managers to strive to generate economic value for shareholders. Papers by Biddle, Bowen and Wallace (1997), and Chen & Dodd (1997) find that residual income has only a minimally incremental association with stock returns, relative to earnings. Garvey and Milbourn (2000) develop a principal agent model where the association between a given performance measure and stock returns is shown to be a proxy for the signal to noise ratio, which in turn determines the weight of a given measure in a compensation contract (Banker & Datar 1989). Correspondingly, the lack of association with stock returns brings the usefulness of residual income as a measure to align the interests of the principal and the agent (i.e. shareholders and management) into question.

The lack of association between residual income and returns in prior research is puzzling. First, there is extensive theoretical work (Anctil 1996, Baldenius 2002, Dutta & Reichelstein 2002, Reichelstein 1997, Rogerson 1997) demonstrating that residual income is useful in managing decentralized investment decisions within organizations by ensuring the effectiveness of capital investment. Theory has also discussed the usefulness of cost of capital as a hurdle rate, a management practice commonly observed in publicly companies (Simons 2001). Second, prior empirical research (Wallace 1997, Balachandran 2006) shows that residual income based compensation is associated with changes in investment behavior. Finally, residual income has been discussed in accounting classes from as early as the 1960's. Textbooks over the years have discussed residual income as earnings in excess of the cost of capital employed to generate those earnings (Solomons 1965, Morse & Zimmerman 1997, Horngren, Datar & Foster 2006).

Given the history of residual income in accounting, we posit three possible explanations for the puzzling lack of association between residual income and returns. First, the empirical literature may have ignored some salient feature of practice or theory. Second, the market may not have fully impounded all of the information from residual income into current returns. Third, the theory may have abstracted away some real world feature captured in the empirical results. In our research design, we conduct tests motivated by the first two explanations. We will interpret the failure to find supporting evidence for either of the first two explanations as indirect support for the third explanation. Our research design is built around insights about residual income found in accounting text books and prior theory.

Textbooks note that earnings can increase simply because the returns from incremental investments exceed the cost of debt added to the firm. In contrast, since residual income requires a charge that accounts for the cost of all capital employed, residual income may not increase even if earnings increase. Hence changes in residual income *combined with* increases in earnings may be informative about the nature of the earnings increases, and correspondingly, the actions taken by management. Accordingly, in this paper we examine changes in earnings and changes in residual income in examining current stock returns, measures of investment and future returns.

In our research design, we measure earnings as net income before extraordinary items. We measure residual income as operating earnings (NOPAT) less a charge for the cost of capital employed, where NOPAT is defined as net income plus the after tax cost of debt. These definitions are consistent with Biddle, Bowen and Wallace (1996). Further, our approach considers cost of capital as a hurdle rate. Firms commonly use hurdle rates as part of their capital budgeting process, so a specification which incorporates this institutional detail may out perform specification which ignore it. We examine contemporaneous levels stock returns in excess of market, changes in invested capital and associations between earnings and returns. Specifically we examine the association between changes in earnings and returns conditioned on changes in residual income. Because accounting information may not be fully impounded in current stock prices, we also conduct tests of future returns in excess of market.

Overall we find that depending on whether residual income increased or decreased, firms with increasing earnings exhibit systematic differences in invested capital, contemporary returns, future returns, and the association between returns and earnings. We interpret these results as consistent with residual income and earnings being jointly informative of shareholder returns. In particular, changes in residual income facilitate identifying the likelihood that earnings increases are the result of increasing investment which does not cover the cost of capital employed. Our results suggest that such investments dampen current returns and the contemporaneous association between earnings and returns.

Further our results suggest that contemporaneous returns do not fully impound the implications of earnings which do not exceed the cost of capital, as changes in current residual income and invested capital predict future returns. We find that firms with the highest changes in residual income have the greatest 1-year-ahead market-adjusted returns. A strategy of going long in firms with the greatest increases in RI and going short in firms with the greatest decline in RI earn positive and significant excess returns that persist after controlling for risk.

Summarizing our results, we conclude that the weak results of prior research can be attributed to the first two of our three potential explanations. Prior research viewed earnings and residual income as competing measures, while in practice, residual income essentially applies a threshold that earnings have to meet given the amount of capital invested. Further, prior research only tested the association of earnings and residual income with contemporaneous returns. Our results indicate that the market only partially impounds the information in changes in residual income in current returns, something which is corrected in future return realizations. This makes it less likely that the theoretical research has abstracted away from some critical feature of practice that makes is un-descriptive of the empirical realities of residual income use.

The remainder of this paper is structured as follows. Section 2 presents our research question and hypotheses. Section 3 outlines our research design. Section 4 describes our sample selection and provides descriptive statistics. Section 5 presents our test results. Section 6 concludes.

## 2. Research Question and Hypotheses

Historically, accountants have raised concerns that earnings from the income statement should be interpreted with caution, as the income statement does not include a charge for the cost of capital contributed by equity holders. As a result, income could be both positive and increasing, but still not provide shareholders with an adequate return.

*"The cost of debt financing is charged against earnings in the form of interest expense on existing debt, however there is no corresponding charge against earnings for equity financing. Any project that is expected to earn greater than the embedded cost of debt increases the absolute level of earnings but reduces shareholder wealth unless it also earns greater than the firm's opportunity cost of all (debt and equity) capital."* (Wallace 1997)

Further concerns have been raised that managers with compensation targets based on earnings might invest in projects that cover incremental interest expenses (the cost of debt), but not their total incremental cost of capital.

*"It (earnings based compensation), fails to reflect additional investments; thus profits and consequently bonuses can increase simply due to new investments, even though the performance of executives may be static or deteriorating"* (Dearden 1972)

Using a principle agent model, Garvey and Milbourn (2000) demonstrate that the extent to which a given performance measure co-varies with stock returns determines the optimal weight placed on that measure in incentive contracts. In their model, a risk neutral principal is interested in maximizing the returns on her stock; hence using the stock price to provide incentives is desirable. In their model, stock prices are increasing in the level of action taken by the agent, with noise. Correspondingly, basing the agent's incentives purely on stock price imposes risk on a risk-averse agent, which in a first best world is inefficient. If, however, there are other performance measures (for example, earnings or residual income) that are also increasing in action with noise, then the extent of co-variation between the noise terms in stock price and the respective performance measures determines the weights on these measures in compensation contracts. The co-variation of noise terms can be viewed as the association between a given performance measure and stock returns; hence the model provides a contracting based motivation to examine the association between alternate performance measures and returns.

To date, papers that examine the association between residual income, earnings and stock returns (Biddle, Bowen and Wallace 1997, Chen & Dodd 2000) have found very little association, which following the Garvey and Milbourn model suggests that these measures have little use in providing incentives. This lack of association is puzzling given the history of these measures in practice in accounting, the large body of theoretical literature on managing investment decisions, and empirical studies documenting the association between residual income and changes investment (Wallace 1997, Balachandran 2006).

We consider three possible explanations for the lack of association documented in prior research. First, the extant empirical literature ignores some salient feature of practice or theory. Second, the market does not fully impound all information in residual income into current returns. Third, the theory abstracts away some real world feature captured in the empirical results. We test the first two explanations directly in this paper.

Past empirical research focused on the co-variation between returns and earnings or residual income in aggregate and the incremental contribution of each. These tests essentially viewed earnings and residual income as competing measures and ran horse-race tests pitting these measures against each other. We consider an alternative approach motivated by historical accounting arguments and past theoretical research. Our approach focuses on the cost of capital as a hurdle rate, and the salient fact that residual income increases when the incremental returns from a firm's operations exceed the incremental cost of capital employed. Our approach is consistent with the historical arguments that increasing earnings could be misleading, as well as theoretical research which focuses on using hurdle rates as mechanisms to manage investment decisions in decentralized settings (Anctil 1996, Baldenius 2002, Dutta & Reichelstein 2002, Reichelstein 1997, Rogerson 1997).

In summary, theory and textbook arguments suggest that increasing earnings can have very different implications for shareholders depending on whether those earnings come with concurrent increases in residual income or not. We use these arguments to hypothesize consistent with our first possible explanation that:

(H1) Changes in earnings will have a different contemporaneous association with stock returns depending on concurrent changes in residual income.

Further to the extent that the stock market does not fully and quickly impound the implications of differences in changes in earnings vs. residual income, we hypothesize that:

(H2) Changes in residual income can be used to predict future market returns.

## 3. Research Design

The aim of this paper is to examine the associations between earnings, residual income and returns. In this section, we outline our research design. We first discuss the differences between the research design in this paper and prior research. We then describe the measures used in the paper and discuss the tests using both contemporaneous as well as future returns.

### 3.1. **Our research design vs. prior research**

Our research design views informativeness differently than prior literature. Essentially prior research viewed these measures as competing in a race to explain returns. We do not necessarily see these measures as competitors, but rather that one builds off the other, and hence may be informative in specific contexts and scenarios.

Historically accounting texts have viewed the charge for capital as the central difference between earnings and residual income (RI). This charge is designed to indicate situations in which returns form the firms' investment decisions exceed the cost of debt, but not the total cost of capital.

The theory on using residual income to manage investment decisions often views the capital charge as a hurdle rate based approach to manage investments. Under different conditions the theory predicts that firms will use hurdle rates to manage decentralized investment decisions. It also predicts that the optimal hurdle rate may be different form the cost of capital, either higher or lower, under different conditions. Our tests seek to specifically examine the role of the cost of capital measure and use cost of capital as a hurdle rate in structuring our tests.

Positive RI reflects profits in excess of the required rate of return for total invested capital, which creates wealth for the shareholders. Negative RI dissipates shareholder wealth. A firm with exactly zero RI just breaks even with respect to generating wealth for its shareholders. In our analyses, our emphasis is on the change in residual income. Assuming that the rate of return from existing projects remains constant, a firm will generate an increase in residual income if and only if the returns from additional investments also exceed the cost of capital. Changes in residual income reflect the efficiency of additional investment made in a given year.

### 3.2. Performance measures

Central to our analysis is the measurement of residual income. Prior research used data on residual income and EVA™ purchased from Stern Stewart, a consulting firm. In this paper we measure residual income from publicly available information using an approach based both in the theory of residual income and consistent with the approach used by consulting firms.[1]

Consistent with BBW, we start with Net Income before extra-ordinary items (NI). Next, we define net operating profits after tax (NOPAT) as NI plus the after-tax cost of interest expense.

NOPAT = NI (#18) + (1-tax rate)* Interest Expense (#15)

We use the prevailing statutory tax rate for each year as our measure of the tax rate. Consistent with BBW, we set the tax rate to zero if a firm has net operating loss carry-forwards (NOLs). Our variable of interest is residual income, which focuses on operating performance net of a charge for capital employed.

RI = NOPAT – k*Capital

where

k = our estimate of the firm's weighted average cost of capital (wacc). We calculate wacc by i) estimating a CAPM cost of equity using 60 past months of returns, ii) inferring after-tax cost of debt from interest expense, total interest

[1] Our discussions with consulting firms indicate that our approach is consistent with the approach they use in measurement at firms and with the data they typically sell.

bearing debt and the tax rate, and iii) estimating proportions of debt and equity using market value of equity and book value of total debt.[2]

Capital = Total Invested Capital (#37)

The main advantage of our approach is that it allows us to examine a longer period of time and a larger sample of firms than prior research. In our analysis, we focus on a thirty year period from 1975 to 2004 using information on all December fiscal year-end firms on Compustat. BBW, on the other hand, focus on a subset of 773 firms from the 1000 largest firms as measured by market capitalization, and only on the period from 1983 to 1994, using private information supplied by Stern Stewart. Our tests are likely to have greater power, be more generalizable and importantly, more easily replicable.

Contemporaneous annual returns for a given firm are calculated by compounding CRSP monthly returns, beginning four months after the beginning of the fiscal year and ending 12 months thereafter. We do this to allow enough time for firms to close their annual books and announce earnings. Similarly, one-year-ahead returns are calculated by starting the compounding period four months after the end of the fiscal year.[3] We adjust the returns by subtracting the return on the value weighted index over the same period. Note that the market adjustment plays no role in our hedge return results, as all portfolios are formed at the same period of time, as we focus only on December fiscal year firms.

### 3.3. Contemporaneous tests

We examine the levels of contemporaneous returns and associations among returns, earnings and residual income. We examine specifications that are analogous to

[2] We estimate betas using at least 24 months of lagged returns.
[3] We also examine our main test results using returns measured from fiscal year beginning to end and found consistent results.

those of prior research, and introduce new specifications that provide an alternate interpretation of residual income. Specifically, we first examine regressions similar to those used in prior research:

$$Ret_t = \alpha + \beta\Delta Earn_t + \varepsilon \quad (1)$$

$$Ret_t = \alpha + \beta\Delta RI_t + \varepsilon \quad (2)$$

$$Ret_t = \alpha + \beta_1\Delta NI_t + \beta_2\Delta RI_t + \varepsilon \quad (3)$$

$$Ret_t = \alpha + \beta 1\Delta Earn_t + \beta 2\Delta Int_t + \beta 3\Delta Capchg_t + \varepsilon \quad (4)$$

All variables on the right hand side are scaled by lagged assets. We also run the tests using lagged market value as our scaling variable. Note that the first regression is a standard earnings response coefficient (ERC) regression. The second regression is an analog of the ERC regression for residual income. The third regression addresses the question of whether residual income adds any power in explaining current returns over and above net income. The final regression essentially separates out change in residual income into changes in earnings, an interest component and the capital charge. As is standard in the prior literature

We then conduct a set of test based on specification (1), but which jointly incorporates changes in residual income as a conditioning variable. In this test, we examine the earnings response coefficient on earnings in the four different states of the world based on whether changes in net income and residual income are positive or negative, i.e. both decreasing ($\Delta$NI -, $\Delta$RI -), NI decrease with an increase in RI ($\Delta$NI -, $\Delta$RI +), NI increase with a decrease in RI ($\Delta$NI +, $\Delta$RI -), and finally both increasing ($\Delta$NI +, $\Delta$RI +).

We compare the differences in the ERCs for earnings increasing firms depending on whether residual income simultaneously increased. Under hypothesis (1) if the change in residual income is informative, the coefficient on earning will be higher if both measures are simultaneously increasing, versus when earnings increases and residual income decreases. For firms whose earnings increase while residual income decreases, incremental earnings are likely to have come from investments that did not cover the incremental cost of capital. Correspondingly, we expect the market to capitalize increasing earnings with increasing residual income at a greater rate than increasing earnings without declining residual income.

Similarly, when earnings decreases, but concurrent residual income does not, the firm has reduced capital employed to offset the decrease in earnings by a reduction in the capital charge. In this condition, the firm is likely to have divested of non performing investments, making it more likely that the current poor performance is transitory. Correspondingly, we expect that the market will capitalize earnings decreases viewed as transitory (i.e. when residual income also increases) at a lower rate than earnings decreases accompanied by residual income decreases as well.

The above predictions are of course only to the extent that the market completely impounds the information in changes in earnings and residual income into price. If that information is not impounded in prices, we are likely to see no differences in the capitalization of earnings in these conditions. Further, even if we see differences it is possible that the information was not fully impounded. We examine that possibility next.

### 3.4 Tests of future returns

In our final sets of analyses, we test whether portfolios formed based on changes in current residual income and current earnings predict returns in the following period. We conduct several tests. First we examine the pooled sample in quintiles of changes in earnings and residual income to get a sense of the magnitude of the overall effect. Next, given that overall effects in pooled tests may be driven by outliers in a few years, we conduct tests year by year. In these tests we examine yearly returns on hedge portfolios formed two ways. First we simply take a long position in the top quintile of change in residual income for the year, and go short in the bottom quintile. Second we go long in the top quintile within a given industry (defined at the 2-digit SIC code level) and short in the bottom quintile in the same industry.

We also examine the possibility that omitted risk factors affect the returns we observe, by examining the alphas in Fama and French (1993) three and four factor models. Specifically, we form portfolios based on the quintiles formed on changes in residual income and conduct calendar-time regressions of the monthly returns on these portfolios in the following year. We regress the returns of each quintile on 4 Fama-French factors – Market ($R_m$-$R_f$), Size (SMB), Book-to-Market (HML) and Momentum (UMD). We conduct tests both with and without momentum. The intercepts to these regressions (alphas) represent the average monthly excess returns to these portfolios after controlling for these risk factors. If the market fails to impound the positive information conveyed by increasing residual income immediately, we would expect to see excess returns as the superior performance of these firms unfurls in the future. Hence, the alphas should be increasing in the changes in residual income.

## 4. Sample Selection and Descriptive Statistics

We conduct or tests in our paper for a sample of firms over a thirty year period from 1975 to 2004. We focus on this period as going further back limits the number of observations per year and makes it difficult to construct hedge portfolios. We rely entirely on publicly available information from two databases – the Compustat Annual File and CRSP Monthly returns file.

Table 1 outlines our sample selection procedure. We start with all firm-years on Compustat in 1975-2004 with valid information on net income before extraordinary items (#18), total assets (#6), price and shares outstanding at fiscal year end to compute market capitalization (#24 and #25 respectively) and total invested capital (#37) needed to compute residual income. We then restrict ourselves to only December fiscal year end firms. We do this in order to ensure that our hedge strategies are not affected by timing differences in the availability of fiscal year-end data. We lose a little over a third of our potential sample, but ensure the integrity of our results. Our sample remains large and, as later descriptive statistics will indicate, well spread out over industries and time. We need to ensure that lagged information is available for earnings and lagged and twice-lagged information is available for invested capital in order to compute current and lagged residual income. Finally, we ensure that both contemporaneous as well as one-year ahead information is available for the firms and that we have enough returns (at least 24 past months) to compute cost of equity and wacc for all the firms in our sample. Our final sample consists of 73,281 firm-years representing 9143 distinct firms, which averages around 2443 firms per year on average.

Table 2 presents descriptive statistics for the sample firms. The large differences between means and medians for our size variables (sales, assets, total invested capital, book and market value of equity) indicates the obvious skewness of these variables due to the presence of large firms. There is also considerable variation in the book-to-market ratio indicating that both value (high BM) and growth (low BM) stocks are potentially present in the sample. We also present the unscaled and scaled (by lagged assets) values of Net Income, NOPAT and Residual Income. Interestingly, while the median values of Net Income and NOPAT are positive, the median residual income is barely negative, indicating that less than half the firms in the sample cover their cost of capital.

Panel B of Table 2 graphically presents the number of observations per year. The number of observations varies from a low of 1617 in 1978 to a high of 3698 in 2002. No single year represents less than 2% or more than 5% of the sample, indicating that time clustering is unlikely to be an issue. Panel C of Table 2 presents the industry distribution. While no industry dominates our sample, the large number of depository institutions (11%) and the small number of wholesale and retail firms (2-digit SIC codes from 50 to 59) may be related to our decision to focus on December fiscal year end firms.

Table 3 presents the descriptive statistics and correlations for the variables used in our analysis. Our variables of interest are the changes in Net Income ($\Delta$NI) and Residual Income ($\Delta$RI), both of which are scaled by lagged total assets. We are interested in their relationship with contemporaneous market-adjusted returns ($RETM_0$) and one-year-ahead market-adjusted returns ($RETM_1$). We also present the statistics for the scaled changes in the capital charge component ($\Delta$CAPC) and interest component ($\Delta$INT) of residual income.

Panel A presents the means of these variables. All variables with the exception of return variables are winsorized at the 1% and 99% level using year-by-year distributions.[4] By construction, the mean change in ΔRI (0.28%) equals the change in ΔNI (0.57%) plus the change in the interest component (0.18%) minus the change in the capital charge component (0.47%). The means of both contemporaneous as well as one-year ahead returns are significantly greater than zero at around 5% as these are equally weighted means while the market index used is the value weighted index; indeed the value weighted means are close to zero.

Panel B presents the correlations between these variables. We present the means of 30 year-by-year cross sectional correlations, both pearson as well as spearman rank-order correlation. Not surprisingly, the changes in net income and residual income are highly correlated (0.95 pearson, 0.86 spearman). This contrasts the much lower correlation shown by BBW. We have two explanations for this. First –we rely on publicly available data where the adjustments leading from NI to RI are very transparent and clear. Second, we present the correlation between the changes in these variables, which implies that the measurement errors in RI are likely to be mitigated by the differencing process. Both ΔNI and ΔRI show strong correlation with current returns ($RETM_0$); while ΔNI does show stronger correlation, ΔRI also shows almost the same correlation. Finally, while both ΔNI and ΔRI show a weak correlation with future returns ($RETM_1$), ΔRI appears to have a slightly stronger correlation with future returns than ΔNI.

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[4] We do not winsorize the returns variables, as these variables are also used in our hedge portfolio returns analysis. As a sensitivity analysis, we delete outliers instead of winsorizing them. Results are very similar and not reported.

## 5. Results

### 5.1 Contemporaneous Return Regressions for Entire Sample

We first run return regressions for the entire sample. The dependent variable is contemporaneous market-adjusted return. We use the 4 models specified in the research design section. Consistent with prior research, we run pooled regressions over the 30 year sample period. As a sensitivity test, we also run the regressions using year fixed-effects. The results are very similar and not reported.[5]

We present the results in Table 4. The first model uses the change in earnings scaled by lagged assets (ΔNI) as the dependent variable. As expected, ΔNI has a strong correlation with current returns with a coefficient of 1.247 and a t-stat of 57.49. The regression has an adjusted $R^2$ of 4.31%. The second regression uses the change in residual income instead of change in income. While the adjusted $R^2$ does decline, it does so only marginally to 4.23%. This contrasts with the results in BBW, who find a significant decline when they move from NI to RI in their regressions.

In the next regression, we add both the change in Net Income and change in Residual Income as independent variables, mindful of the high positive correlation between these two measures, as is typical in these "horse-race" regressions. We find that the change in Residual Income (ΔRI) continues to be significant after the inclusion of net income, and the explanatory power of the regression edges up to 4.36%.

Finally, we decompose change in residual income into the changes in the net income, interest and capital charge components. As expected, we find that the change in income component (ΔNI) has a strong positive component and the change in the capital

[5] Ideally, we would also like to run the tests at an annual level and report Fama-Macbeth (1973) style average coefficients. Unfortunately, the sample size is rather small in some of the partitions examined later on in some of the years, leading to unstable regression coefficients.

charge ($\Delta$CAPC) has a negative component. However the coefficient on $\Delta$CAPC has a smaller absolute magnitude than the coefficient on $\Delta$NI. This can be viewed as preliminary evidence that although the market does consider the capital charge in contemporaneous returns, it does so only partially. This regression has the highest explanatory power at 4.41%.

To summarize, we find that which residual income has a slightly smaller association with returns than net income, the association is significant and incremental to the association between returns and income. In future tests, we will view Net Income and Residual Income not as competing metrics, but as complementary measures.

### 5.2 Contemporaneous Regressions based on Changes in Net Income and Residual Income

We now focus on the basic ERC specification (equation 1) with contemporaneous market adjusted returns as the dependent variable and change in Net Income ($\Delta$NI) as the independent variable. We run this regression in the four different states of the world based on whether changes in net income and residual income are positive or negative, i.e. both decreasing ($\Delta$NI -, $\Delta$RI -), NI decrease with an increase in RI ($\Delta$NI -, $\Delta$RI +), NI increase with a decrease in RI ($\Delta$NI +, $\Delta$RI -), and finally both increasing ($\Delta$NI +, $\Delta$RI +).

Panel A of Table 5 shows that changes in RI and Earnings typically move in the same direction, as the measures move in the same direction in over 60,000 of the 73,281 observations, with 35992 observations of firms with increasing NI and RI and 24810 observations of firms with decreasing NI and RI.

However, concurrent movements in these measures are in different directions in almost a fifth of the observations. The majority of these (9436) are in the case where earnings increase, but residual income decreases. These are firms whose increase in earnings is being achieved by additional investments that are not covering the incremental cost of capital invested. If the market cares about investment efficiency, we should see a smaller ERC for this group compared to the group where earnings and residual income both increase.

In the smallest of the four groups, we see decreases in earnings while RI increases (3043 observations). These are firms who are potentially divesting non-performing assets in an effort to restore profitability. These actions, in turn, are likely to make earnings (losses) even more transitory. We should expect these firms to have a lower ERC than firms for which both NI and RI decrease.

Panel B of Table 5 displays the mean contemporaneous market adjusted returns for each of the four above mentioned groups. Firms for which both RI and NI decline earn the lowest market-adjusted returns at -12.5%, while firms with increases in both earn the highest market-adjusted returns at +18.8%. Interestingly, firms for which earnings decrease but residual income increases actually do not underperform the market. Finally, firms which increase their earnings at the expense of lowered residual income earn small positive excess returns (+2.6%). For both earnings increasing and earning decreasing firms, the subgroup with increasing residual income is associated with higher returns.

We present these results merely as descriptive statistics. Indeed, the firms with increasing residual income and decreasing net income may have higher returns simply because their decline in net income is likely to have been less steep than firms where both decline. Similarly, firms with increasing residual income and increasing net income may also earn higher returns than firms with decreasing residual income and increasing net income because their increase in net income is likely to have been greater. To formally test the associations in these groups, we present the results from the ERC regressions.

Panel C of Table 5 presents the results of the regressions. We first consider the 2 partitions with increase in earnings. The ERC for the group with the increase in both NI and RI at is significantly greater than the ERC for the subgroup with increase in NI and a decline in RI (1.008 vs. 0.521). One way to interpret this is that the market capitalizes positive changes in income at a lower rate when they are also not associated with positive changes in residual income. Next, we consider the 2 partitions with a decline in earnings. The ERC for the partition where NI declines but RI increases (0.072) is significantly smaller than the partition for which both NI and RI decline (0.563). In other words, the market is more likely to treat a loss as transitory when at least RI is increasing.

Hence the partitioned ERC regressions indicate that trends in residual income provide information to help interpret changes in net income. Specifically, an increase in net income is more likely to be viewed as good news when it is also associated with increasing residual income, while a decline in net income is less likely to be viewed as bad news when it is mitigated by increases in residual income. Our results are consistent with findings in Harris and Nissim (2004), who show that earnings generated through organic growth is valued at a higher rate than earnings acquired through investments.

**5.3 Correlation with Future Returns**

The evidence thus far indicates that residual income does add to the informativeness of net income contemporaneously. However, it is also possible that the market only partially impounds the information in residual income. If this is the case, we should see a trend in future returns, as the information implicit in residual income trends becomes apparent to the stock market. Specifically, we should expect firms with an increase in residual income to earn positive future abnormal returns if the market only partially capitalizes the good news implicit in increases in residual income, while conversely, we should expect firms with a decline in residual income to earn negative future abnormal returns.

In Panel A of Table 6, we present the mean market-adjusted 1-year-ahead returns for the 4 partitions based on changes in net income and residual income. The first column consists of firms with a decline in NI. Among these firms, firms with an increase in RI earn significantly greater market adjusted returns than firms with a decline in RI. The second column focuses on firms with an increase in NI. Here too the same pattern is repeated, with firms that also see an increase in RI earning greater 1-year-ahead returns than firms with a decline in RI. Interestingly, when we compare across columns, we find that conditioning on trends in Net Income does not help separate firms in terms of their future returns. Specifically, among firms with an increase (or decrease) in RI, there is an insignificant difference between firms whose NI increased and those whose NI decreased. One implication of this is that conditioning on residual income trends provides more information regarding future returns.

Given that NI and RI are so closely linked, we focus on the one aspect that drives the difference between the measures – the level of investment made to attain the income level. We focus on the changes in invested capital used to determine the capital charge in the computation of RI. As the results in Panel B of Table 6 indicate, firms with increasing RI have substantially lower increase in invested capital as compared to firms with decreasing RI. In both income-increasing as well as income-decreasing groups, the difference in the change in invested capital is around 11-12%. For instance, amongst NI increasers, the RI-increasing sub-group sees a change in invested capital of barely 0.8%, while the RI-decreasing sub-group a substantial change in invested capital of 12.1%. The differences in 1-year-ahead returns may have to do with the market realizing the difference between income growth driven by increases in profitability as opposed to income growth driven merely by increases in investment, again consistent with Harris and Nissim (2004).

Panel C of Table 6 presents the market-adjusted 1-year-ahead returns for quintiles based on changes in NI and changes in RI. The first set of columns present the results based on changes in NI. One does see a positive correlation between changes in Net Income and future returns. This is consistent with prior research on the post-earnings-announcement drift (Bernard and Thomas 1989). The firms in the highest quintile of ΔNI earn 2.7% more in terms of future returns than firms in the highest quintile of ΔNI. However, the relationship is not monotonic, as firms in the middle quintile actually earn the highest returns. In contrast, the difference in future returns between groups of firms in the extreme quintiles of ΔRI is greater at 3.9%, and the relationship is strictly monotonic. Hence, it appears that firms in the highest quintile of ΔRI systematically earn higher returns in future periods.

The above results suggest that the market may not fully impound the implications of changes in residual income and invested capital into price, suggesting the possibility of generating hedge returns using these measures in a trading rule. However, it is also possible that the return differences reported above may be clustered in certain time periods and not consistent across time. To test whether the ability of ΔRI to generate excess returns holds across time, we construct hedge portfolios in each year by going long in firms in the top quintile of ΔRI and short in firms in the bottom quintile. The results are reported in Panel A of Table 7. The average annual return to the hedge portfolio is 4.5%, which is highly significant (t-stat=3.97). More importantly, the strategy of going long in high ΔRI firms and short in low ΔRI firms generates positive returns in 26 out of the 30 years, indicating the robustness of the strategy as well as making it unlikely that the higher risk could be contributing to the positive average returns. Figure 1 presents the results to the hedge strategy graphically. As the graph indicates, the strategy earns returns below -5% in only one year, 1998. Interestingly, the future returns for this year correspond to 1999, now acknowledged to be the peak year of the technology bubble, when fundamentals played little or no role in stock returns.

When we replicate the strategy using ΔNI, the average return is only 2.5%, and the strategy generates positive returns in only 20 out of 30 years (results not tabulated). Comparing these results leads one to conclude that the returns to ΔRI are incremental to any returns that may be associated with the post-earnings-announcement drift.

As a sensitivity test, we form quintiles based on changes in residual income within industry (defined at the 2-digit SIC code level), and as before go long in the highest ΔRI firms and short in the lowest ΔRI firms. The results are presented in Panel B of Table 7. The results are very similar – the mean return is slightly lower at 4.2%, but the t-stat actually increases marginally to 4.46. As before, the strategy generates excess returns in most years (26 out of 30).

As a final test, we control for additional risk factors using the Fama-French (1993) 3-factor and 4-factor models. We create calendar time portfolios of firms based on the quintile of ΔRI. The 12 monthly returns to these portfolios in the year after portfolio formation are regressed on the market factor ($R_m$-$R_f$), size factor (SMB), book-to-market factor (HML) and additionally for the 4-factor model, momentum (UMD). While there is debate about whether momentum is indeed a risk factor, we include it in our tests to ensure that the results are incremental to a momentum effect, be it risk or mispricing. This can also be viewed as a control for the post-earnings-announcement drift, which potentially is a momentum effect. The regression is run in time series by pooling the twelve future months for each of the thirty years. The intercept (alpha) of this regression represents the average future monthly excess return for each quintile.

Panel A of Table 8 presents the results from the 3-factor model regression. Firms in the lowest ΔRI quintile earn a significant negative return of -0.33%, while firms in the highest ΔRI earn a significant positive return of 0.53%. The alphas also increase monotonically from the lowest to the highest quintile. The difference between the alphas of the extreme ΔRI portfolios is 0.86%, equivalent to an annualized difference of 10.8%.

Panel B of Table 8 presents the results to the 4-factor model. While the lowest quintile firms no longer show a negative alpha, the monotonic relationship with quintile of ΔRI continues to persist. The difference in alphas between the extreme quintiles is still significant at 0.57%, equivalent to an annualized difference of 7.1%.

Taken together, Tables 6 through 8 show that the market does not fully incorporate the implications of changes in residual income into contemporaneous price, and that the extent of mispricing persists even after controlling for known risk factors. This confounds interpretations of concurrent associations between returns and residual income, commonly used in the prior literature to infer the “usefulness” of residual income in contracting. Residual income attempts to capture efficiency in investment decisions, the true value of which becomes apparent to the stock market only in the future.

### 5.4 Sensitivity Analyses

We conduct a number of sensitivity analyses to our base analysis. We use other deflators to scale changes in net income and residual income such as lagged market value and lagged invested capital. The results are essentially unchanged. We also recompute residual income using a variety of different approaches including a flat 12% or 15% wacc threshold for each firm as well as constant threshold for all firms in a given year, but varying the threshold based on the changes in interest rates across time. We also calculate residual income using Net Income, the cost of equity and lagged book values instead of NOPAT, wacc and lagged invested capital. In all cases, our results and conclusions are essentially unaltered. Finally, 11% of our sample consists of depository institutions for which the conventional notions of investment may not be applicable. When we conduct our analyses after excluding these firms, our results are generally unchanged and in some instances even stronger.

## 6. Conclusion and Discussion:

This paper questions the results in prior research which indicate that residual income has limited practical usefulness. Biddle, Bowen and Wallace (1997) and Chen & Dodd (1997) find that residual income has only a minimally incremental association with stock returns, relative to earnings.

This lack of association is puzzling given an extensive theoretical literature on the usefulness of residual income and managing decentralized investment decisions, past empirical evidence that that residual income based compensation is associated with changes in investment, and historical arguments accountants have made in text books from as early as the 1960's.

In this paper, we posit three possible explanations for this puzzle. First, the empirical literature may ignore some salient feature of practice or theory. Second, the market does not fully impound all of the information from residual income into current returns. Third, the theory abstracts away some relevant real world factors that limit the applicability of residual income in practice. We test the first two explanations using a research design motivated by insights regarding the cost of capital and hurdle rates found in theory and in accounting texts.

Arguments in finance and accounting textbooks suggest that earnings might increase simply based of incremental investments with returns that exceed the cost of debt added to the firm. In contrast, since residual income requires a charge for the cost of all capital employed, residual income may not increase even if earnings increase. Hence changes in residual income *combined with* increases in earnings may be informative about the nature of the earnings increase, and correspondingly the actions taken by management. Accordingly, in this paper we examine changes in earnings and changes in residual income in examining current stock returns, measures of investment and future stock returns.

In our research design, we examine the associations among changes in residual income, changes in earnings, and stock returns both concurrently and in the future. Overall we find that conditional on whether residual income increased or decreased, firms with increasing earnings exhibited systematic differences in invested capital, contemporary returns, future returns, and the association between returns and earnings. We interpret these results as consistent with residual income and earnings being jointly informative of shareholder returns. In particular, changes in residual income facilitate identifying the likelihood that earnings increases are the result of increasing investment which does not cover the cost of capital employed. Our results suggest that such investments dampen current returns and the contemporaneous association between earnings and returns. Further our results suggest that contemporaneous returns do not fully impound the implications of earnings which do not exceed the cost of capital, as changes in current residual income predict future returns.

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**Table 1:** Sample selection procedure

| | *Firm-Years* | *Distinct Firms* |
|---|---|---|
| Data on Compustat with information on Net Income (#18), Total Assets (#6), Price (#25), Shares Outstanding (#24) and Invested Capital (#37) in the 1975-2004 period | 194,055 | 21,388 |
| LESS Firms with non-December Fiscal Year Ends | 78,682 | 7,751 |
| December Fiscal Year Firms with adequate Financial Information | 115,373 | 13,637 |
| LESS Firms with missing lagged information on Net Income and missing lagged and twice-lagged information on Invested Capital | 17,331 | 1,596 |
| December Fiscal Year Firms with adequate Current and Lagged Financial Information | 98042 | 12,041 |
| LESS Firms with deflators that are too small (lagged assets, market capitalization or invested capital under 1 million dollars) | 3,416 | 409 |
| December Fiscal Year Firms with adequate Current and Lagged Financial Information and Reasonable deflators | 94,626 | 11,632 |
| LESS Firms with missing current returns on CRSP | 13,374 | 1,473 |
| December Fiscal Year Firms with adequate Current and Lagged Financial Information, Reasonable deflators and current returns | 81,252 | 10,159 |
| LESS Firms with missing 1-year ahead returns on CRSP | 1,797 | 204 |
| December Fiscal Year Firms with adequate Current and Lagged Financial Information, Reasonable deflators, Current and Future returns | 79,455 | 9955 |
| LESS Firms with inadequate lagged returns information on CRSP to calculate betas to estimate wacc | 6,174 | 812 |
| FINAL SAMPLE | 73,281 | 9143 |

**Table 2:** Sample descriptive statistics

*Panel A: Descriptive statistics for sample firm-years (N=73281)*

| | *Mean* | *Std. Dev.* | *Q1* | *Median* | *Q3* |
|---|---|---|---|---|---|
| Sales ($millions) | 1697.2 | 7238.9 | 41.6 | 172.2 | 768.0 |
| Assets | 4582.2 | 32358.4 | 58.5 | 283.4 | 1565.6 |
| Total Invested Capital | 1583.8 | 9146.2 | 36.1 | 145.2 | 702.8 |
| Book value of equity | 791.2 | 3247.9 | 23.3 | 93.2 | 402.8 |
| Market value of equity | 1664.7 | 9384.3 | 35.2 | 146.3 | 686.6 |
| Book-to-market | 0.844 | 1.382 | 0.368 | 0.642 | 1.058 |
| Net Income | 93.6 | 589.2 | 0.2 | 6.8 | 42.5 |
| Net Income/Lagged Assets | 0.7% | 28.3% | 0.3% | 3.1% | 7.4% |
| NOPAT | 137.7 | 838.8 | 1.0 | 10.0 | 57.8 |
| NOPAT/Lagged Assets | 2.3% | 28.0% | 0.9% | 5.1% | 9.1% |
| Cost of Debt | 7.6% | 4.9% | 4.6% | 6.1% | 8.7% |
| Cost of Equity | 12.1% | 4.5% | 8.5% | 11.4% | 14.6% |
| Wacc | 10.7% | 4.1% | 7.4% | 10.0% | 12.9% |
| Residual Income | 14.6 | 469.5 | -7.6 | -0.1 | 8.5 |
| Residual Income/Lagged Assets | -4.6% | 28.6% | -5.2% | -0.1% | 2.1% |

*Panel B: Number of Observations per year*

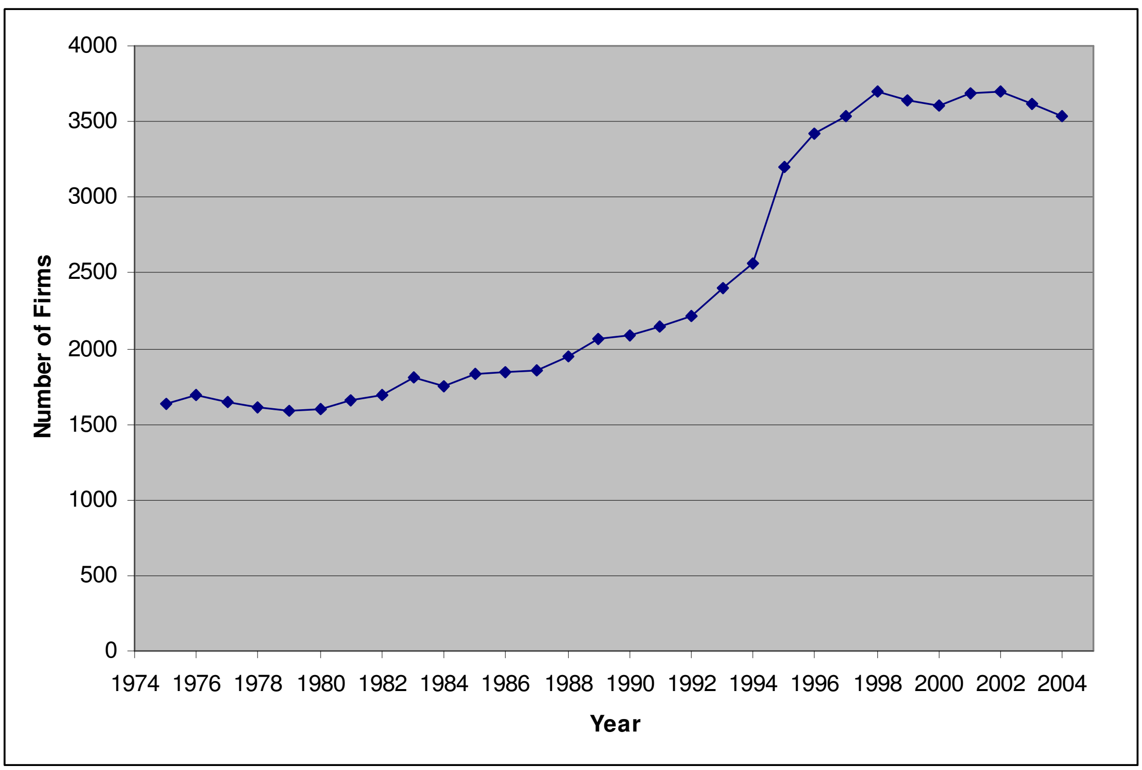

**Table 2** continued

*Panel C: Industry distribution*

| *SIC Code* | *Description* | *Firm-Years* | *%* |
|---|---|---|---|
| 60 | Depository institutions | 8034 | 11.00% |
| 28 | Chemicals and allied products | 4914 | 6.70% |
| 73 | Business services | 4615 | 6.30% |
| 49 | Electric, gas, and sanitary services | 4436 | 6.10% |
| 35 | Industrial machinery and equipment | 4033 | 5.50% |
| 36 | Electronic & other electric equipment | 4025 | 5.50% |
| 38 | Instruments and related products | 3331 | 4.50% |
| 67 | Holding and other investment offices | 3239 | 4.40% |
| 13 | Oil and gas extraction | 2988 | 4.10% |
| 63 | Insurance carriers | 2848 | 3.90% |
| 48 | Communication | 2229 | 3.00% |
| 37 | Transportation equipment | 1562 | 2.10% |
| 50 | Wholesale trade-durable goods | 1523 | 2.10% |
| 34 | Fabricated metal products | 1409 | 1.90% |
| 20 | Food and kindred products | 1325 | 1.80% |
| 33 | Primary metal industries | 1282 | 1.70% |
| 26 | Paper and allied products | 1198 | 1.60% |
| 30 | Rubber and misc. plastics products | 1057 | 1.40% |
| 27 | Printing and publishing | 1044 | 1.40% |
| 87 | Engineering and management services | 1037 | 1.40% |
| 10 | Metal mining | 963 | 1.30% |
| 29 | Petroleum and coal products | 914 | 1.20% |
| 80 | Health services | 905 | 1.20% |
| | ALL OTHER INDUSTRIES | 14370 | 19.6% |
| | TOTAL | 73281 | 100.0% |

For Panel A, the following data items are directly from the annual Compustat file: Sales (#12), Assets (#6), Total Invested Capital (#37), Book Value of Equity (#60), Market Value of Equity (shares outstanding (#25) * stock price (#24)) and Net Income before Extra-ordinary items (#18). NOPAT is Net Income before extraordinary items plus interest expense (#15) times (1-tax rate). Cost of debt is estimated as after tax interest expense deflated by prior year's balance of short term and long term debt. Cost of equity is measured using CAPM betas estimated using 60 lagged months of returns, ensuring that at least 24 returns are available, and a market premium of 5%. Wacc is estimated from cost of equity and cost of debt, using the book value of debt and market value of equity for proportions of debt and equity. Residual Income is defined as NOPAT minus (lagged Invested Capital* wacc)

Table 3: Descriptive Statistics for Analysis Variables.

*Panel A: Univariate Statistics (n= 73,281 observations)*

| | *Mean* | *Std. Deviation* | *25th percentile* | *Median* | *75th percentile* |
|---|---|---|---|---|---|
| *ΔNI* | 0.57% | 11.00% | -1.41% | 0.34% | 2.57% |
| *ΔRI* | 0.28% | 11.78% | -2.16% | 0.11% | 2.31% |
| *ΔCAPC* | 0.47% | 3.04% | -0.53% | 0.22% | 1.48% |
| *ΔINT* | 0.18% | 1.48% | -0.08% | 0.00% | 0.30% |
| $RETM_0$ | 5.33% | 67.74% | -26.98% | -2.94% | 23.32% |
| $RETM_1$ | 5.60% | 64.16% | -25.31% | -1.91% | 23.55% |

*Panel B: Time-series means of cross-sectional correlation coefficients*

| | *ΔNI* | *ΔRI* | *ΔCAPC* | *ΔINT* | $RETM_0$ | $RETM_1$ |
|---|---|---|---|---|---|---|
| *ΔNI* | | 0.863 | -0.041 | -0.121 | 0.304 | 0.026 |
| *ΔRI* | 0.951 | | -0.360 | -0.088 | 0.276 | 0.034 |
| *ΔCAPC* | -0.154 | -0.406 | | 0.268 | -0.004 | -0.034 |
| *ΔINT* | -0.138 | -0.057 | 0.227 | | -0.089 | -0.056 |
| $RETM_0$ | 0.246 | 0.228 | -0.025 | -0.045 | | 0.076 |
| $RETM_1$ | 0.022 | 0.024 | -0.030 | -0.039 | 0.032 | |

*ΔNI* is the change in Net income before extra-ordinary items (#18) scaled by lagged assets. *ΔRI* is the change in Residual income (RI) scaled by lagged assets, where RI is defined as in the bottom of table 2. *ΔCAPC* is the change in the capital charge scaled by lagged assets, where the capital charge is defined as Total Invested Capital (#37) times wacc, where wacc is estimated as described at the bottom of table 2. *ΔINT* is the change in the interest expense (#15), adjusted for taxes, scaled by lagged assets. $RETM_0$ and $RETM_1$ respectively are contemporaneous and one-year-ahead annual buy and hold returns, adjusted by subtracting value-weighted market returns for the same time period.

Table 4: Earnings Response Coefficient Regressions for Changes in Earnings and Changes in Residual Income

Dependent Variable $RETM_0$

| Model | Intercept | ΔNI | ΔRI | ΔCAPC | ΔINT | Adj. $R^2$ | N |
|---|---|---|---|---|---|---|---|
| ΔNI | 0.046<br>(19.08) | 1.247<br>(57.49) | | | | 4.31% | 73281 |
| ΔRI | 0.051<br>(20.70) | | 1.173<br>(56.89) | | | 4.23% | 73281 |
| ΔNI & ΔRI | 0.048<br>(19.52) | 0.814<br>(9.70) | 0.426<br>(5.34) | | | 4.36% | 73281 |
| ΔRI Decomposed | 0.050<br>(20.17) | 1.269<br>(57.46) | | -0.509<br>(-6.32) | -0.126<br>(-1.15) | 4.42% | 73281 |

The dependent variable is $RETM_0$, the contemporaneous annual buy and hold returns, adjusted by subtracting value-weighted market returns for the same time period. *ΔNI* is the change in Net income before extra-ordinary items (#18) scaled by lagged assets. *ΔRI* is the change in Residual income (RI) scaled by lagged assets, where RI is defined as in the bottom of table 2. *ΔCAPC* is the change in the capital charge scaled by lagged assets, where the capital charge is defined as Total Invested Capital (#37) times wacc, where wacc is estimated as described at the bottom of table 2. *ΔINT* is the change in the interest expense (#15), adjusted for taxes, scaled by lagged assets.

Table 5: Contemporaneous Returns and Earnings Response Coefficients for interactions between Changes in Earnings and Changes in Residual Income

*Panel A: Number of Observations*

| | ΔNI - | ΔNI + |
|---|---|---|
| ΔRI - | 24810 | 9436 |
| ΔRI + | 3043 | 35992 |

*Panel B: Contemporaneous Mean Market Adjusted Returns*

| | ΔNI - | ΔNI + | Difference |
|---|---|---|---|
| ΔRI - | -0.125 | 0.026 | 0.151 |
| | | | (27.08) |
| ΔRI + | 0.000 | 0.188 | 0.188 |
| | | | (16.70) |
| Difference | 0.125 | 0.162 | |
| | (11.65) | (27.13) | |

*Panel C: Earnings Response Regressions (Dependent Variable $RETM_0$)*

| *PARTITION* | *Intercept* | ΔNI | *Adj. $R^2$* | *N* |
|---|---|---|---|---|
| ΔNI + and | | | | |
| ΔRI - | 0.020 | 0.521 | 0.03% | 9435 |
| | (3.88) | (2.03) | | |
| ΔRI + | 0.127 | 1.008 | 1.73% | 35992 |
| | (26.75) | (25.17) | | |
| *Increase – Decrease* | 0.107 | 0.487 | | |
| | (15.14) | (1.87) | | |
| ΔNI - and | | | | |
| ΔRI - | -0.083 | 0.563 | 1.18% | 24810 |
| | (-19.37) | (17.21) | | |
| ΔRI + | 0.000 | 0.072 | 0.00% | 3043 |
| | (0.03) | (0.17) | | |
| *Increase – Decrease* | 0.083 | -0.491 | | |
| | (6.67) | (-1.20) | | |

*ΔNI* is the change in Net income before extra-ordinary items (#18) scaled by lagged assets. *ΔRI* is the change in Residual income (RI) scaled by lagged assets, where RI is defined as in the bottom of table 2. $RETM_0$ is the contemporaneous annual buy and hold returns, adjusted by subtracting value-weighted market returns for the same time period.

Table 6: Future Returns by groups based on changes in Income and changes in Residual Income

*Panel A: 1 Year Ahead Mean Market Adjusted Returns*

| | ΔNI - | ΔNI + | Difference |
|---|---|---|---|
| ΔRI - | 4.3% | 3.6% | -0.6%<br>(-0.93) |
| ΔRI + | 8.6% | 6.8% | -1.8%<br>(-1.62) |
| Difference | 4.3%<br>(3.70) | 3.1%<br>(5.33) | |

*Panel B: Changes in Invested Capital*

| | ΔNI - | ΔNI + | Difference |
|---|---|---|---|
| ΔRI - | 7.5% | 12.1% | 4.5%<br>(23.97) |
| ΔRI + | -4.4% | 0.8% | 5.3%<br>(16.08) |
| Difference | -12.0%<br>(-35.98) | -11.3%<br>(-62.88) | |

*Panel C: Future Returns based on Quintiles of ΔNI and ΔRI*

| Quintiles based on ΔNI | | | Quintiles based on ΔRI | | |
|---|---|---|---|---|---|
| Quintile | N | $RETM_1$ | Quintile | N | $RETM_1$ |
| 1 | 14645 | 3.7% | 1 | 14645 | 3.2% |
| 2 | 14662 | 5.0% | 2 | 14662 | 4.9% |
| 3 | 14664 | 6.7% | 3 | 14664 | 6.2% |
| 4 | 14662 | 6.2% | 4 | 14662 | 6.6% |
| 5 | 14648 | 6.4% | 5 | 14648 | 7.1% |
| Q5-Q1 | | 2.7%<br>(2.80) | Q5-Q1 | | 3.9%<br>(4.12) |

ΔNI is the change in Net income before extra-ordinary items (#18) scaled by lagged assets. ΔRI is the change in Residual income (RI) scaled by lagged assets, where RI is defined as in the bottom of table 2. $RETM_1$ is the one-year-ahead annual buy and hold returns, adjusted by subtracting value-weighted market returns for the same time period. For Panel C, quintiles are formed within each year based on ΔNI and ΔRI.

Table 7: Returns to Hedge Portfolios based on Changes in Residual Income

*Panel A: Portfolios based on Annual Quintiles of ΔRI*

| Year | $N_{short}$ | $N_{long}$ | $Ret_{short}$ | $Ret_{long}$ | $Ret_{long} - Ret_{short}$ | Positive |
|---|---|---|---|---|---|---|
| 1975 | 326 | 326 | 14.5% | 16.7% | 2.2% | Yes |
| 1976 | 338 | 338 | 30.2% | 27.7% | -2.5% | No |
| 1977 | 328 | 329 | 24.1% | 26.8% | 2.7% | Yes |
| 1978 | 323 | 323 | 12.0% | 17.9% | 5.8% | Yes |
| 1979 | 316 | 316 | 57.1% | 60.5% | 3.4% | Yes |
| 1980 | 319 | 319 | -17.0% | -9.1% | 7.9% | Yes |
| 1981 | 332 | 332 | 58.2% | 72.3% | 14.1% | Yes |
| 1982 | 339 | 339 | -2.2% | 0.9% | 3.1% | Yes |
| 1983 | 361 | 361 | -5.9% | 5.8% | 11.7% | Yes |
| 1984 | 350 | 350 | 11.0% | 22.0% | 11.0% | Yes |
| 1985 | 367 | 367 | 10.6% | 12.1% | 1.5% | Yes |
| 1986 | 368 | 368 | -13.5% | -6.6% | 6.9% | Yes |
| 1987 | 371 | 371 | 8.7% | 12.4% | 3.7% | Yes |
| 1988 | 390 | 390 | -6.8% | -0.4% | 6.5% | Yes |
| 1989 | 413 | 413 | 3.5% | 13.2% | 9.7% | Yes |
| 1990 | 417 | 418 | 14.4% | 19.8% | 5.4% | Yes |
| 1991 | 428 | 428 | 14.2% | 16.6% | 2.4% | Yes |
| 1992 | 442 | 442 | 19.2% | 19.4% | 0.2% | Yes |
| 1993 | 479 | 479 | 11.5% | 7.0% | -4.5% | No |
| 1994 | 511 | 511 | 41.7% | 53.0% | 11.3% | Yes |
| 1995 | 641 | 641 | -9.3% | -1.8% | 7.5% | Yes |
| 1996 | 683 | 683 | 30.0% | 38.3% | 8.3% | Yes |
| 1997 | 707 | 708 | -13.3% | -10.6% | 2.7% | Yes |
| 1998 | 739 | 739 | 66.2% | 50.7% | -15.5% | No |
| 1999 | 729 | 729 | -15.2% | -8.7% | 6.6% | Yes |
| 2000 | 721 | 721 | 7.9% | 8.2% | 0.3% | Yes |
| 2001 | 738 | 738 | -21.3% | -8.5% | 12.8% | Yes |
| 2002 | 739 | 739 | 90.5% | 95.4% | 4.8% | Yes |
| 2003 | 722 | 722 | 1.6% | -4.1% | -5.7% | No |
| 2004 | 708 | 708 | 15.8% | 25.6% | 9.8% | Yes |
| Average | 488.2 | 488.3 | 14.6% | 19.1% | 4.5%<br>(3.97) | 26 out of 30 |

*Panel B: Portfolios based on Annual Quintiles within industry of ΔRI*

| Year | $N_{short}$ | $N_{long}$ | $Ret_{short}$ | $Ret_{long}$ | $Ret_{long}$ - $Ret_{short}$ | Positive |
|---|---|---|---|---|---|---|
| 1975 | 300 | 314 | 17.3% | 17.9% | 0.6% | Yes |
| 1976 | 314 | 328 | 29.6% | 25.8% | -3.8% | No |
| 1977 | 306 | 315 | 20.9% | 24.5% | 3.6% | Yes |
| 1978 | 303 | 310 | 6.6% | 17.8% | 11.3% | Yes |
| 1979 | 289 | 304 | 49.2% | 59.0% | 9.8% | Yes |
| 1980 | 292 | 307 | -12.0% | -5.2% | 6.8% | Yes |
| 1981 | 305 | 319 | 60.4% | 68.2% | 7.8% | Yes |
| 1982 | 313 | 326 | 0.2% | 0.6% | 0.3% | Yes |
| 1983 | 339 | 346 | 2.1% | 13.1% | 11.0% | Yes |
| 1984 | 324 | 338 | 16.8% | 24.8% | 8.0% | Yes |
| 1985 | 336 | 355 | 11.3% | 12.3% | 1.0% | Yes |
| 1986 | 342 | 357 | -12.9% | -5.5% | 7.4% | Yes |
| 1987 | 347 | 358 | 10.0% | 16.6% | 6.6% | Yes |
| 1988 | 366 | 378 | -6.5% | 0.7% | 7.3% | Yes |
| 1989 | 384 | 400 | 3.7% | 13.9% | 10.2% | Yes |
| 1990 | 391 | 404 | 16.7% | 19.3% | 2.6% | Yes |
| 1991 | 400 | 416 | 14.6% | 21.3% | 6.8% | Yes |
| 1992 | 420 | 430 | 19.4% | 18.1% | -1.3% | No |
| 1993 | 453 | 463 | 12.5% | 2.8% | -9.7% | No |
| 1994 | 484 | 500 | 38.3% | 44.3% | 6.0% | Yes |
| 1995 | 612 | 624 | -2.4% | 5.8% | 8.2% | Yes |
| 1996 | 654 | 664 | 34.9% | 41.3% | 6.4% | Yes |
| 1997 | 680 | 696 | -12.6% | -11.9% | 0.7% | Yes |
| 1998 | 717 | 725 | 45.2% | 37.0% | -8.2% | No |
| 1999 | 706 | 716 | -4.6% | -2.7% | 1.9% | Yes |
| 2000 | 693 | 708 | 10.7% | 15.2% | 4.5% | Yes |
| 2001 | 708 | 726 | -13.7% | -6.3% | 7.4% | Yes |
| 2002 | 712 | 727 | 77.1% | 80.3% | 3.2% | Yes |
| 2003 | 694 | 711 | 2.7% | 3.7% | 1.0% | Yes |
| 2004 | 681 | 696 | 12.6% | 22.5% | 9.9% | Yes |
| Average | 462.2 | 475.4 | 14.9% | 19.2% | 4.2% | 26 out of 30 |
| | | | | | (4.46) | |

ΔRI is the change in Residual income (RI) scaled by lagged assets, where RI is defined as in the bottom of table 2. For Panel A, quintiles are formed within each year based on ΔRI. For Panel B, quintiles are formed within each year within industry defined at the 2-digit SIC code level. A hedge portfolio strategy is formed on the basis of going long on the highest quintile of ΔRI and going short on the lowest quintile of ΔRI. $N_{long}$ and $N_{short}$ are the number of firms in the long and short portfolios. $Ret_{long}$ and $Ret_{short}$ are the equally weighted returns to the firms in the long and short portfolios respectively. $Ret_{long}$-$Ret_{short}$ represents the returns to the hedge strategy. The t-statistic for the average hedge return is calculated using the standard error estimated from the time series of hedge returns

Table 8: Fama-French Regressions for portfolios based on quintiles of change in Residual Income

*Panel A: Fama-French 3 factor Model; N=357 months*

| Quintile | Alpha | $R_m$-$R_f$ | SMB | HML | Adj. $R^2$ |
|---|---|---|---|---|---|
| 1 | -0.33 | 1.04 | 1.02 | 0.07 | 80.2% |
| | (-1.96) | (25.12) | (19.05) | (1.10) | |
| 2 | -0.03 | 0.95 | 0.53 | 0.45 | 91.8% |
| | (-0.48) | (54.13) | (23.18) | (17.11) | |
| 3 | 0.25 | 0.86 | 0.36 | 0.54 | 88.6% |
| | (3.46) | (48.48) | (15.50) | (20.50) | |
| 4 | 0.27 | 0.95 | 0.54 | 0.45 | 92.3% |
| | (4.00) | (56.17) | (24.51) | (18.04) | |
| 5 | 0.53 | 1.05 | 1.04 | 0.18 | 87.0% |
| | (4.11) | (33.14) | (25.10) | (3.90) | |
| Q5 – Q1 | 0.86 | | | | |
| | (4.06) | | | | |

*Panel B: Fama-French 4 factor Model; N=357 months*

| Quintile | Alpha | $R_m$-$R_f$ | SMB | HML | UMD | Adj. $R^2$ |
|---|---|---|---|---|---|---|
| 1 | 0.05 | 1.01 | 1.08 | 0.00 | -0.39 | 85.8% |
| | (0.31) | (28.78) | (23.66) | (0.05) | (-11.87) | |
| 2 | 0.12 | 0.94 | 0.55 | 0.42 | -0.16 | 94.0% |
| | (1.93) | (62.30) | (28.17) | (18.67) | (-11.45) | |
| 3 | 0.28 | 0.86 | 0.36 | 0.54 | -0.03 | 88.7% |
| | (3.84) | (48.39) | (15.68) | (20.23) | (-2.06) | |
| 4 | 0.31 | 0.95 | 0.54 | 0.45 | -0.04 | 92.5% |
| | (4.50) | (56.28) | (24.84) | (17.79) | (-2.69) | |
| 5 | 0.61 | 1.05 | 1.05 | 0.17 | -0.09 | 87.2% |
| | (4.68) | (33.19) | (25.51) | (3.61) | (-2.98) | |
| Q5 – Q1 | 0.57 | | | | | |
| | (2.91) | | | | | |

At the end of each fiscal year, quintiles are formed on the basis of ΔRI, the change in Residual income (RI) scaled by lagged assets, where RI is defined as in the bottom of table 2. The equally weighted monthly returns for the next year for portfolios based on quintile of ΔRI are regressed on the market factor ($R_m$-$R_f$), Size factor (SMB), Book-to-market factor (HML), and additionally for the 4-factor model (UMD). The regression is a time series regression that pools 30 years of 12 monthly returns for each portfolio. As the CRSP database ends in December 2005, and we start compounding 4 months after fiscal year end, we have only 9 future months for our final fiscal year (2004), and hence 357 months in total. The intercepts to these portfolios represent the monthly excess returns earned in the year following portfolio formation.

Figure 1: Returns to Hedge Portfolios based on changes in Residual Income