Fundamental Analysis of Receivables and Bad Debt Reserves

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ABSTRACT

This paper (1) identifies factors that influence changes in accounts receivable and bad debt reserves and (2) measures the relation between unexpected changes in the ratio of total accounts receivable-to-sales and the ratio of bad debt reserves-to-sales, and (3) estimates the relation between changes in the accounts receivable-to-sales ratio and the bad debt reserve-to-receivables ratio and changes in future earnings. The results show that extreme changes in both ratios are signals of declining future performance when the firm is currently profitable and are signals of better future performance when the firm is currently unprofitable. Relatively large changes in these ratios signify changes in a company's receivable credit policy, which in turn signal changes in a company's economic outlook. These findings are important because previous studies examining the impact of current unexpected changes in accounts receivable or bad debt reserves on future earnings and stock returns sometimes report contradictory or inconsistent results.

Data Availability: Publicly available.

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1. Introduction

This paper identifies and tests several financial attributes that are associated with changes in receivables and bad debt reserves, and examines the impact of changes in receivables and bad debt reserves on future earnings. My objective is to better understand the extent to which changes in these balance sheet accounts signal changes in future financial performance. Since Ohlson [1995] demonstrates that current book value, earnings forecasts, and expected capital costs constitute sufficient data to determine intrinsic firm value, an investigation of the relation between fundamental signals and future earnings is a direct test of the relation between these signals and security prices. This approach to fundamental analysis follows Penman [1992] and Abarbanell and Bushee [1997], who advocate tests that link fundamental signals to future earnings changes.

Modern accounting research in fundamental analysis begins with Ou [1984, 1990] and Ou and Penman [1989], who use statistical approaches to identify nonearnings accounting numbers that are associated with firm values, and then determine the extent to which these nonearnings variables convey information about future earnings that is not reflected in stock prices. Later students use a "directed search" approach to identify specific nonearnings accounting numbers that are determinants of firm values (e.g., Bernard and Noel [1991]; Lev and Thiagarajan [1993]; Stober [1993]; Abarbanell and Bushee [1997]; Thomas and Zhang [2002]. In general, these prior studies model a linear relationship between changes in balance sheet ratios and changes in future performance.[1] Unlike these prior studies, however, I show that changes in balance sheet ratios (like total receivables-to-sales and bad debt reserves-to-total receivables) can signal either good news or bad news, depending on the firm's current financial performance. The regression models in this study reduce the unexplained portion of changes in receivables and bad debt reserves, and improve the predictive ability of changes in these accounts on future earnings.

[1] The sole exception is Stober (1993), who models expected receivables as a function of inventory and sales.

This paper makes three contributions to the research literature on fundamental accounting analysis. First, it identifies several financial factors that are associated with changes in accounts receivable and bad debt reserves. Modeling the relationship between these factors and changes in receivables and bad debt reserves should enable analysts to form better expectations of changes in these accounts as compared to models that relate changes in receivables or bad debt reserves to single drivers. Second, the results show that unexpected changes in the ratio of total receivables-to-sales are negatively associated with unexpected changes in the ratio of bad debt reserves-to-total receivables. This finding is consistent with companies simultaneously managing their receivables and reserves to achieve desired earnings outcomes. Last, the results show that the relation between changes in the accounts receivable-to-sales ratio and the bad debt reserve-to-receivables ratio and changes in future earnings depends on current performance and the absolute value of the change. Extreme changes in both ratios are signals of declining future performance when the firm is currently profitable and are signals of better future performance when the firm is currently unprofitable. Relatively large changes in these ratios signify changes in a company's receivable credit policy, which in turn signal changes in a company's economic outlook.

These contributions of this study are important because security analysts, investors, and other users of financial statement information need to base their fundamental analysis of firm valuations on sound and reliable models. The paper shows that a contextual analysis of changes in balance sheet accruals can lead to better predictions of future performance. Accounting researchers and investment advisors who analyze earnings quality through their examination of discretionary accruals measured using the modified Jones model [Dechow et al. 1995] can also benefit from this study by incorporating my model of unexpected changes in receivables in their measurement of discretionary revenues.

2. Prior Research

Analysts often cite the receivables-to-sales ratio as a key measure in determining current earnings quality and signaling future changes in financial performance. According to Palepu et al. [2004], unusual increases in the receivables-to-sales ratio may suggest that the company is relaxing its credit policies or artificially loading up its distribution channels to record revenues during the current period. If credit policies are relaxed unduly, the firm may face receivable write-offs in subsequent periods as a result of customer defaults. Relatively large changes in receivables may also suggest that the company is recording unrealized receivables as sales. For example, Marquandt and Wiedman [2004] find that unexpected receivables are significantly higher when firms issue equity and significantly lower just before a management buyout, and Rosner [2003] shows that unexpected receivables are significantly higher in failing firms prior to bankruptcy.[2] Consequently, many commentators view a disproportionate increase in receivables as a signal of "bad news". Consistent with this view, Lev and Thiagarajan [1993] find that current annual excess stock returns are declining in unexpected receivables and Chan et al. [2004] find that future annual excess stock returns are declining in unexpected receivables. However, other studies examining the impact of current unexpected changes in receivables on future earnings and stock returns report contradictory or inconsistent results. For example, Stober [1993] reports that that unexpected changes in receivables are positively related to the next quarter's earnings changes (but not to earnings changes in subsequent quarters) and Abarbanell and Bushee [1997] find that unexpected changes in accounts receivable are positively related to future annual earnings changes and unrelated to future stock returns. Lev and Thiagarajan [1993] also report that the predicted relation between unexpected changes in bad debt reserves and future stock returns is found only during certain periods of relatively high inflation. These contradictory results suggest that other factors may influence the assumed relationship between unexpected receivables and future returns.

[2] Most of these studies measure unexpected receivables in different ways. Lev and Thiagarajan [1993] and Abarbanell and Bushee [1997] define unexpected receivables by first calculating expected receivables and expected sales as the average receivables and average sales over the prior two years. Unexpected receivables is calculated as the percentage difference between actual and expected receivables divided by the percentage difference between actual and expected sales. Chan et al. [2004] define unexpected receivables as the difference between the current year receivables-to-sales ratio and the expected receivables-to-sales ratio, which is calculated as the ratio between total receivables for the past five years over total sales over the past five years. Marquandt and Weidman [2004] base their calculation of unexpected receivables on the modified Jones model, as they first calculate expected receivables by multiplying prior year's receivables by the ratio of current year sales to prior year sales. Unexpected receivables is determined by dividing the difference between actual and expected receivables by total assets. Rosner [2003] uses three different measures: change in receivables divided by assets; percentage change in receivables; and percentage change in receivables divided by percentage change in sales. Finally, Stober [1993] calculated unexpected receivables as the residual of a regression model that regresses the receivables-to-sales ratio on the inverse of current sales, prior year's receivables-to-sales ratio, and the difference between the receivables-to-sales ratio for the prior quarter to the same quarter of the prior year.

The relation between unexpected receivables and future earnings is also affected by changes in a firm's bad debt reserves because the unexpected receivables measured in these studies are calculated net of bad debt reserves. In most cases, however, researchers either ignore the impact of changes in bad debt reserves on unexpected receivables or assume that company strategies involving bad debt reserves will complement strategies involving receivables. Existing studies, for the most part, expect managers to make estimates of bad debt reserves that facilitate strategies to either smooth earnings or meet earnings or regulatory targets. For example, there is a large body of research that firms in the banking and insurance industries adjust their loan loss reserves to avoid regulatory intervention.[3] Beaver et al. [2003] find that P&C insurance companies with relatively large losses and relatively small earnings understate their loan loss reserves while those with relatively large earnings tend to overstate their reserves. In a study that includes both financial and nonfinancial firms, Teoh et al. [1998] show that the bad debt reserves of firms planning to sells shares in an initial public offering (IPO) are significantly lower than matched firms in the IPO year and in the year prior to the IPO. In other settings, however, studies fail to find the predicted relationship linear relationship between unexpected changes in bad debt reserves and contemporaneous earnings or excess stock returns. For example, Lev and Thigarajan [1993] fail to find that declining debt reserves signal lower stock returns. In addition, McNichols and Wilson [1988] find that bad debt reserves for nonfinancial firms are relatively high when current earnings are either extremely large or extremely negative. These results suggest that the relation between unexpected changes in bad debt reserves and changes in future earnings may be more complex than assumed in most research studies.

3. Development of Hypotheses

3.1 IDENTIFYING FACTORS THAT INFLUENCE CHANGES IN RECEIVABLES AND BAD DEBT RESERVES

Accounts receivable is reported on the balance sheet at net realizable value, which is the net amount expected to be received on collection. The net realizable value is determined by subtracting an estimate of

[3] See Fields et al. [2001] for a summary of this literature. More recent studies by Beatty et al. [2002]; Beaver et al. [2003]; Gaver and Paterson [2004]; and Kanagaratnam et al. [2004] reach similar conclusions in different settings.

uncollectible accounts from the total amount due from customers. To differentiate these accounts from each other, I define the net book value of accounts receivable as “net receivables”, the total amount due from customers as “total receivables”, and the estimate of uncollectible accounts as “bad debt reserves”. For a given firm in a given industry, total accounts receivable is an increasing function of sales while the bad debt reserve is an increasing function of total accounts receivable. The relation between these ratios is modeled in the following equation:

$$NR_t = AR_t(1 - BD_t) \tag{1}$$

where AR_t is the ratio of total receivables-to-total sales (or “total receivables ratio”) at the end of year t, BD_t is the ratio of bad debt reserves-to-total receivables (or “bad debt ratio”), and NR_t is the ratio of net receivables-to-total sales (or “net receivables ratio”). These three ratios are hereafter included under the umbrella term “receivable ratios”.

Receivable ratios are primarily influenced by the firm’s industry, its individual credit policy, and the economic environment. An optimal receivable policy maximizes net earnings (not total sales) and establishes a credit strategy that allows for a certain portion of its credit sales to be uncollectible. If its credit policy is too tight, the firm loses potential sales and the resultant earnings. If credit policy is too loose, uncollectible sales create out-of-pocket losses. Credit policy is reactive because the optimum level of receivables depends on the perceived creditworthiness of the firm’s customers. When the industry outlook is rosy, credit policy is loosened as firms can expect to collect a higher percentage of their credit sales. When the industry outlook declines, credited policy is tightened as firms can expect higher default rates among less creditworthy customers.

If company credit policy is reactive, then there should be a lag between changes in the economic environment and changes in the credit policy. It is extremely difficult for credit analysts to predict the peaks and troughs of an economic cycle. Consequently, the tightening or loosening of a credit policy will probably occur after a company has experienced verifiable signals that economic conditions have changed. For example, an improving economic environment may be evidenced by increases in purchase orders from customers. The resultant loosening in credit policy is likely to be iterative in nature. Later, when the economy experiences slowing or declining growth, the company's credit policy will slowly adjust to the new economic environment as decision makers cannot be immediately certain that a peak has occurred.

The effect of an improving economic environment has a slightly different impact on the bad debt ratio. There can be a substantial lag between the recording of company credit sales, which are usually recorded at the time of sale, and the final adjustments that are made to the bad debt reserve, which generally occurs after the outstanding receivables at the balance sheet date have been analyzed for collectibility. This lag between recording credit sales and recording adjustments to the bad debt reserve creates a stronger link between changes in the economic environment and changes in the bad debt ratio because adjustments to the bad debt reserve can be made with hindsight. By contrast, credit decisions affecting receivables must be made "on the spot." The ability to record adjustments to the bad debt reserves with hindsight results in a potentially stronger relationship between changes in the bad debt ratio and changes in the business environment and firm activities. Since customers are less likely to default in a favorable economic environment, changes in the bad debt ratio should be a decreasing function of changes in customer profitability and firm performance.

Managerial incentives to increase the present value of their expected compensation may cause managers to interfere with a firm's optimal credit policy if the company is in danger of missing earnings targets. In these situations, managers have economic incentives to temporarily loosen credit policies, creating higher levels of receivables and sales, to meet or beat these targets. Companies that choose to temporarily boost earnings may also accomplish their goal by minimizing the expense recorded as the provision for bad debts. In turn, this will reduce the bad debt ratio. By contrast, when firms are meeting their earnings targets, managers are less likely to engage in strategies that shift income from future years into the current year. Instead, once earnings targets are met, managers may shift income from the current year to the future year and may set up additional bad debt reserves that could be drawn down in a subsequent period.

This analysis of receivable credit policy leads to four testable predictions concerning the change in the firm's total receivables ratio. Based on this analysis, changes in the total receivables ratio are (1A) positively related to changes in the economic environment; (2A) negatively related to changes in sales growth; (3A) negatively related to changes in current earnings, and (4A) positively related to incentives to increase earnings due to missing earnings targets. Prediction (1A) is based on the hypothesis that firms will loosen credit policy in good times and tighten credit policy in bad times. Predictions (2A) and (3A) are based on the hypothesis that changes in credit policy will lag actual changes in the business environment. These predictions are also influenced by managerial incentives to delay recognition of sales if the company is beating its earnings targets. Prediction (4A) is based on the earnings management hypothesis.

The above analysis also leads to four testable predictions concerning a firm's bad debt reserve ratio. Based on this analysis, changes in the bad debt ratio are (1B) negatively related to changes in the economic environment; (2B) negatively related to changes in sales growth; (3B) negatively related to changes in current earnings, and (4B) negatively related to incentives to increase earnings due to missing earnings targets. Predictions (1B), (2B), and (3B) are based on the observation that default of receivables is more likely to occur in a depressed economic environment than in good times. Prediction (4B) is based on the earnings management hypothesis, which suggests that company executives will reduce their reserves to increase current earnings if the company is in danger of missing financial targets.

The relation between changes in total receivables and changes in bad debt reserves is difficult to predict. On the one hand, an increase in the total receivables ratio may indicate that a company is loosening its credit policy, which should result in a higher level of bad debt reserves. However, as I mentioned before, increasing bad debt reserves will reduce income, which offsets a receivable policy borne from an earnings management strategy. Moreover, a looser credit policy during a booming business economy may not create higher bad debt ratios because customers are less likely to default in these circumstances. As it is difficult to predict ex ante which of these factors is stronger, I make no prediction concerning this relationship.

In addition to these predictable changes in receivable ratios, other set of factors can introduce abnormal shocks to the relation between total receivables and sales. For example, the strategic decision to begin offering company credit cards to customers could cause the receivable ratios to skyrocket in the year of this decision. In addition, companies that charge higher interest rates on their receivable balances have economic incentives to increase the total receivable ratio as long as the present value of the income from the outstanding receivables exceed the present value of the carrying costs. Abnormal shocks can also occur when companies securitize loans with receivables. In certain circumstances, the structure of the loan transaction could permit companies to reduce their receivable balance by the amount of the loan, reducing the total receivables ratio. The unexpected bankruptcy of a major customer could also dramatically change a company's expected receivable ratios. These factors are difficult to predict and are treated as random fluctuations in the regression models described below.

3.2 THE RELATION BETWEEN RECEIVABLE RATIOS AND FUTURE CHANGES IN EARNINGS

The above analysis suggests that changes in a company's credit policies often result from changes in the firm's perceived economic outlook. In particular, the analysis shows that an increase in the total receivables ratio could either signal good news or bad news, depending on the reason for the change. Companies may extend more credit in rosier economic conditions to obtain additional sales (good news) or loosen credit policies to shift earnings from the future to the current year (bad news). Symmetrically, a decrease in the total receivables ratio could either signal good news or bad news. *AR* ratios will decline when sales growth is increasing due to increases in customer demand (good news) or as companies tighten credit policies in a depressed business environment (bad news). This view contrasts sharply with the widely perceived view that decreases in the net receivable ratio always signal good news and increases in the net receivable ratio always signal bad news.

In the absence of changes in the economy or business prospects, credit policies should remain somewhat constant. Hence, other than changes due to strategic choices (e.g., credit card initiation or loan securitization), a change in the company's receivable ratios should signal a change in the company's economic outlook. This change could indicate better economic conditions for profitable companies, worsening economic conditions for unprofitable companies, or a reversal of fortune.

In the absence of contrary data, a change in the credit policy of a profitable firm is more likely to signal a reversal of fortune, instead of improving future profits, because managers are less likely to change successful policies than unsuccessful policies. When a policy is currently successful, company decision makers are more likely to engage in "satisficing" behavior (Simon 1957). According to Simon, managers will rely on solutions that are "ok", "satisfactory", or "reasonable" rather than "optimal", because of bounded rationality. When a policy is not working, however, managers will change the policy because they clearly see the old one is not working. Hence, I predict that a change in the net receivables ratio, the total receivables ratio, or bad debt ratio is a signal of lower future earnings when the firm is currently profitable.

The interpretation of a change in the receivable ratios of an unprofitable firm is less clear. In this case, a change in the current credit policy could signal a reversal of fortune, instead of worsening losses, if the change in the policy is made in response to positive changes in the business environment. However, if the firm is currently suffering losses, it is possible that the manager will depart from the current policy, even if appears to be currently "optimal" in the hopes that the change could help the firm. Thus there are two opposing interpretations that, without additional evidence, is difficult to assess.

4. Sample

The data used to test the hypotheses developed in the prior section is primarily taken from the 2004 Compustat North America industry annual database included in the 2004 Wharton Research Data Services data management system over the years 1973-2003. The potential sample includes all firms other than those in the finance, insurance, and real estate sectors (SIC codes 6000-6999) or public administration (SIC codes 9000-9999) with at least three consecutive years of annual data using the same fiscal year ends.[4] Additional historical data on quarterly current-dollar gross domestic product (used to measure changes in the economic environment) are taken from the website of the Bureau of Economic Analysis.

Table 1 presents descriptions of all variables used in the analysis and summary statistics for a subset of the variables. All of the variables other than dummy variables used in the analysis are calculated as annual

[4] Companies that change fiscal year ends during this three year period are eliminated from the sample because their ratios are not comparable across time.

changes in ratios. Most ratios are calculated in a two step process.[5] First, the ratio is calculated at the beginning and at the end of the accounting period. Once the ratio is calculated, I sort the ratio by value and winsorize the ratio values in the extreme one percent for each year in the sample.[6] Second, I subtract the ratio calculated at the beginning of the accounting period from the ratio calculated at the end of the accounting period. After the change in the ratio is calculated, I eliminate the extreme one percent for each year in the sample. I use this simple process to eliminate outliers (mainly due to small denominators).

In addition to using firm-based ratios to analyze financial performance, analysts frequently compare the change in firm ratios across time to benchmark ratios across time. This benchmark ratio could be a single firm, a subset of high-quality competitors, or a mean industry ratio. It is often useful to compare firm performance to industry performance because business policies are often common among firms in the industry and the economic environment is similar for firms in the industry. For example, if the customers of a product are experiencing financial difficulties, then all firms in an industry that sell these products to these customers probably face the same problem in collections and sales and many firms will respond to this problem in the same way. In this situation, if a firm's net receivable ratio is higher than the benchmark firms, this relation could indicate that the firm could have greater write-offs in the future. In addition, it is important to control for the change in industry benchmarks when analyzing the change in receivable ratios because firm ratios may be increasing (decreasing) at faster or slower rates than the industry. For example, it is possible that a firm that appears to tightening its credit policy when compared to its ratio in the prior year may in fact be tightening it less than others when compared to the change in ratios of comparable firms. I control for this effect in the analysis by constructing variables that measure the change in the difference between the firm receivables ratio and the mean industry receivables ratio. These variables are calculated after the receivable ratios have been winsorized and the extreme ratios have been eliminated. Mean industry ratios are calculated for each firm year for each industry sector (based on two-digit SIC codes) using all available firm ratios on

[5] Two variables, the change in sales growth (ΔSGR) and the change in quarterly gross domestic product ($\Delta GDPGR$) are calculated as differences in percentages rather than differences in ratios, because these variables represent changes in growth rates rather than differences in ratios.

an equal-weighted basis. Mean industry total receivable ratios are designated by the term *INR*, mean industry total receivable ratios are designated by the term *IAR*, and mean industry total receivable ratios are designated by the term *IBD*. The change in the difference between the firm receivable ratio and the related mean industry receivable ratio is determined by first subtracting the industry ratio from the firm ratio and then subtracting the difference in the ratios at the beginning of the year from the difference in the ratios at the end of the year.[7]

After the elimination procedures are completed, the sample consists of 62,832 firm year observations.

5. Results

5.1 DESCRIPTION OF REGRESSION MODELS

I examine the effect of various factors on changes in the total receivable ratio and the bad debt ratio in the following regression equations:

$$\begin{aligned}\Delta AR_{i,t} = {} & \alpha_1 + \alpha_2 \Delta AR_{i,t-1} + \alpha_3 \Delta INV_{i,t} + \alpha_4 EPS3_{i,t} + \alpha_5 \Delta EPS3_{i,t} \\ & + \alpha_5 \Delta SGR_{i,t} + \alpha_6 \Delta AROA_{i,t} + \alpha_7 \Delta GDPGR_{i,t} + \varepsilon_t\end{aligned} \tag{2}$$

$$\begin{aligned}\Delta BD_{i,t} = {} & \beta_1 + \beta_2 \Delta BD_{i,t-1} + \beta_3 \Delta AR_{i,t} + \beta_4 EPS3_{i,t} + \beta_5 \Delta EPS3_{i,t} \\ & + \beta_5 \Delta SGR_{i,t} + \beta_6 \Delta AROA_{i,t} + \beta_7 \Delta GDPGR_{i,t} + \varepsilon_t\end{aligned} \tag{3}$$

where $\Delta AR_{i,t}$ is the change in firm *i*'s total receivables ratio for year *t*; $\Delta BD_{i,t}$ is the change in firm *i*'s bad debt ratio for year *t*; $\Delta INV_{i,t}$ is the change in the firm’s inventory-to-sales ratio; $EPS3_{i,t}$ is a dummy variable equal to one if the firm’s current earnings per share is between zero and three cents per share; $\Delta EPS3_{i,t}$ is a dummy variable equal to one if EPS3 = 0 and current year EPS equals or exceeds prior year EPS by three cents or

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6 In some cases (i.e., receivable ratios), the ratio is nonnegative. In these cases, I winsorize only the top one percent of ratio values.

7 I am not happy with this variable for several reasons. First, the firm’s receivable ratio is included in the industry benchmark. This can have a big impact on firms in small industries. Second, the industry could conceivably consist of a single firm. Should I only include this variable for industries that have more than XX number of firms? If so, what is XX? Also, as you will see in table 2, these change in industry variables are highly correlated with the change in the receivable ratio. I am thinking of substituting a different variable that compares the firm’s ratio to the industry ratio (instead of the comparing the change in the firm’s ratio to the change in the industry ratio). I could then create dummy variables for extremely positive and extremely negative differences and somehow construct interaction variables. When

less; $\Delta SGR_{i,t}$ is the change in the firm's growth rate in cash collected from sales; $\Delta AROA_{i,t}$ is the firm's current year adjusted return on assets; $\Delta GDPGR_{i,t}$ is the change in the annual growth of gross domestic product for the company's fiscal year; and ε_t represents error terms. Lagged variables of each dependent variable are included to control for possible mean reversion in these ratios across time and ΔINV_t is included because changes in sales simultaneously affect inventory and receivables. $EPS3_t$ and $\Delta EPS3_t$ are included to control for the likelihood that the current year's earnings were managed to either avoid a loss or meet or beat prior year's earnings. If firms use receivables and bad debt reserves to manage their earnings, then the coefficients on these variables are predicted to be positive because firms with these characteristics have a greater probability of managing their accruals to increase earnings (Burgstahler and Dichev 1997). ΔSGR_t and $\Delta AROA_t$ respectively measure the effect of changes in current year sales growth and earnings performance on ΔAR and ΔBD. To remove the impact of current period changes in *AR* and *AR* on firm earnings, $\Delta AROA_{i,t}$ is calculated by removing the portion of sales and cost of goods sold attributable to changes in the total receivables ratio, the changes in bad debt expense due to changes in the bad debt ratio, and the corresponding tax effect of these changes on the firm's current year net income before extraordinary items. The last variable, $\Delta GDPGR_t$, proxies for the change in the economic environment. The analysis in section 3.1 predicts that the coefficients on the ΔSGR_t and $\Delta AROA_t$ variables is will be negative in both equations as firms that are improving sales growth and earnings will have lower *AR* ratios and lower *BD* ratios. The coefficient on $\Delta GDPGR_t$ is predicted to be positive in equation (2) and negative in equation (3) as firms will loosen their credit policies (increasing receivables) but reduce their *BD* ratios as economic conditions improve.

The relation between changes in current receivables ratios and future changes in annual earnings is examined in several sets of cross-sectional regressions. The first set of signaling equations examines the

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you see the results, think about how you might want to construct industry variables to examine the effect of industry ratios on the relationship.

relation between changes in the net receivables ratio (ΔNR_t) and changes in next year's return on assets (ΔROA_{t+1}) without controlling for industry effects. These regressions take the following form:

$$\begin{aligned}\Delta ROA_{i,t+1} &= \delta_1 + \delta_2 \Delta ROA_{i,t} + \delta_3 P_{i,t} + \delta_4(\Delta ROA_{i,t} \times P_{i,t}) + \delta_5 \Delta NR_{i,t} \\ &+ \delta_6(\Delta NR_{i,t} \times HNR_{i,t}) + \delta_7(\Delta NR_{i,t} \times P_{i,t}) + \delta_8(\Delta NR_{i,t} \times P_{i,t} \times HNR_{i,t}) + \varepsilon_t\end{aligned} \tag{4}$$

where $\Delta ROA_{i,t}$ is the change in firm *i*'s return on assets (*ROA*) for year *t*; $P_{i,t}$ is a dummy variable equal to one if current period $ROA > 0$; and $HNR_{i,t}$ is a dummy variable equal to one if the $\Delta NR_{i,t}$ for firm *i* is in the highest quartile of ΔNR ratios for year *t*.[8] ΔROA_t is included in the equations to control for mean reversion in earnings changes and is predicted to have a negative coefficient. $P_{i,t}$ is included to differentiate firms that have positive earnings in year *t* and $HNR_{i,t}$ is included to identify firms that have had significant increases in the net receivable ratio for the year. The interaction terms group firms by profitability and the degree of change in their net receivable ratios. Under the reversal of fortune theory, firms with ROA > 0 and relatively large unexpected increases in net receivables will have lower future ROA. Hence, the model predicts that $\delta_8 < 0$; $(\delta_7 + \delta_8) < 0$; and $(\delta_6 + \delta_7 + \delta_7 + \delta_8) < 0$;

The second set of signaling equations examines the relation between ΔNR_t and ΔROA_{t+1} after controlling for changes in mean industry ratios. These regressions take the following form:

$$\begin{aligned}\Delta ROA_{i,t+1} &= \gamma_1 + \gamma_2 \Delta ROA_{i,t} + \gamma_3 P_{i,t} + \gamma_4(\Delta ROA_{i,t} \times P_{i,t}) + \gamma_5 \Delta NR_{i,t} \\ &+ \gamma_6 \Delta(NR - INR)_{i,t} + \gamma_7(\Delta NR_{i,t} \times HNR_{i,t}) + \gamma_8(\Delta NR_{i,t} \times P_{i,t}) \\ &+ \gamma_9[\Delta(NR - INR)_{i,t} \times P_{i,t}] + \gamma_{10}(\Delta NR_{i,t} \times P_{i,t} \times HNR_{i,t}) + \varepsilon_t\end{aligned} \tag{5}$$

where $INR_{i,t}$ is mean industry net receivable ratio for firm *i* in year *t*. In this set of equations, the change in the difference between firm and mean industry net receivable ratio, $\Delta(NR - INR)_{i,t}$, is expected to strengthen the negative relation between firms with relatively high ΔNR_t when current $ROA > 0$.

The third set examines the effect of changes in gross receivables (ΔAR_t) and bad debt reserves (ΔBD_t) on ΔROA_{t+1}. When analyzing receivables, it is often useful to simultaneously analyze bad debt reserves because changes in the reserve affects the net receivable ratio because prior research has shown that

[8] Instead of including a dummy variable for firms in the highest quartile, I could merely include an interaction term that squares the change in the receivable ratios. Would this be better?

the periodic recording of bad debt reserves is highly subjective and is often determined strategically. The variables in this set of regressions include the same control variables and interaction terms that were included in (4) and (5). In each equation, however, I replace the ΔNR-based variables with those based on ΔAR and ΔBD ratios. Thus, the regression model includes twice as many regression ratios as in the prior equations:

$$\begin{aligned}\Delta ROA_{i,t+1} &= \lambda_1 + \lambda_2 \Delta ROA_{i,t} + \lambda_3 P_{i,t} + \lambda_4 (\Delta ROA_{i,t} \times P_{i,t}) + \lambda_5 \Delta AR_{i,t} \\ &+ \lambda_6 \Delta (AR - IAR)_{i,t} + \lambda_7 (\Delta AR_{i,t} \times HAR_{i,t}) + \lambda_8 (\Delta AR_{i,t} \times P_{i,t}) \\ &+ \lambda_9 [\Delta (AR - IAR)_{i,t} \times P_{i,t}] + \lambda_{10} (\Delta AR_{i,t} \times P_{i,t} \times HAR_{i,t}) + \lambda_{11} \Delta BD_{i,t} \\ &+ \lambda_{12} \Delta (BD - IBD)_{i,t} + \lambda_{13} (\Delta BD_{i,t} \times HBD_{i,t}) + \lambda_{14} (\Delta BD_{i,t} \times P_{i,t}) \\ &+ \lambda_{15} [\Delta (BD - IBD)_{i,t} \times P_{i,t}] + \lambda_{16} (\Delta BD_{i,t} \times P_{i,t} \times HBD_{i,t}) + \varepsilon_t\end{aligned} \tag{6}$$

where $HAR_{i,t}$ ($HBD_{i,t}$) is a dummy variables equal to one if the $\Delta AR_{i,t}$ ($\Delta BD_{i,t}$) for firm i is in the highest quartile of ΔAR (ΔBD) ratios for year t and $IAR_{i,t}$ ($IBD_{i,t}$) is the mean industry total receivables ratio (mean industry bad debt reserve ratio) for firm i in year t.

5.2 PEARSON CORRELATION MATRICES

Table 2 presents two panels of Pearson correlations for the variables used in the analysis. Panel A shows the correlation matrix for variables used to examine the factors that influence annual changes in the receivable ratios while panel B shows the correlation matrix for variables to examine the relation between current changes in receivable ratios and future changes in earnings. Both panels include independent variables that are highly correlated with each other. In panel A, the change in the prior year's total receivable ratio (ΔAR_{t-1}) is highly correlated with the current year's change in sales growth (ΔSGA_t). In panel B, each of the receivable ratios (ΔNR_t, ΔAR_t, and ΔBD_t) are positively correlated with the corresponding change in the difference between the firm and the mean industry variables ($\Delta(NR - INR)_t$, $\Delta(AR - IAR)_t$, and $\Delta(BD - IBD)_t$), respectively.[9]

Univariate analysis in panel A shows that the current annual change in total receivables (ΔAR_t) is negatively related to concurrent annual changes in the bad debt reserve (ΔBD_t), suggesting that firms appear

[9] Note that these correlations are huge and embarrassing. This leads me to believe that these industry variables are poorly constructed.

to be reducing their bad debt reserve ratio as their total receivables ratio increases. ΔAR_t is also positively correlated to with the current change in the inventory-to-sales ratio (ΔINV_t), which is unexpected at first glance because an increase in receivables due to increased sales should reduce, not increase, inventory. However, this relation could also be caused by a decline in sales growth, as slower sales could increase both ΔAR_t and ΔINV_t. This interpretation of the correlation is supported by the negative correlation between each of these variables and the change in sales growth (ΔSGR_t). With the exception of the earnings management variables, the predicted causes of ΔAR_t and ΔBD_t are all highly correlated with the expected signs. However, the earnings management variables ($EPS3_t$ and $\Delta EPS3_t$) are only correlated with ΔBD_t, suggesting that managers are more likely to use bad debt reserves instead of credit sales to meet earnings targets.

The correlations in panel B show that changes in the net receivable ratios and the total receivable ratios are positively correlated with future returns while changes in the bad debt ratios are negatively correlated with future returns.

5.3 RESULTS FOR ΔAR and ΔBD REGRESSION MODELS

Table 3 presents the regression estimates of the annual changes in total receivable ratios (ΔAR) and changes in bad debt reserve ratios (ΔBD) on a variety of variables that are predicted to cause these changes. The table shows the results of four regressions. The regression estimates in the first two columns examine factors that predict changes in ΔAR while the regressions the columns three and four examine factors that predict changes in ΔBD. The results in column one are based on equation (2) while the results in column three are based on equation (3). The regressions in columns two and four include additional terms that measure the extent to which the results are affected by whether the firm is currently profitable.

The adjusted R^2 for the equations vary between 0.0717 and 0.0882. In equation one, the coefficients on all variables other than the earnings management variables are significantly different from zero in the expected direction. The coefficients on *EPS3* and $\Delta EPS3$ are positive but only significant at the 0.126 and 0.106 levels, respectively. When the interaction terms are added in the column two regressions, the adjusted

R^2 increases by about 9 percent (from 0.0808 to 0.0882) and the coefficient on *EPS3* becomes significant at the 0.05 level. In the ΔBD equations, all coefficients are signed in the expected direction and are significantly different from zero at the 0.01 level. These results are consistent with the analysis discussed earlier in the paper.[10]

5.4 REGRESSION RESULTS THAT MEASURE THE EFFECT OF ΔNR ON NEXT YEAR'S ROA

Table 4 presents the results of the first set of regressions of future ROA performance on changes in the current year's net receivable ratios and the control variables. The table is separated into two panels. Panel A shows the regression results and panel B measures the mean change in future ROA signaled by the mean change in the net receivable ratio for firms grouped in the highest and lowest quartiles of ΔNR_t over the sample period. The results of three regressions are presented in the table. The results in column one regresses ΔROA_{t+1} on ΔNR_t without regard to the magnitude of ΔNR_t or whether the firm is currently profitable. The results in column two estimate the differential effect of relatively large increases in ΔNR_t on future returns. Finally, the results in column three examines whether effect of ΔNR_t on future returns is affected by whether the firm is currently profitable.

In each regression, the coefficients on the three control variables (ΔROA_t, P_t, and $\Delta ROA_t \times P_t$) are significantly different from zero at the 0.01 level. The first column of table 4 shows that the baseline result that ΔNR_t is negatively related to future returns at the 0.10 level. The results in the second column show that the signaling effect of ΔNR_t on future returns is enhanced when the magnitude of the change in the *NR* ratio is taken into account, as the adjusted R^2 increases by about 1.6 percent (from 0.0807 to 0.0820). The negative sign on the ($\Delta NR_t \times HNR_t$) variable indicates that relatively large positive changes in the net receivable ratio signal lower future returns while the positive sign on the ΔNR_t variable suggests that relatively large negative changes in the ΔNR_t also signal lower future returns.

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[10] I also ran regressions after removing the firms in the lowest quartile of ΔNR_t, based on the assumption that the receivables for these firms are relatively small and would have less impact on the relation. The adjusted R^2 increases in each table by about 0.005 (e.g., increase the adjusted R^2 from 8% to 8.5%). I do not discuss this analysis in the paper.

The results in table 3 indicate that the current profitability of the firm affects the signaling effect of ΔNR_t on future returns. As predicted, the coefficient on the ($\Delta NR_t \times HNR_t \times P_t$) variable is negative and significantly different from zero at the 0.01 level. Moreover, coefficient on the ($\Delta NR_t \times HNR_t \times P_t$) variable exceeds in absolute value the coefficient on the ($\Delta NR_t \times P_t$) variable, which in turn exceeds in magnitude the remaining coefficients on the ΔNR_t variables. By comparing the magnitudes of the different coefficients, the results show that relatively large changes in the net receivables ratio for profitable firms signal lower future ROA regardless of whether the change is positive or negative, while relatively large negative changes in *NR* for loss firms signal higher future ROA. Because the sign of the coefficient on the ($\Delta NR_t \times HNR_t$) variable is not significantly different from zero at conventional levels, it is difficult to predict the effect of relatively large positive changes in the *NR* ratio for loss firms on future *ROA*.

Panel B of table 4 calculates the mean change in next year's ROA for four different portfolios of firms. The first portfolio consists of all profitable firms with that are ranked in the lowest quartile of ΔNR_t for the current year while the second portfolio includes all profitable firms in the highest quartile of ΔNR_t for the current year. The other two portfolios consist of unprofitable firms in the lowest and highest ΔNR_t quartiles, respectively. The mean changes in future ROA are determined by multiplying the mean change in the net receivables ratio for each group by the appropriate coefficient(s) from the regression results. The results for the first equation are economically insignificant. However, the results for the second and third columns show an increasing ability to signal significant changes in ROA_{t+1}. In the third column, the results show that the mean change in ROA_{t+1} when $ROA_t > 0$ is -0.75 (-0.73) percentage points for firms with relatively large negative (positive) changes in the *NR* ratio, while the mean change in ROA_{t+1} for unprofitable firms with relatively large negative changes in the net receivables ratio is +0.44 percentage points. These results are generally consistent with the proposition that extreme changes in net receivables signal bad news when the firm is currently profitable and good news when the firm is currently unprofitable.

5.5 REGRESSION RESULTS THAT MEASURE THE EFFECT OF ΔNR AND $\Delta(NR - INR)$ ON NEXT YEAR'S ROA

Table 5 presents the results of regressing the change in future ROA on changes in the current year's net receivable ratios, changes in difference between firm and mean industry net receivable ratios, and the control variables. The regression results in panel A include two specifications of equation (5), with the results in the first column including only one variable that measures the change in the difference between firm and mean industry net receivable ratios, $\Delta(NR - INR)_t$, while the results in column two include an additional variable that interacts $\Delta(NR - INR)_t$ with firms that are currently profitable. When these additional variables are included in the equation, the adjusted R^2 increases only by about 0.5 percent (from 0.0820 to 0.0824) and the additional variables are generally significant at conventional levels.

The groups of firms formed in panel B to measure the mean change in future ROA based on changes in the current year net receivables ratio are different than in table 4. In table 5, the groups consist of firms who are in the extreme quartiles of ΔNR_t and $\Delta(NR - INR)_t$ firms in each year. As additional factors are used to differentiate firms, the signals begin to take on different characteristics. Once again, profitable firms with relatively large ΔNR experience declines in next year's *ROA* while loss firms with relatively large negative ΔNR experience increases in next year's *ROA.* Within each subcategory of profitable and unprofitable firms, however, the change in future ROA is more negative for firms that experience relatively large positive ΔNR than those that experience relatively large negative changes in net receivable ratios. This differential effect within each subcategory is consistent with the analysis in prior studies.

5.6 REGRESSION RESULTS THAT MEASURE THE EFFECT OF ΔAR AND ΔBD ON NEXT YEAR'S ROA

Table 6 presents the results for three regression equations that estimate how changes in total receivables ratios and changes in bad debt reserves signal changes in future ROA.

The regression estimates in the first column is based on the third regression in table 4 (which does not include variables that estimate the differences between firm and mean industry ratios). The results in Panel A show that substituting ΔAR and ΔBD ratios for ΔNR increases the adjusted R^2 by about 1.3 percent (from 0.082 to 0.0831). Consistent with my expectations, relatively large changes in AR_t and BD_t is a signal of lower future ROA when current ROA > 0. The coefficients on the ($\Delta AR_t \times P_t \times HAR_t$) and ($\Delta BD_t \times P_t \times HBD_t$) variables in the highest quartiles are negative and significantly different from zero at the 0.01 level. The negative coefficients on these two variables also exceed in absolute value the sum of the coefficients on the other ΔAR and ΔBD variables, respectively. In addition, the coefficient on ($\Delta BD_t \times HBD_t$) is positive and significantly different from zero at the 0.01 level. The positive coefficient on this variable exceeds in absolute value the coefficient on the ΔBD_t variable, indicating that relatively large positive changes in the bad debt reserve ratio is good news when ROA < 0. This positive relationship between ΔBD_t and ΔROA_{t+1} for loss firms is consistent with the popular theory that unprofitable companies are ready to turn around their performance when they "clean up" their balance sheet by setting up larger reserves for nonperforming receivables. However, the coefficient on the ($\Delta AR_t \times HAR_t$) variable is not significantly different from zero (p-value of 0.157), while the coefficient on the ΔAR_t variable is negative and significantly different from zero at the 0.01 level. This finding implies that increases in the accounts receivable-to-sales ratio are generally bad news, even for loss firms. However the difference between the negative coefficient on ΔAR_t and the positive coefficient on ($\Delta AR_t \times HAR_t$) suggests that this relation weakens as ΔAR_t increases.

The regression estimates in the second and third columns are based on the regressions in table 5, which include variables that estimate the incremental impact of differences between firm and mean industry ratios on future ROA. The results in that including variables that measure the change in the difference between firm and mean industry accounts receivable ratios, $\Delta(AR - IAR)$, and the change in the difference between firm and mean industry bad debt reserve ratios, $\Delta(BD - IBD)$, increases the adjusted R^2 by an additional 1.7 percent (from 0.0831 to 0.0845). The general significance of these additional variables (as compared to the results in table 5) substantiates the intuitive proposition that mean industry ratios become more useful when the net receivables ratio is decomposed into its components.

Panel B of table 5 shows the mean change in future ROA for different groups of firms formed from the extreme quartiles of the of ΔAR, ΔBD, $\Delta(AR - IAR)$, and $\Delta(BD - IBD)$ ratios. As before, the groups are distinguished by the sign of current ROA. Since the same firm can be in the highest quartile of ΔAR and the lowest of ΔBD (and vice versa), the number of possible group combinations doubles from those in the prior tables. The results present stronger evidence (than in prior tables) that relatively large changes in these ratios are signals of lower future ROA when the firm is currently unprofitable. When current ROA > 0, the results for the equations in columns two and three indicate that a relatively large change in each of these ratios signals a decline in future ROA by approximately 1.19 – 1.36 percentage points, regardless of the direction of the change. When current ROA < 0, relatively large changes in each of these ratios generally predict an improvement in future ROA, though the average improvement is lower in absolute value than when ROA > 0. These results support the argument that changes in receivables and bad debt have the most relevance for future performance when the firm is currently profitable. In this case, a large change in *AR* and *BD* usually results in a large deviation from industry means. A significant change to receivable credit policies when the firm is current profitable is a signal of a decline in future performance.

6. Concluding Remarks

Prior research studies generally model expected changes in net accounts receivables as a function of changes in sales and model changes in future returns as a linear function of unexpected receivables. This study separates net receivables into total receivables and bad debt reserves, identifies additional factors that impact changes in receivables and bad debt reserves, and shows that the signaling effect of changes in receivables and bad debt reserves can result in better predictions of next year's earnings if the analyst also considers the current profitability of the firm magnitude of the change. The results should be useful for financial analysts and other users of financial information in creating better earnings forecasts.

The goal of fundamental analysis research is to provide better estimates of future earnings using historical financial information. By understanding the fundamental drivers of accruals, analysts can make better predictions of future financial performance. Yet analysts often relate accruals to single drivers and ignore the effect of other factors on this primary relationship. This study shows how investors and other financial statement users can derive benefits by engaging in a more thorough examination of fundamental factors affecting accruals.

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TABLE 1
Sample Statistics and Variable Descriptions

	No. of Obs.	Mean	25th Percentile	Median	75th Percentile	Standard Deviation
ΔROA	62,832	−0.28%	−2.72%	0.06%	2.26%	8.69%
ΔNR	62,832	−0.15%	−1.52%	−0.05%	1.27%	3.53%
ΔAR	62,832	−0.13%	−1.54%	−0.05%	1.32%	3.68%
ΔBD	62,832	0.13%	−0.59%	0.00%	0.69%	2.87%
$\Delta NRDIFF$	62,832	−0.04%	−1.52%	−0.00%	1.48%	3.58%
$\Delta ARDIFF$	62,832	−0.00%	−1.58%	−0.01%	1.54%	3.71%
$\Delta BDDIFF$	62,832	0.03%	−0.88%	−0.06%	0.81%	2.89%
ΔINV	62,832	−0.24%	−1.48%	−0.00%	0.95%	3.70%
ΔSGR	62,832	−2.49%	−13.48%	−1.39%	9.58%	25.41%
$\Delta AROA$	62,832	−0.30%	−2.94%	−0.01%	2.44%	8.73%
$\Delta GDPGR$	62,832	0.00%	−0.20%	−0.00%	0.02%	0.12%

The sample consists of 63,208 firm year observations between 1970 and 2003. Variable descriptions are as follows:
ΔROA_t is the difference in a firm's return on assets (*ROA*) for its fiscal year *t* and its *ROA* for its fiscal year *t*-1, where *ROA* is defined as net income before extraordinary items divided by mean total assets held at the beginning and end of the year.
ΔNR is the difference between a firm's net receivable ratio (*NR*) at the end of its fiscal year and its *NR* at the beginning of its fiscal year, where *NR* is ending net accounts receivable divided by firm sales for the year.
ΔAR is the difference between a firm's accounts receivable ratio (*AR*) at the end of its fiscal year and its *AR* at the beginning of its fiscal year, where *AR* is ending total accounts receivable divided by firm sales for the year.
ΔBD is the difference between a firm's bad debt reserve ratio (*BD*) at the end of its fiscal year and its *BD* at the beginning of its fiscal year, where *BD* is ending reserve for bad debts divided by total accounts receivable.
$\Delta NRDIFF$ is the change in the difference between a firm's net receivable ratio (*NR*) and the mean industry net receivable ratio (*INDNR*) during the year, where the mean industry net receivable ratio is determined using all firms with the same 2-digit SIC code for the calendar year.
$\Delta ARDIFF$ is the change in the difference between a firm's accounts receivable ratio (*AR*) and the mean industry accounts receivable ratio (*INDAR*) during the year, where the mean industry accounts receivable ratio is determined using all firms with the same 2-digit SIC code for the calendar year.
$\Delta BDDIFF$ is the change in the difference between a firm's bad debt reserve ratio (*BD*) and the mean industry bad debt reserve ratio (*INDBD*) during the year, where the mean industry bad debt reserve ratio is determined using all firms with the same 2-digit SIC code for the calendar year.
ΔINV is the difference between a firm's inventory-sales ratio (*INV*) at the end of its fiscal year and its INV at the beginning of its fiscal year, where *INV* is ending inventory divided by firm sales for the year.
ΔSGR is the difference between the growth in cash sales (*SGR*) for the current fiscal year and its *SGR* for the prior fiscal year, where *SGR* is current year sales after adjusting for the change in accounts receivable, divided by prior year sales after adjusting for the change in accounts receivable.
$\Delta AROA$ is the difference between a firm's adjusted *ROA* (*AROA*) for the current fiscal year and its AROA for the prior fiscal year, where *AROA* is current year *ROA* after adjustments are made to sales and bad debt expense so that the ending accounts receivable ratio (*AR*) and bad debt reserve ratio (*BD*) are the same as in the prior year, and after adjusting cost of goods sold for the change in sales and adjusting tax expense for the overall change in pre-tax income.
$\Delta GDPGR$ is the difference between the growth in the gross domestic product (*GDPGR*) for the U.S. economy for the current fiscal year and the *GDPGR* for the prior fiscal year, where *GDPGR* is the GDP for the quarter that coincides with the firm's fiscal year divided by the GDP for the same quarter of the prior year. (GDP data is obtained from the Bureau of Economic Analysis). If the firm's fiscal year ends in a different month than the quarter for which GDP is calculated, GDP is recalculate by prorating the current quarter and prior quarter's GDP.

EPS3 is a dummy variable equal to one if the current year's earnings per share (EPS) is between zero and three cents per share, and zero otherwise.
Δ*EPS3* is a dummy variable equal to one if difference between the current year's EPS and the prior year's EPS is between zero and three cents per share and *EPS3* equals zero, and zero otherwise.
P is a dummy variable equal to one if current year ROA > 0 and zero otherwise.
LNR is a dummy variable equal to one if the firm is in the lowest quartile of ΔNR for the calendar year and zero otherwise.
LAR is a dummy variable equal to one if the firm is in the lowest quartile of ΔAR for the calendar year and zero otherwise.
LBD is a dummy variable equal to one if the firm is in the lowest quartile of ΔBD for the calendar year and zero otherwise.
HNR is a dummy variable equal to one if the firm is in the highest quartile of ΔNR for the calendar year and zero otherwise.
HAR is a dummy variable equal to one if the firm is in the highest quartile of ΔAR for the calendar year and zero otherwise.
HNR is a dummy variable equal to one if the firm is in the highest quartile of ΔBD for the calendar year and zero otherwise.

TABLE 2

Correlation Matrices

Panel B: Pearson correlation matrix for variables included in ΔAR and ΔBD equations

	ΔAR_t	ΔBD_t	ΔAR_{t-1}	ΔBD_{t-1}	$EPS3_t$	$\Delta EPS3_t$	ΔINV_t	ΔSGR_t	$\Delta AROA_t$
ΔBD_t	-0.15^{***}								
ΔAR_{t-1}	-0.23^{***}	0.06^{***}							
ΔBD_{t-1}	0.05^{***}	-0.14^{***}	-0.15^{***}						
$EPS3_t$	0.00	-0.03^{***}	-0.01^{**}	-0.01^{**}					
$\Delta EPS3_t$	0.01^{*}	-0.01^{***}	0.00	−0.00	-0.03^{***}				
ΔINV_t	0.12^{***}	0.01^{***}	-0.27^{***}	-0.01^{***}	0.00	0.01^{*}			
ΔSGR_t	-0.24^{***}	-0.09^{***}	0.55^{***}	-0.08^{***}	0.01^{**}	−0.00	-0.16^{***}		
$\Delta AROA_t$	-0.11^{***}	-0.13^{***}	0.09^{***}	0.01^{*}	0.07^{***}	−0.00	0.02^{***}	0.31^{***}	
$\Delta GDPGR_t$	0.01^{***}	-0.03^{***}	0.02^{***}	−0.00	−0.00	0.00	−0.00	−0.00	0.02^{***}

Panel B: Pearson correlation matrix for variables included in ROA equations

	ΔROA_{t+1}	ΔROA_t	P_t	$\Delta ROA_t \times P_t$	ΔNR_t	ΔAR_t	ΔBD_t	$\Delta NRDIFF_t$	$\Delta ARDIFF_t$
ΔROA_t	-0.22^{***}								
P_t	-0.24^{***}	0.30^{***}							
$\Delta ROA_t \times P_t$	-0.06^{***}	0.62^{***}	0.08^{***}						
ΔNR_t	-0.03^{***}	0.03^{***}	0.07^{***}	-0.03^{***}					
ΔAR_t	-0.02^{***}	0.00	0.05^{***}	-0.04^{***}	0.98^{***}				
ΔBD_t	0.06^{***}	-0.19^{***}	-0.13^{***}	-0.09^{***}	-0.28^{***}	-0.15^{***}			
$\Delta(NR - INR)_t$	-0.03^{***}	0.02^{***}	0.05^{***}	-0.03^{***}	0.96^{***}	0.95^{***}	-0.25^{***}		
$\Delta(AR - IAR)_t$	-0.02^{***}	−0.00	0.04^{***}	-0.04^{***}	0.94^{***}	0.96^{***}	-0.14^{***}	0.96^{***}	
$\Delta(BD - IBD)_t$	0.06^{***}	-0.17^{***}	-0.11^{***}	-0.07^{***}	-0.25^{***}	-0.14^{***}	0.96^{***}	-0.25^{***}	-0.14^{***}

The sample consists of 63,208 firm year observations between 1970 and 2003. Variable descriptions are described in table 1. ρ-values are indicated by asterisks: *, **, and *** indicate significance at the 10%, 5%, and 1% (two-tailed) levels, respectively.

TABLE 3

Determinants of Changes in Gross Receivables and Bad Debt Reserves

	Dependent Variable: ΔAR_t		Dependent Variable: ΔBD_t	
Intercept	−0.002***	0.001***	0.001***	0.001***
	(13.54)	(7.39)	(8.77)	(4.93)
ΔAR_{t-1}	−0.149***	−0.150***		
	(32.64)	(32.91)		
ΔBD_{t-1}			−0.139***	−0.148***
			(44.80)	(37.03)
ΔAR_t			−0.148***	−0.135***
			(36.82)	(43.56)
ΔINV_t	0.086***	0.080***		
	(22.24)	(20.89)		
$EPS3_t$	0.001	0.002**	−0.003***	−0.003***
	(1.53)	(2.01)	(4.49)	(3.80)
$\Delta EPS3_t$	0.001	0.001	−0.002***	−0.001
	(1.62)	(1.12)	(2.79)	(1.51)
ΔSGR_t	−0.188***	−0.017***	−0.012***	−0.019***
	(26.70)	(16.54)	(25.77)	(25.06)
$\Delta SGR_t \times P_t$		−0.000		0.010***
		(0.41)		(10.53)
$\Delta AROA_t$	−0.018***	0.010***	−0.037***	−0.016***
	(10.53)	(4.68)	(28.06)	(26.67)
$\Delta AROA_t \times P_t$		−0.077***		0.025***
		(21.29)		(8.67)
$\Delta GDPGR_t$	0.733***	1.129***	−0.377***	−0.555***
	(6.43)	(5.96)	(4.20)	(3.72)
$\Delta GDPGR_t \times P_t$		−0.586***		0.277
		(2.48)		(1.48)
Adjusted R^2	0.0808	0.0882	0.0717	0.0755
Total observations	62,832	62,832	62,832	62,832

This table presents regression estimates of the annual changes in accounts receivable ratios (Δ*AR*) and changes in bad debt reserve ratios (Δ*BD*) on variables that proxy for beating earnings targets (*EPS3* andΔ*EPS3*), changes in sales growth (Δ*SGR*), changes in adjusted return on assets (Δ*AROA*), changes in the growth of the economy (Δ*GDPGR*), and lagged ratios, In columns 2 and 4, the regression equations also include additional variables for Δ*SGR*, Δ*AROA*, and Δ*GDPGR* that equal Δ*SGR*, Δ*AROA*, and Δ*GDPGR*, respectively, when current *ROA* > 0 (designated as $P = 1$) and zero otherwise. The sample consists of 63,208 firm year observations between 1970 and 2003. Variable descriptions are described in table 1.

TABLE 4

Effect of Changes in Net Receivable Ratios on Future Period Earnings: Baseline Regressions:

	(1)	(2)	(3)
Panel A: Regression results			
Intercept	0.021***	0.024***	0.020***
	(28.67)	(29.88)	(21.77)
ΔROA_t	−0.226***	−0.226***	−0.225***
	(43.29)	(43.37)	(43.10)
P_t	−0.034***	−0.035***	−0.030***
	(40.76)	(41.72)	(28.98)
$\Delta ROA_t \times P_t$	0.150***	0.153***	0.154***
	(18.03)	(18.40)	(18.61)
ΔNR_t	−0.016*	0.074***	−0.078***
	(1.76)	(5.41)	(3.65)
$\Delta NR_t \times HNR_t$		−0.208***	0.062
		(9.05)	(1.61)
$\Delta NR_t \times P_t$			0.252***
			(9.09)
$\Delta NR_t \times P_t \times HNR_t$			−0.427***
			(8.87)
Adjusted R^2	0.0807	0.0820	0.0820
Total observations	62,832	62,832	62,832
Panel B: Effect of mean change in the low and high quartiles of Δ*NR* ratios on future *ROA*			
Mean value of change in future *ROA* when current $ROA_t > 0$:			
Mean change in lowest quartile of ΔNR_t	0.07%	−0.32%	−0.75%
Mean change in highest quartile of ΔNR_t	−0.06%	−0.51%	−0.73%
Mean value of change in future *ROA* when current $ROA_t \le 0$:			
Mean change in lowest quartile of ΔNR_t	0.09%	−1.24%	0.44%
Mean change in highest quartile of ΔNR_t	−0.08%	−0.92%	−0.08%

Panel A of this table presents regression estimates of next year's change in return on assets (*ROA*) on variables that measure annual changes in net receivable ratios (ΔNR). Panel B presents point estimates of next year's change in *ROA* for firms that are classified in the lowest and highest quartiles of ΔNR ratios for the current year. Firms in the highest ΔNR quartile is classified as $HNR = 1$. The quartile groupings are further separated into different groups depending on whether current $ROA > 0$ (designated as $P = 1$) or $ROA \le 0$ (in which case $P = 0$). These point estimates are calculated by multiplying the mean values of the ΔNR groups by the applicable coefficients from the regressions. The sample consists of 63,208 firm year observations between 1970 and 2003. Variable descriptions are described in table 1.

TABLE 5

Effect of Changes in Net Receivable Ratios and Mean Industry Net Receivable Ratios on Future Period Earnings

	(1)	(2)
Panel A: Regression results		
Intercept	0.020^{***}	0.020^{***}
	(21.92)	(21.56)
ΔROA_t	-0.225^{***}	-0.224^{***}
	(43.16)	(43.05)
P_t	-0.029^{***}	-0.029^{***}
	(29.06)	(28.65)
$\Delta ROA_t \times P_t$	0.154^{***}	0.153^{***}
	(18.59)	(18.48)
ΔNR_t	0.036	-0.159^{**}
	(0.93)	(2.47)
$\Delta(NR - INR)_t$	-0.118^{***}	0.084
	(3.56)	(1.33)
$\Delta NR_t \times HNR_t$	0.064^{*}	0.061
	(1.64)	(1.58)
$\Delta NR_t \times P_t$	0.251^{***}	0.519^{***}
	(9.03)	(6.80)
$\Delta(NR - INR)_t \times P_t$		-0.280^{***}
		(3.78)
$\Delta NR_t \times P_t \times HNR_t$	-0.425^{***}	-0.420^{***}
	(8.82)	(8.71)
Adjusted R^2	0.0822	0.0824
Total observations	62,832	62,832
Panel B: Effect of mean change in the low and high quartiles of ΔNR ratios and $\Delta NRDIFF$ ratios on future *ROA*		
Mean value of change in future *ROA* when current $ROA_t > 0$:		
Mean change in lowest quartile of ΔNR_t and $\Delta(NR - INR)_t$ ratios.	−0.61%	−0.56%
Mean change in highest quartile of ΔNR_t and $\Delta(NR - INR)_t$ ratios.	−0.81%	−0.91%
Mean value of change in future *ROA* when current $ROA_t \leq 0$:		
Mean change in lowest quartile of ΔNR_t and $\Delta(NR - INR)_t$ ratios.	0.46%	0.46%
Mean change in highest quartile of ΔNR_t and $\Delta(NR - INR)_t$ ratios.	−0.07%	−0.10%

Panel A of this table presents regression estimates of next year's change in return on assets (*ROA*) on variables that measure annual changes in net receivable ratios (ΔNR) and variables that measure annual changes in the difference between a firm's net receivable ratio and the mean industry net receivable ratios ($\Delta(NR - INR)$) Panel B presents point estimates of next year's change in *ROA* for firms that are classified in the lowest and highest quartiles of both ΔNR and $\Delta(NR - INR)$ ratios for the current year. Firms in the highest ΔNR quartiles are classified as $HNR = 1$. The quartile groupings are further separated into different groups depending on whether current $ROA > 0$ (designated as $P = 1$) or $ROA \leq 0$ (in which case $P = 0$). These point estimates are calculated by multiplying the mean values of the ΔNR and $\Delta(NR - INR)$ groups by the applicable coefficients from the regressions and summing the products. The sample consists of 63,208 firm year observations between 1970 and 2003. Variable descriptions are described in table 1.

TABLE 6

Effect of Changes in Accounts Receivable Ratios and Bad Debt Reserve Ratios on Future Period Earning

	(1)	(2)	(3)
Panel A: Regression results			
Intercept	0.018***	0.019***	0.019***
	(18.64)	(19.09)	(19.05)
ΔROA_t	−0.224***	−0.225***	−0.226***
	(42.31)	(42.54)	(42.60)
P_t	−0.027***	−0.027***	−0.027***
	(24.56)	(24.66)	(24.60)
$\Delta ROA_t \times P_t$	0.159***	0.158***	0.159***
	(18.88)	(18.78)	(18.84)
ΔAR_t	−0.065	−0.042	−0.284***
	(3.06)	(1.13)	(4.58)
$\Delta(AR - IAR)_t$		−0.026	0.225***
		(0.81)	(3.71)
$\Delta AR_t \times HAR_t$	0.052	0.055	0.052
	(1.41)	(1.47)	(1.41)
$\Delta AR_t \times P_t$	0.223***	0.222***	0.553***
	(8.20)	(8.13)	(7.53)
$\Delta(AR - IAR)_t \times P_t$			−0.343***
			(4.83)
$\Delta AR_t \times P_t \times HAR_t$	−0.388***	−0.386***	−0.382***
	(8.36)	(8.31)	(8.82)
ΔBD_t	−0.064***	−0.403***	−0.627***
	(2.07)	(7.80)	(7.56)
$\Delta(BD - IBD)_t$		0.344***	0.570***
		(8.20)	(7.32)
$\Delta BD_t \times HBD_t$	0.148***	0.152***	0.152***
	(3.61)	(3.70)	(3.70)
$\Delta BD_t \times P_t$	0.192***	0.198***	0.507***
	(4.71)	(4.84)	(5.09)
$\Delta(BD - IBD)_t \times P_t$			−0.313***
			(3.39)
$\Delta BD_t \times P_t \times HBD_t$	−0.455***	−0.455***	−0.456***
	(7.85)	(7.84)	(7.86)
Adjusted R^2	0.0831	0.0841	0.0845
Total observations	62,832	62,832	62,832

Panel B: Effect of mean change in the low and high quartiles of ΔAR ratios, ΔBD ratios, $\Delta(AR - IAR)$ ratios, and $\Delta(BD - IBD)$ ratios on future *ROA*

Mean value of change in future *ROA* when current $ROA_t > 0$:			
Mean change in lowest quartile of ΔAR_t and $\Delta(AR - IAR)_t$ ratios and lowest quartile of ΔBD_t and $\Delta(BD - IBD)_t$ ratios	−1.01%	−1.24%	−1.19%
Mean change in lowest quartile of ΔAR_t and $\Delta(AR - IAR)_t$ ratios and highest quartile of ΔBD_t and $\Delta(BD - IBD)_t$ ratios	−1.19%	−1.33%	−1.32%
Mean change in highest quartile of ΔAR_t and $\Delta(AR - IAR)_t$ ratios and lowest quartile of ΔBD_t and $\Delta(BD - IBD)_t$ ratios	−1.05%	−1.32%	−1.32%
Mean change in highest quartile of ΔAR_t and $\Delta(AR - IAR)_t$ ratios and highest quartile of ΔBD_t and $\Delta(BD - IBD)_t$ ratios	−1.15%	−1.33%	−1.36%
Mean value of change in future *ROA* when current $ROA_t \leq 0$:			
Mean change in lowest quartile of ΔAR_t and $\Delta(AR - IAR)_t$ ratios and lowest quartile of ΔBD_t and $\Delta(BD - IBD)_t$ ratios	0.64%	0.59%	0.53%
Mean change in lowest quartile of ΔAR_t and $\Delta(AR - IAR)_t$ ratios and highest quartile of ΔBD_t and $\Delta(BD - IBD)_t$ ratios	1.00%	0.84%	0.80%
Mean change in highest quartile of ΔAR_t and $\Delta(AR - IAR)_t$ ratios and lowest quartile of ΔBD_t and $\Delta(BD - IBD)_t$ ratios	0.15%	0.08%	0.09%
Mean change in highest quartile of ΔAR_t and $\Delta(AR - IAR)_t$ ratios and highest quartile of ΔBD_t and $\Delta(BD - IBD)_t$ ratios	0.40%	0.35%	0.40%

Panel A of this table presents regression estimates of next year's change in return on assets (*ROA*) on variables that measure annual changes in total accounts receivable ratios (ΔAR), annual changes in bad debt reserve ratios (ΔBD), annual changes in the difference between a firm's accounts receivable ratio and the mean industry accounts receivable ratios ($\Delta(AR - IAR)$), and annual changes in the difference between a firm's bad debt reserve ratio and the mean industry bad debt reserve ratio ($\Delta(BD - IBD)$), Panel B presents point estimates of next year's change in *ROA* for firms that are classified in the lowest and highest quartiles of the ΔAR and $\Delta(AR - IAR)$ ratios and the ΔBD and $\Delta(BD - IBD$ ratios for the current year. Firms in the highest ΔAR quartiles are classified as $HAR = 1$ and firms in the highest ΔBD quartiles are classified as $HBD = 1$. The quartile groupings are further separated into groups depending on whether current $ROA > 0$ (designated as $P = 1$) or $ROA \leq 0$ (in which case $P = 0$). These point estimates are calculated by multiplying the mean values of the ΔAR, ΔBD, $\Delta(AR - IAR)$, and $\Delta(BD - IBD$ groups by the applicable coefficients from the regressions and summing the products. The sample consists of 63,208 firm year observations between 1970 and 2003. Variable descriptions are described in table 1.