How Does the Corporate Bond Market Value Capital Investments and Accruals?

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Abstract

This paper examines whether the mispricing of accruals documented in equity markets extends to bond markets. The paper finds that corporate bonds of firms with high operating accruals underperform corporate bonds of firms with low operating accruals. In the first year after portfolio formation, the underperformance is 115 basis points using an accrual measure that includes capital investments and 93 basis points using an accrual measure that is based only on working capital investments. The Sharpe ratios of the zero-investment bond accrual portfolios are comparable to those of the corresponding zero-investment stock accrual portfolios. The results are also robust to risk adjustments based on both a factor model consisting of the Fama and French (1993) stock and bond market factors and a characteristics model based on bond ratings and duration. Cross-sectional Fama-MacBeth regressions that use individual bond data and control for stock and bond issuances in addition to ratings and duration also confirm the time-series portfolio findings. Overall, our results reveal an accrual anomaly among bonds similar to that observed among stocks.

1. Introduction

Recent research has uncovered an "anomaly" related to operating accruals,[1] defined as the difference between earnings and cash flows (see Sloan (1996)).[2] Stocks with high operating accruals tend to underperform stocks with low operating accruals, suggesting that high (low) accrual stocks are relatively overvalued (undervalued). The most popular explanation for the accrual "anomaly" is the apparent inability of stock market participants to understand the relationship between accruals and future earnings and cash flows. Previous research has shown that firms with high current earnings accompanied by high current accruals (and therefore low current cash flows) tend to have lower future earnings and cash flows than firms with high current earnings accompanied by low current accruals. In other words, earnings accompanied by higher accruals are supposed to be of *lower* quality than that accompanied by lower accruals, where the term "quality" refers to the information about future earnings and cash flows. According to this earnings quality explanation, investors who are unable to distinguish between low quality and high quality earnings overvalue stocks with high accruals and undervalue stocks with low accruals.[3]

Earnings quality should also be of concern to corporate bond investors since debt is serviced out of cash flows rather than reported earnings. As stated in the Standard & Poor's (S&P) guide on the methodology for determining bond ratings, under the heading of cash flow adequacy:

> *"Interest or principal payments cannot be serviced out of earnings, which is just an accounting concept; payment has to be made with cash. Although there is usually a strong relationship between cash flow and profitability, many transactions and accounting entries affect one and not the other. Analysis of cash flow patterns can reveal a level of debt-servicing capability that is either stronger or weaker than might be apparent from earnings...Cash flow analysis is critical in all credit rating decisions."*

[1]Depending on how the earnings and cash flows are defined the operating accruals measure might include only working capital accruals or both working capital accruals and capital investments. We discuss this in detail in Section 2.
[2]Papers extending Sloan (1996) include Thomas and Zhang (2002), Xie (2001), Chan, Chan, Jegadeesh and Lakonishok (2006), Collins, Gong and Hribar (2003), Richardson, Sloan, Soliman, and Tuna (2005), Hirshsleifer, Hou, Teoh, and Zhang (2003), and Fairfield, Whisenant, and Yohn (2003).
[3]The earnings quality explanation is usually accompanied by an earnings management hypothesis where it is suggested that the differences in earnings quality is the result of a deliberate choice on the part of managers who use their discretion to manage earnings. However, one does not need to assume earnings management to explain the source of mispricing. Mispricing which is the result of investor unsophistication can coexist with more benign explanations for the observed differences in earnings quality.

These quotes underscore the importance of cash flows and earnings quality to corporate bond investors. Yet, existing research has focused exclusively on the stock market. In this paper, we address this gap by examining how the corporate bond market values the information in operating accruals. Focusing on the corporate bond market is also of theoretical interest since stocks and bonds are contingent claims on the same underlying cash flows and firm value (see Black and Scholes (1973) and Merton (1974)) and, therefore, one would expect common information to affect the valuation of both securities. The primary issue, however, is whether the corporate bond market prices this information more efficiently than the stock market.

In our analysis, we consider two measures of operating accruals: (a) the traditional accrual measure of Sloan (1996) which we refer to as *working capital accruals* (WCA), and (b) a new measure suggested by Richardson, Sloan, Soliman and Tuna (2005) that includes capital investments which we refer to as *net new investments* (NNI). The NNI measure is closely tied to the *reinvestment rate (or plowback rate)* defined in finance textbooks.[4] The reinvestment rate measures the funds reinvested in a firm's current and long-term operating assets as a fraction of its operating profits after taxes. The fraction of operating profits available after reinvestment represents a firm's free cash flows. Thus, the two operating accrual measures widely discussed in the accounting literature refer to a firm's current and long-term capital investments net of replacement capital investments.

Our study uses a unique database on corporate bonds from Lehman Brothers containing roughly 2,300 corporate bonds corresponding to about 540 firms each year from 1973 to 1997. To be included in any month in our sample, each firm must have at least one non-convertible bond available with three or more years to maturity and be rated by Moody's or S&P. We also use additional data filters (discussed in the data section) to eliminate bonds with any potential pricing errors. As a result of these requirements, the firms in our sample tend to be relatively larger than those in existing accrual studies (see panel C of Table 1). Therefore, our findings on the accrual effect in equities and bonds should be considered a lower bound of the full sample accrual effect. On the other hand, our results might also constitute what may be, in fact, achievable for an institutional investor net of transaction costs since institutions typically avoid smaller firms.

Our key findings are as follows. Bonds of firms with high accruals significantly underperform bonds of firms with low accruals. In the first year after the portfolio formation date, for the overall sample period of 1973 to 1997, the underperformance is a statistically significant 115 basis points using the net new investment accruals (NNI) measure and 93 basis points using the working capital accrual measure (WCA). In general, the underperformance continues up to Year 3, weakening gradually from Year 1. The Sharpe ratios corresponding to the zero-investment bond accrual portfolio (long high accrual and short low accrual) are comparable in magnitude to the Sharpe ratios corresponding to the zero-investment stock portfolio, suggesting that the results are also economically significant. The underperformance is weaker but statistically and economically significant in sub-samples (chosen to minimize concerns about illiquidity) that exclude bonds with unique features (callable, puttable, secured, annual coupons, sinking fund provisions, etc.), bonds not in the Lehman bond indices and include only the most recently issued bond as of the portfolio formation date. This suggests some of the underperformance may be driven away by transaction costs.

The underperformance is also robust to factor risk adjustments based on a 6-factor model consisting of a default factor, a term risk factor, the three Fama and French (1993) stock market factors and the return on the corresponding zero-investment stock accrual portfolio (we use this variable to control for the accrual effect in stock returns and contemporaneous correlation between stock and bond returns of the same firm) and characteristic risk adjustments based on duration and bond ratings. Cross-sectional Fama-MacBeth regressions that use individual bond data and control for stock and bond issuances in addition to ratings and duration also confirm the time-series portfolio findings. We control for equity and bond issuances to rule out the possibility that the underperformance in bond returns might be driven by any underperformance following debt and equity offerings.

Overall, our results show that the corporate bond market misprices accruals in the same manner as the stock market. Thus, not only are the stocks of firms with high accruals overvalued but also their bonds, which suggest that that the entire firm with high accruals is overvalued. In other words, the overvaluation of high accrual firms cannot be explained by wealth redistribution between equity and debt. Furthermore, the fact that the overvaluation result becomes stronger

[4] See Copeland, Koller, and Murrin (2000).

when using net new investment accruals (NNI) indicates that the stock and the bond market particularly overvalue firms with high capital expenditures.

What are the implications of our findings for the earnings quality explanation? Our results suggest that corporate bond investors are unable to distinguish between low earnings quality and high earnings quality in the same manner as stock investors. It is puzzling as to why corporate bond investors who have strong incentives to focus on cash flows and who tend to be large, sophisticated institutional investors, are deceived by differences in earnings quality in the same manner as equity investors. Perhaps the information in accruals has to do with more than just earnings quality and is related to over-optimism about the value created by current capital expenditures. This is an important avenue for future research.

Our results are also particularly interesting in light of the fact that payoffs from debt are less volatile than equity payoffs. The value of debt should be less sensitive to changes in the underlying cash flow as compared to the value of equity. Therefore, it should be more difficult to detect mispricing in the bond market compared to equity. The evidence that the accrual effect extends to bond markets is indicative of the robustness of the mispricing associated with accruals. From an investment perspective, our results suggest that there is more than one market venue for investors to exploit the accrual effect. The rest of the paper proceeds as follows. Section 2 discusses the two accrual measures used in this study and relates them to operating profits, free cash flows, and the reinvestment rate. Section 3 describes the data used in the study, Section 4 provides the empirical results and Section 5 concludes the paper.

2. Operating Profits, Free Cash Flows, Net New Investments, and Accruals

As discussed earlier, we use two measures of operating accruals. One is the original accrual measure recommended by Sloan (1996), defined as the change in non-cash working capital less depreciation, i.e., working capital accruals (WCA). The other measure is based on recent work extending the definition of accruals to include changes in non-current operating assets (Fairfield, Whisenant and Yohn (2003); Hirshleifer, Hou, Teoh and Zhang (2004); Richardson, Sloan, Soliman and Tuna (2005)).[5] These studies find that the mispricing of accruals by the stock

[5] Richardson et al. (2005), formally derive a comprehensive measure of accruals by defining it as the difference between accrual earnings and cash earnings. The basic argument is that in the absence of accrual accounting the only

market is not limited to WCA, but extends to non-current operating accruals. Non-current operating assets, which represent accruals relating to investing activities, usually involve expenditures related to purchase of property, plant and equipment, business acquisitions and development costs. Richardson et al., (2005), suggest that the ultimate cash flow stream associated with these assets is uncertain and therefore the initial recognition and reversal of these accruals are subjective. Consistent with these studies, we define our second measure of accruals to include both working capital and non-current operating assets (net new investment accruals (NNI)). These two accrual measures are closely related to the reinvestment rate defined in the finance textbooks. Below, we formally define these two measures and clarify their relationship to the reinvestment rate.

2.1 Net New Investment Accruals (NNI)

To understand the relationship between earnings, free cash flows, net new investments and accruals; let us start with the textbook definition of the free operating cash flows of the firm (FCFF) generated by the net operating assets of the firm:

$$FCFF(t) = NOPAT(t) + Dep(t) - \Delta WC(t) - CapEx(t) \tag{1}$$

NOPAT(t)	=	Net operating profits after taxes for year 't'.
Dep(t)	=	Depreciation & Amortization expenses for year 't'.
ΔWC(t)	=	Change in operating working capital for year 't'; operating current assets include receivables and inventories and exclude cash and short-term investments and operating current liabilities include accounts payable and accrued expenses and exclude notes payable and other interest-bearing current liabilities.
CapEx(t)	=	Capital expenditures and acquisitions excluding long-term investments in treasury & corporate bonds and equities of unrelated subsidiaries.

asset or liability on the balance sheet would be cash. Thus everything else on the balance sheet is accruals. This measure of accruals differs from the traditional definition in that it includes non-current assets and non-current liabilities.

Now, define gross investment (GI) as the sum of working capital and long-term operating investments:

$$GI(t) = CapEx(t) + \Delta WC(t) \qquad (2)$$

The net new investment (NI) undertaken by the firm is the gross investment *less* the replacement investment. A firm needs replacement investment to maintain the current profits and cash flows and new investments to grow. A proxy for the replacement investment is depreciation & amortization. Therefore, empirically, net new investment may be measured as follows:

$$NI(t) = \underbrace{\left[CapEx(t) + \Delta WC(t)\right]}_{\text{Gross Investment}} - \underbrace{Dep(t)}_{\text{Replacement Investment}} \qquad (3)$$

Combining equation (1) with equation (3), we can rewrite free cash flows (FCFF) as:

$$FCFF(t) = NOPAT(t) - NI(t) \qquad (4)$$

Thus, economically free cash flow is the residual cash left over from operating profits after a firm has reinvested a fraction of its profits back in the firm. Define reinvestment rate (b) as the ratio of net new investments to operating profits after taxes:

$$b(t) = \frac{NI(t)}{NOPAT(t)} \qquad (5)$$

Now, define invested capital (IC) (same as net operating assets, NOA) as the sum of net operating working capital (WC) and net fixed and long-term operating capital (FC):

$$IC(t) = WC(t) + FC(t) \qquad (6)$$

By definition, the change in invested capital equals net new investments:

$$NI(t) = IC(t) - IC(t-1) \qquad (7)$$

Multiply (b) in equation (5) by the return on invested capital ROIC(t) (defined as the ratio of NOPAT(t) to IC(t-1)) and refer to the resulting quantity as the net new investment accrual NNI(t):

$$\begin{aligned} NNI(t) &= b(t) \times ROIC(t) \\ &= \frac{NI(t)}{NOPAT(t)} \times \frac{NOPAT(t)}{IC(t-1)} \\ &= \frac{NI(t)}{IC(t-1)} \\ &= \frac{IC(t) - IC(t-1)}{IC(t-1)} \end{aligned} \tag{8}$$

Thus, the product of reinvestment rate (b) and the return on invested capital (ROIC) gives the total accrual measure suggested by Richardson, Sloan, Soliman, and Tuna (2005) which is just the growth in invested capital (IC).[6] Equation (8) shows that this measure is influenced by a firm's capital expenditure policy as well as its profitability captured by the return on capital.

2.2 Working Capital Accruals (WCA)

Now drop *CapEx* from the definition for net new investment (NI) in equation (3) and define a new quantity referred to as the net working capital investment (WCI):

$$WCI(t) = \Delta WC(t) - Dep(t) \tag{9}$$

If we divide WCI by NOPAT we get working capital reinvestment rate (bw):

$$bw(t) = \frac{WCI(t)}{NOPAT(t)} \tag{10}$$

[6] Fairfield, Whisenant, and Yohn (2003) define a similar measure except they scale the change in invested capital or net operating assets by total assets.

Now multiply (bw) by ROIC and by the ratio of last period's IC to total assets (TA) and refer to the resulting measure as the working capital accrual (WCA):

$$\begin{aligned} WCA(t) &= bw(t) \times ROIC(t) \times \frac{IC(t-1)}{TA(t-1)} \\ &= \frac{WCI(t)}{NOPAT(t)} \times \frac{NOPAT(t)}{IC(t-1)} \times \frac{IC(t-1)}{TA(t-1)} \\ &= \frac{WCI(t)}{TA(t-1)} \end{aligned} \tag{11}$$

which gives Sloan (1996)'s original accrual variable. Equation (11) provides insights as to the constituents of this variable. It is a product of the working capital reinvestment rate, return on invested capital and the ratio of invested capital (net operating assets) to total assets. Equations (8) and (11) raise the possibility that the link between accruals and future returns could be caused by overinvestment on the part of firms or overoptimism about the profitability of new investments on the part of investors, in addition to other factors. While we do not attempt to disentangle these effects in this paper, the above analysis is still useful in interpreting our findings.

Prior work studying the stock returns of firms subsequent to a debt or equity offering find that these firms tend to underperform their control groups (e.g., Loughran and Ritter (1995); Spiess and Affleck-Graves (1999)). Given that working capital and capital expenditures are funded through a combination of internal and external capital, it is likely that firms with large increases in working capital or non-current operating assets will use external equity or debt to fund these investments. It is therefore possible that the effect of accruals on future returns could be caused by the underperformance that results from external financing activities. Cohen and Lys (2006) and Dechow, Richardson and Sloan (2007) explicitly examine the link between accruals, financing activities and returns and find that the accrual effect subsumes the financing effect. We control for these effects in our empirical tests.

3. Data

3.1 Corporate Bond Data

The corporate bond data used in this study is drawn from the Lehman Brothers Fixed Income Database (LBFI), which covers the period from January 1973 to February 1997. The LBFI database contains month-end bid prices, ratings, yields, and other characteristics for thousands of publicly traded, non-convertible corporate bonds and is currently the best corporate bond database available for academic studies. In addition, actual trader quotes for round lots of at least five hundred bonds, rather than matrix prices, make up the majority of the bids. Hong and Warga (2000) find that the bid prices contained in the LBFI database correspond closely with reported transactions and are better, in that they have significantly fewer price discrepancies from transaction data than bid prices for bonds traded on the NYSE's Automated Bond System. Lehman Brothers uses the prices in the LBFI database to construct its widely followed corporate bond indices. Since Lehman Brothers also trades these indices, there are strong incentives in general for accurate prices. However, according to Hite and Warga (1997), Lehman (like other banks) was not a major player in the high-yield market before 1992, did not publish high-yield benchmark indices before 1992, and, therefore, the high-yield bonds in the Lehman database is dominated by fallen angels with fewer original issue bonds. This suggests the possibility that the prices of high-yield bonds before 1992 may not be accurate. We discuss below the various steps we have taken to address this and other potential data issues. In addition, we have also examined the robustness of all of our key findings in sub-samples chosen to minimize these concerns (see Section 4.3).

There are other potential problems with the database.[7] All bonds have missing data on August 1975 and December 1984. In addition, some bonds have data missing on other dates between the first date they appear in the database and the last. Bonds with data missing on more than four dates including August 1975 and December 1984 are eliminated from the sample. Perhaps a more severe problem is that returns are calculated from month-end bid prices of a single market maker, not transaction prices. There is the additional concern that even the prices of investment grade bonds not included in the Lehman bond indices may not be accurate.[8] We address these concerns as follows. First, we exclude non-coupon bonds and short time-to-maturity bonds

[7] For a more detailed description of the database see Hong and Warga (2000).
[8] In Section 4.3, we examine the robustness of our findings in a sub-sample that eliminates all bonds not in any Lehman bond index.

because liquidity might be low for these issues and could therefore subject them to pricing errors.[9] Second, to minimize the influence of data errors in bid prices, we use a rudimentary error filter: if a bond has returns of greater than 95% in month t followed by returns of less than -45% in month t+1 or vice-versa, we drop the firm to which that bond belongs from our analysis. In other words, if the price jumps up (down) significantly in one month and down (up) significantly next month so as to offset the previous month's gain, it is most likely an error. This filter eliminates only 24 firms from our analysis.[10]

The final but less easily addressed issue is that some bonds leave the database for unknown reasons i.e., they cannot be directly classified as matured, called, defaulted or still outstanding. This could potentially introduce a delisting bias into the results depending on what actually happened to those bonds and whether the delisting was known ex-ante. However, the percentage of firms, which delist for unknown reasons, averages less than 1% per year.

Thus, to be included in our sample in any month, each bond must be coupon bearing, have at least *three years to maturity* and satisfy the error filters discussed above. Finally, to minimize any microstructure problems in the data, we leave a one-month gap between the portfolio formation month and the first month we start computing the future returns earned by the portfolio. Both S&P and Moody rate most issues. We use the mean rating if both ratings are available, and otherwise use the rating that is available. Ratings are converted to an integer ranking ranging from 0 to 23 with 0 representing AAA+ and 23 representing CC-. Thus, higher rating numbers represent higher risk and lower quality.

The monthly corporate bond return as of time $t+1$, r_{t+1}, is computed as follows:

$$r_{t+1} = \frac{(P_{t+1} + AI_{t+1}) + C_{t+1} - (P_t + AI_t)}{P_t + AI_t} \qquad (12)$$

[9] Elton, Gruber, Agrawal, and Mann (2001) note that eliminating bonds not included in the indices eliminates all bonds with maturity less than a year. We exclude all bonds with less than three years to maturity from our analysis.
[10] We have also examined the robustness of our findings by using different filters: > 100% and < -50%, > 90% and < -40% and the results do not appreciably change.

where P_t is the *quoted price* at time *t*, AI_t is *accrued interest* which is the coupon payment scaled by the ratio of days since the last payment date to the days between last payment and next payment, and C_{t+1} is the semi-annual coupon payment (if any) at time *t+1*. Note that the sum of quoted price and the accrued interest give the *cash price* of the bond. As long as P_t or P_{t+1} are not missing, we can compute a return for month t+1. Since accruals are a firm level concept and a firm could have more than one bond, we calculate the value-weighted bond returns (using the outstanding amount of each series of bonds) for each firm. By value-weighting the monthly returns of all eligible bonds of a firm by the total market value of each bond, biases due to bad prices of particular bonds should be significantly reduced.[11]

3.2 Net New Investment Accruals (NNI)

Net new investment accrual (NNI) is measured as the growth in invested capital (net operating assets) as defined in equation (8). Following Richardson et al (2005), invested capital is computed from the balance sheet as follows:

Invested Capital	=	Operating Assets – Operating Liabilities
Operating Assets	=	Total Assets (6) – Cash & short-term investments (1)
Operating Liabilities	=	Total Assets (6) – Total Debt (9 & 34) – Book Value Common and Preferred stock (60 & 130) – Minority Interest (38)

The numbers in parentheses are annual COMPUSTAT item numbers.

3.3 Working Capital Accruals (WCA)

Working capital accruals (WCA) are computed using the Quarterly and Annual COMPUSTAT Primary, Supplementary and Tertiary and Research Files. We estimate quarterly WCA using the cash flow method as the difference between earnings and cash flow from operations:

WCA	=	(Earnings from continuing operations (76) – Cash flow from continuing operations (108 less 78))/Total Assets

[11] As discussed later, analysis using the most recently issued bond yielded similar results.

The numbers in parentheses are quarterly COMPUSTAT item numbers. Trailing-four-quarter (TFQ) accruals are calculated every month as the sum of the accruals over the last four quarters scaled by total assets at the beginning of the first quarter.[12] For observations that have missing accruals data when using the quarterly cash flow method, we resort to the quarterly balance sheet approach where WCA = [(Change in current assets – Change in cash) – (Change in current liabilities – Change in debt included in current liabilities) – Depreciation & Amortization]/Total Assets.

In the event quarterly accruals are unavailable, we substitute TFQ accruals with fiscal year accruals using annual data. In using annual data, we follow the same procedure wherein we first attempt to determine accruals using cash flow information and if these are not available, we turn to balance sheet data. To ensure that the accrual information is available publicly as of the portfolio formation date, we allow for one month between the portfolio formation date and the date on which the TFQ is calculated. If the last quarter in the TFQ calculation is the 4th quarter or if annual data is used, we allow for a 4 month gap since it takes longer for 4th quarter results to be released.

Panel A of Table 1 provides statistics on the sample of firms that have both corporate bond data and data on NIA or WCA available and that satisfy all of our selection criteria. The number of firms varies from 195 in 1973 to 824 in 1996. The number of corporate bonds in the sample varies from 327 in 1973 to 3,108 in 1993. Panel B provides average return earned by bonds rated AAA/AA, A, BBB, below BBB and an equal-weighted portfolio of all corporate bonds. Panel B also provides the average return on long-term government bonds and default and term factors. The default factor is defined as the difference in returns earned by an equal-weighted portfolio of all corporate bonds with at least ten years to maturity and long-term government bonds. The ex-post default risk premium is 5 basis points a month. The term factor is defined as the difference between long-term government bond returns and one-month T-bill returns. The ex-post term risk premium is 18 basis points a month.

The firms in the corporate bond sample that we use in this paper represent the larger firms in the U.S. stock market. This is the result of the fact that generally only large firms issue public debt

[12] In calculating each quarter's numbers, we adjust for the cumulative reporting of quarterly data by Compustat.

that are rated by rating agencies and the various other filters (discussed earlier) we impose on the data to minimize concerns about illiquidity and data errors. Panel C of Table 1 provides mean and median equity market capitalization ranks for the overall corporate bond sample and two sub-samples requiring the availability of the accrual data and membership in Lehman indices. The numbers provided in the table are time-series averages of cross-sectional statistics. The median size rank for the overall sample is 8. The median rank remains 8 for the sub-sample requiring availability of accrual data. The median rank rises to 9 for a sub-sample requiring Lehman membership. These numbers suggest that the corporate bond sample used in this paper represents the largest firms in the U.S. stock market. Thus, any mispricing related to accruals observed in this sample should represent a lower bound of that observed in a larger sample. In addition, it should be noted that any robustness test performed in the paper to minimize concerns about illiquidity involves even larger firms in this already large firm sample.

4. Returns earned by accrual portfolios

4.1 Stock Returns

The accrual strategies are implemented as follows. At the beginning of each month from January 1973 to February 1997, we form quintile portfolios of all available firms based on their NNI or WCA accrual measures. *P1* is the *low accrual* portfolio consisting of firms with the lowest accruals, *P5* is the *high accrual* portfolio consisting of firms with the highest accruals and *P3* is the portfolio with average accruals. We compute returns (in percent) earned by these portfolios over the next four quarters and the subsequent two years. *K=1, 2, 3, or 4* refers to quarters one through four. Since the strategy uses overlapping monthly observations, the holding period returns are autocorrelated up to the degree of the overlap. The quarterly returns are autocorrelated up to two lags and the annual returns up to eleven lags. Therefore, the asymptotic Z-statistics (reported in parentheses) are computed using the Hansen and Hodrick (1980) and Newey and West (1987) (henceforth simply Hansen-Hodrick-Newey-West) autocorrelation correction with the appropriate lags.

Table 2 reports the returns earned by the stocks of the firms in the various accrual portfolios. Computing the stock returns allows us (a) to examine how the results involving our restricted sample of firms compare to those reported in earlier studies and (b) to provide a benchmark to compare the profitability of strategies involving corporate bonds. Panel A presents results based on net new investment accruals (NNI) and Panel B presents results based on working capital accruals (WCA). The results show that the NNI measure performs better than the WCA measure although both measures generate a statistically and economically significant accrual effect in stock returns. The results show that stocks of the high NNI portfolio underperform stocks of the low NNI portfolio by 6.64% during the first year (Year 1) after portfolio formation. The underperformance continues in Year 2 where it is a significant 3.27%. In comparison, stocks of the high WCA portfolio underperform stocks of the low WCA portfolio by a statistically significant 3.64% during the first year after the portfolio formation date. The results also show that during the first year the underperformance is the strongest in the first quarter after the portfolio formation date and weaker in subsequent quarters.

The magnitude of the zero-investment profits based on working capital accruals (WCA) is about $1/3^{rd}$ of the findings reported in Sloan (1996) which is based on a larger sample of firms and is similar to the profits in Collins, Gong and Hribar (2003) who limit their sample to firms with high institutional ownership. This is not unexpected since our sample consists of firms with publicly traded bonds that are followed by rating agencies and are therefore likely to be larger in size, more liquid, and widely followed.

The last row of Panels A and B of Table 2 provide the (absolute) Sharpe ratios of these strategies to give a sense of the risk-return tradeoff involved in these strategies. The Sharpe ratio corresponding to the profits of the zero-investment strategy (P5-P1) in Year 1 (based on non-overlapping calendar year returns) is 0.71 for strategies based on NNI and 0.41 for strategies based on WCA.[13] We will use these Sharpe ratios as benchmarks to evaluate the economic significance of the profitability of strategies involving corporate bond returns.

4.2 Corporate Bond Returns

Table 3 provides the key findings of our paper on the relationship between operating accruals and corporate bond returns. Panel A provides the returns earned by the net new investment accrual (NNI) portfolios and Panel B provides the returns earned by the working capital accrual (WCA) portfolios. The results reveal a significant accrual effect in corporate bond returns. The

[13] The Sharpe ratio is the ratio of the average excess return divided by the standard deviation of excess return.

results show that, in Year 1, the bonds of the high NNI portfolio underperform the bonds of low NNI portfolio by 115 basis points (Panel A) while the bonds of the high WCA portfolio underperform the bonds of the low WCA portfolio by 93 basis (Panel B). There is significant underperformance in Year 2 also with 65 basis points underperformance for the NNI strategy and 100 basis points (which is higher than the first year underperformance) for the WCA strategy. The higher second year underperformance using WCA is surprising given that the WCA effect in equities seems to disappear after one year. The cumulative underperformance over the first two years is about 200 basis points for both the NNI and the WCA portfolios. Intra-year in Year 1, the underperformance is spread over all four quarters with the underperformance ranging from 13 to 37 basis points per quarter for the NNI strategy and 13 to 24 basis points for the WCA strategy.[14]

Is underperformance in the range of 93 to 115 basis points economically significant, especially when compared to numbers in the range of 3.64% to 6.64% for stocks? In answering this question, it is important to note that while bonds earn lower returns than stocks, they are also less volatile. Therefore, we use Sharpe ratios to compare profitability across asset classes. The (absolute) Sharpe ratios corresponding to the P5-P1 bond portfolio in Year 1 (based on non-overlapping calendar year returns) for the NNI strategy and the WCA strategy are 0.65 and 0.49, respectively. This is comparable to the range of 0.41 to 0.71 obtained for the stock portfolios in Table 2 and suggests that the accrual effect in corporate bonds is economically significant.

The economic significance of the results in Table 3 is also related to the issue of liquidity and trading costs in corporate bonds. Hong and Warga (2000) use transactions data and estimate the spreads on investment grade bonds to be around 13 basis points for a one way transaction or 26 basis points for a round trip transaction. Since the zero-investment bond portfolio returns are in the range of 93 to 115 basis points, on paper, the strategies appear to be profitable even after taking into account transaction costs. However, there are two issues that might lead to higher transaction costs. First, our sample also includes non-investment grade bonds, which are likely to be less liquid than investment grade bonds. Second, the bonds in the extreme accrual portfolios,

[14] All of the portfolio analysis is done using equal-weighted returns. However, we tested the robustness of our results using value-weighted portfolios. The results (untabulated) though slightly weaker continue to be economically and statistically significant. This is consistent with our sample consisting mainly of large firms.

which represent the most mispriced bonds, could be less liquid than bonds in the intermediate portfolios. As a result, the realizable profits could be a lot less than the paper profits.

Overall, the underperformance of the corporate bonds of the high accrual portfolio suggests that these bonds were overvalued as of the portfolio formation date. On the flip side, corporate bonds of low accrual portfolios trade at a relative discount.

4.3 Robustness Tests

There are several concerns about the robustness of the findings in Table 3. First, our analysis includes high yield, (non-investment grade) bonds but Lehman (like other major banks) did not publish high-yield benchmark indices before 1992. As we discussed in the data section, bonds not on a Lehman index might contain more data errors. To address this concern, we excluded non-coupon bonds and bonds with maturities less than three years from our sample. These steps, however, may not be sufficient for non-investment grade bonds. Second, even investment grade bonds not in any Lehman index may contain data errors. Third, our analysis also includes bonds with special features such as callability, puttability, sinking fund provisions etc. Accounting information may be less important in the pricing of bonds with option features, these bonds may be less liquid, and their risk benchmarks may be misspecified, all of which could lead to mispricing. It would be of interest to know whether the results in Table 3 would hold even after we eliminate these bonds. Finally, value-weighting individual bond returns may not completely eliminate data errors associated with individual bonds.

To address these concerns, we construct a sub-sample of bonds that excludes all bonds not in a Lehman index as of the portfolio formation date, and those with “unique” features (see Duffee (1999) and Elton, Gruber, Agrawal, and Mann (2001)); i.e., it includes only noncallable, nonputtable, senior unsecured straight bonds with semiannual coupons with no variation in promised coupon payments over time, no sinking fund provisions, original maturities of less than 35 years and remaining maturity of at-least one year. This filter eliminates more than half of our sample, leaving fewer than ten firms per portfolio prior to 1987. Therefore, we eliminate the pre-1987 data and focus on the 1987 to 1997 time period. Because we eliminate all bonds not in the Lehman index at any given time, this sample contains only investment grade bonds in the Lehman index, does not contain any non-investment grade bonds prior to 1992, and contains only those non-investment grade bonds in the Lehman index after 1992. We also close our position on any bond that drops off the Lehman Index. In addition, in computing the bond returns of each firm, because a recently issued bond is likely to be more actively traded than a seasoned bond (see Gebhardt, Hvidkjaer, and Swaminathan (2005) and Duffee (1999)), we use the return on the most recently issued bond instead of the value-weighted return of all eligible bonds of a firm. This should further minimize concerns about data errors affecting the calculation of bond returns.

We implement the bond accrual strategies using this sub-sample and the results are presented in Table 4. First, notice that the average number of firms per portfolio falls from about 80 to 85 firms in Table 3 to approximately 30 firms in Table 4. This is likely to reduce the power of these tests to find abnormal performance. Nevertheless, the results in Table 4 show that the high accrual portfolio (P5) significantly underperforms the low accrual portfolio (P1) in Year 1. The underperformance in the first year is 88 basis points in the case of the NNI strategy (Panel A) and 142 basis points over the first two years in the case of the WCA strategy (Panel B). This is lower than the roughly 200-basis-point underperformance in Table 3 but nevertheless economically significant.

Table 4 also provides results for the sample period between 1992 and 1997 (excluding bonds with unique features), which is the portion of our sample during which Lehman published high-yield indices. There are only 60 monthly observations with about 40 firms per portfolio in this sub-sample, which renders the findings vulnerable to sampling error and makes it difficult to draw strong conclusions. In spite of these limitations, the results continue to show that high accrual bonds underperform low accrual bonds. The underperformance in the case of the NNI strategy is a significant 90 basis points in the first two years while the underperformance in the case of the WCA strategy is 92 basis points in the first two years.

A concern with the additional data filters is the potential for loss of power due to the reduced sample size. As we noted in Section 3 (Panel C of Table 1), the median size rank of this sub-sample is 9, which shows that this sub-sample consists of the largest of the large firms in our original sample. Thus, it is possible that the additional filters are not only eliminating firms with data errors but those with the most mispricing. To examine this possibility, we report results of the equity accrual strategies involving the same sub-sample in panels C and D of Table 4. The results show essentially that the equity accrual anomaly is economically smaller (compared to the numbers in Table 2) and in most cases statistically insignificant in this sub-sample. This is not surprising because these are really large firms where there is likely to be very little mispricing of any kind and also because the smaller sample reduces the power to detect any mispricing. This suggests that at least some if not all of the weakening of the bond accrual effect is driven by dropping firms that are more likely to be mispriced and not because of the reduction in data errors. In subsequent tests, we focus on the larger sample from Table 3.

4.4 Ratings and Duration Adjusted Corporate Bond Returns

The results presented in Table 3 are based on raw bond returns without any adjustments for risk. Could the accrual effect in bonds be explained by differences in systematic risk? For corporate bonds, the relevant risks are default and term risks. Could the low bond returns of the high accrual portfolio be explained by lower exposures to default and term risk? To address this issue we compute risk-adjusted bond returns of the accrual portfolios. Specifically, we match every bond in each accrual portfolio with a benchmark portfolio with roughly the same bond rating and duration. To form the benchmark portfolios, we independently sort all bonds available at the beginning of any given month into three rating categories – AAA/AA, A, BBB and below – and three duration categories (by partitioning the sample into three groups based on duration). The risk-adjusted bond return is then computed as the difference between the raw bond return and the return on the corresponding benchmark portfolio. These adjusted bond returns are then value-weighted (using the market value of each bond) for each firm. The adjusted firm level bond returns are then equal-weighted to compute portfolio returns over the holding period.

Table 5 presents these results. Panel A presents risk-adjusted bond returns for strategies based on net new investment accruals, NNI, and Panel B reports results for strategies based on working capital accruals, WCA. The returns in Table 5 are smaller in magnitude than those in Table 3, suggesting that some of the returns earned by the accrual portfolios can be attributed to differences in default and term risks. However, the risk-adjusted returns are still quite large and both economically and statistically significant. The results show that the high NNI portfolio (P5) underperforms the low NNI portfolio (P1) on a risk-adjusted basis by 102 basis points in Year 1 (Panel A) while the high WCA portfolio (P5) underperforms the low WCA portfolio (P1) by 77 basis points in Year 1 (Panel B). Both these numbers are significant at the 1% level. The results confirm the findings in Table 3 and suggest that differences in default and term risk cannot fully explain the accrual effect in bond returns.

We also carried out a ratings and duration adjusted returns analysis for the post 1987 and 1992 filtered samples discussed in Table 4. The results for NNI are similar to those in the previous tables. The hedge returns for the first year subsequent to portfolio formation are 35 and 37 basis points for the two periods respectively. Both are statistically significant with t-statistics of 2.16 and 2.36 respectively. The hedge returns using WCA are weaker than the raw return results. The hedge returns for the first period subsequent to portfolio formation are not statistically significant, but become significant in the second year subsequent to portfolio formation with returns of 49 basis points (t-stat=4.06) and 32 basis points (t-stat=2.85) for the two subperiod samples. This could be attributable to the shorter sample periods and much smaller sample size thereby reducing the power of the tests (there are only about 150 firms each year in the filtered sample as opposed to over 400 firms each year in the entire sample)

4.5 Factor Risk Adjusted Corporate Bond Returns

The risk adjustments in Table 5 use characteristic matched portfolios to adjust for the default and term risk of the accrual bond portfolios. The returns reported were buy-and-hold abnormal returns (BHAR) computed in event time. In this section, we perform risk adjustments using a multi-factor model (consisting of default and term factors) that uses monthly calendar time excess returns.[15] The calendar time approach provides test statistics that are better specified than those provided by the BHAR approach (see Fama (1998)). On the other hand, calendar time statistics may have lower power to reject the null (see Loughran and Ritter (2000)). Regardless of the relative merits and demerits of the two approaches, empirically, our objective is to ensure that our results are robust to alternate approaches to adjusting for risk.

Following Fama and French (1993), we consider a five-factor model involving 2 bond market factors and 3 stock market factors for corporate bonds. One source of common factor risk for corporate bonds is term risk, which arises from unexpected changes in the term structure of

[15] Gebhardt, Hvidkjaer and Swaminathan (2005) find that default and term betas estimated from factor models explain the cross-section of corporate bond returns better than characteristics such as ratings and duration.

interest rates. The other source of common factor risk is the unexpected change in default risk in response to changing economic conditions. We use *TERM*, defined as the difference in the monthly long-term government bond return (from Center for Research in Security Prices, CRSP) and one month T-bill returns (from CRSP), as a proxy for term risk, and *DEF*, defined as the difference between the monthly return on a value-weighted portfolio of all corporate bonds with *at least ten years to maturity* and the monthly long-term government bond return, as a proxy for default risk.

In addition, we also include three stock market factors: *Mkt* (excess return on the NYSE/AMEX/Nasdaq value-weighted index), *SMB* the size factor and *HML* the book-to-market factor. While there are no *a priori* theoretical reasons for including these stock market factors, we include them to ensure that our results are not driven by omitted risk factors. All our results are robust to a model that contains only the default and term risk factors. Finally, we consider a sixth factor, which is the contemporaneous monthly excess stock return earned by the high accrual (NNI or WCA) portfolio over the low accrual portfolio, ($r_{e5t} - r_{e1t}$). Since bond and stock returns are positively correlated at the firm level, one concern about finding an accrual effect in bond returns is whether it is simply a restatement of the accrual effect in stock returns. In other words, there may be a mechanically induced accrual effect in bond returns due to positive contemporaneous correlation between stock and bond returns of the same firm. We address this concern by adding ($r_{e5t} - r_{e1t}$) as an additional factor.[16] The resulting 6-factor model is provided below:

$$r_{bt} - r_{ft} = a + b\,Mkt_t + c\,SMB_t + d\,HML_t + e\,Def_t + f\,Term_t + g\,(r_{5et} - r_{1et}) + u_t \qquad (13)$$

where r_{bt}-r_{ft} represents excess returns on corporate bond portfolios based on accruals, and the slope coefficients represent the ex-post factor loadings or betas. *a* is the intercept which represents the risk-adjusted abnormal returns or the *alpha* of the portfolio.

Table 6 presents monthly risk-adjusted returns where the portfolios are formed at the beginning of each month 't' and the portfolio return computed for the month 't+1' (recall that we skip a

[16] We have also estimated regressions in which we use the excess stock return of the P1, P3, or P5 portfolios as the 6th factor in regressions involving the bond returns of the corresponding portfolios and the results are similar.

month in between to minimize microstructure effects). Panel A presents results for strategies based on NNI and Panel B for strategies based on WCA. The results show that the high NNI portfolio (P5) significantly underperforms the low NNI portfolio (P1) by 8 basis points per month (96 basis points annualized) on a risk-adjusted basis (see column titled *Intpt).* Panel B reports similar results for accrual strategies based on WCA. The intercept corresponding to the P5-P1 portfolio is equal to 6 basis points a month (72 basis points annualized), which is similar to the results in Panel B of Table 3 but not statistically significant. Overall, the results confirm the findings in Table 3.

The results also show that the differences in default and term betas between the low accrual portfolio (P1) and the high accrual portfolio (P5) are quite small, suggesting that the default and term risks faced by the two portfolios are quite similar. The betas corresponding to the stock market factors for portfolios P1, P3, and P5 are low and economically insignificant though some of them are more than two standard errors away from zero, primarily because these regressions have high R-squares due to the high explanatory power of the two bond market factors. Finally, the results seem to suggest that there is no relationship between the stock return and the bond return of the P5-P1 accrual portfolio. This is misleading since this is a conditional result obtained after controlling for various risk factors. Univariate regressions involving just the bond return and the stock return (not reported in a table) reveal a stronger relationship. We examine this issue in more detail in Section 4.7 using individual bond returns.

4.6 Fama-MacBeth Cross-Sectional Regressions

In this section, we run cross-sectional regressions that utilize bond returns of individual firms and allow us to control for individual firm characteristics. Specifically, we estimate the following multivariate regression involving accrual ranks, duration, ratings, and a dummy for equity or debt offerings:

$$r_{i,t+k} = a + b\,Rnk_{i,t} + c\,Ratings_{i,t} + d\,Duration_{i,t} + e\,Issue_{i,t} + u_{i,t+k} \qquad (14)$$

where $r_{i,t+k}$ represents corporate bond returns over the subsequent k years and $Rnk_{i,t}$ represents accrual ranks (Rnk = NNIRnk, WCARnk). The ranks based on NNI or WCA are computed each month by forming 10 portfolios based on the corresponding accruals and then assigning the portfolio rank of 1 for firms in the low accrual portfolio and 10 for firms in the high accrual portfolio.[17] Using ranks is a way to mitigate any noise in the accrual data due to the presence of outliers. Note that we convert letter ratings to an integer ranking ranging from 0 to 23 with 0 representing AAA and 23 representing CC-. Thus, higher ratings numbers represent higher risk and lower quality. Duration is in number of years. Both the ratings and the duration are computed at the firm level by averaging the corresponding values for all eligible bonds of the firm. *Issue* is a dummy variable equal to 1 if the firm issued debt or equity in the previous 12 months and 0 otherwise.[18] As discussed in Section 2, the issue dummy controls for any underperformance in bond returns following equity or debt offerings. The regression is estimated each month and the time-series average of monthly slope coefficients and the corresponding time-series t-statistics are reported. Since future returns are computed over overlapping 12 month holding periods, the t-statistics are computed using the Hansen-Hodrick autocorrelation correction with 11 lags.

The results from the cross-sectional regressions are provided in Table 7. Panel A presents results involving NNI ranks (NNIRnk) and Panel B presents results involving WCA ranks (WCARnk). The results show that accruals are significantly and negatively related to future bond returns even after controlling for ratings, duration, and debt or equity offerings at the individual bond level. Both NNIRnk and WCARnk are significantly and negatively related to bond returns over the next two years. Interestingly, the issue dummy is also negatively related to long-term corporate bond returns, suggesting that there is some underperformance in bond returns following offerings to raise external capital. As expected, both ratings and duration are positively related to future bond returns, implying that bonds with high default and term risk earn high returns. Overall, the findings in Tables 5, 6, and 7 indicate that standard risk adjustments cannot fully explain the negative cross-sectional relationship between accruals and corporate bond returns.

4.7 Sub-Period Analysis

The earnings quality argument would suggest that the accrual effect would be stronger in periods where credit risk is higher. In this section we examine whether the return predictive ability of accruals varies in periods of high aggregate defaults. Data on historical default rates from

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[17] Partitioning the firms into 25 portfolios yielded similar results.
[18] We obtain data on equity and debt offerings from the Securities Data Corporation (SDC).

Moody's Investors Service, shows that default rates trended upwards in the 1980s but were at their highest level between 1989 and 1993. We partition our sample into two groups, one including the high default period and the other encompassing all other periods. The results are provided in Table 8. Given that one of the sub-samples covers four years we limit our analysis to examining one-year ahead returns. The results are consistent with the prior that the accrual effect is greater in periods of unusually high default risk. The hedge returns using NNI during the high default period 125 basis points compared with an average of 114 basis points during all other periods. The differences are sharper using WCA with hedge returns of 113 basis points during the high default period and 88 basis points in all other periods.

5. Conclusions

In this paper, we find that bonds of high accrual firms underperform bonds of low accrual firms in the first year after portfolio formation. The underperformance varies between 93 to 115 basis points, depending on whether we use net new investment accruals, NNI, or working capital accruals, WCA. Our results are robust to various factor and characteristics risk adjustments. These results parallel the findings on the relationship between accruals and stock returns and suggest that firms with high (low) accruals are overvalued (undervalued). In other words, the overvaluation (undervaluation) is not just limited to the equity of the firms but also extends to the risky debt of the firm, which suggests that, the bond market misprices information about earnings quality in a manner similar to the stock market.

Our results leave unresolved the issue of the nature of information in operating accruals that is being mispriced by both the stock and corporate bond markets. Perhaps the information in operating accruals has to do with more than just earnings quality. Since accruals are closely tied to reinvestment as shown in Section 2, perhaps accruals also provide information about overinvestment. This is an important avenue for future research. From an investment perspective, our results suggest that there is more than one market venue for investors to exploit the accrual effect. However, since our results are based on historical analysis, there is no assurance that these predictability patterns will repeat themselves in the future.

In addition, credit markets have undergone significant changes during the time period analyzed in this paper. One of the major shifts has been the rapid growth of the swap market (in particular credit default swaps, CDS). The CDS market has grown from roughly 180 billion dollars in 1997 (according to estimates from the British Bankers Association) to roughly 20 trillion dollars in 2006 (according to the Bank for International settlements)[19]. Prior to the development of the CDS market, bond managers (most of whose performance was evaluated against a bond index) could only underweight the bonds with lower expected returns because shorting bonds was difficult. With the development of the CDS market, managers can be more effective by actively shorting the bonds rather than passively avoid investing in them. This suggests that in more recent years, the returns on the short side of the bond accruals strategy could be less than documented in this paper. However, the CDS market allows for easier access to credit risk and more liquidity than can be provided by the cash market for the underlying bonds. This could result in greater mispricing by allowing for more noise traders to participate in the market. Similarly, transaction costs and other arbitrage constraints are also likely to play a significant role in the implementation of these strategies, which implies that the profits realizable in practice may be significantly lower than the profits reported in the paper.

[19] http://db.riskwaters.com/public/showPage.html?page=11379 and http://www.fenews.com/fen54/euro_angles/euro_angles.html

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Table 1

Summary Statistics on Corporate Bonds

The following table gives summary statistics for the sample of firms used in this study. To be included in any month, each firm must have at least one non-convertible bond with three or more years to maturity and be rated by Moody's or S&P. All data on individual corporate bonds, including bid prices, coupon, maturity, and call provisions are from the Lehman Brothers Fixed Income Database. Portfolio returns for bonds are equal-weighted by firm. If a firm has more than one bond outstanding, the returns for all bonds for that firm are value-weighted to form a composite bond return. In addition, each firm should have data available in Compustat, as discussed in the text, to compute net new investments (NNI) or working capital accruals (WCA). NNI is defined as the growth in net operating assets and WCA is defined as the ratio of change in net operating working capital less depreciation and amortization to total assets. In Panel A, the total number of bonds and the number of individual firms are shown by year. Firms are also divided into four bond rating categories AAA/AA, A, BBB and below BBB. Panel B summarizes the monthly returns of the four bond portfolios formed by bond rating along with the bond returns of the portfolio consisting of all firms in the sample and the default and term factor spread. The default factor (DEF) is defined as the difference between the return on a portfolio of bonds with at least 10 years to maturity and the return on the long-term government bond series from CRSP. The term factor (TERM) is the difference between long-term government bond return and the one-month T-Bill return. The factors are constructed using all available bond data including even firms for which the accrual data is not available. For each portfolio, the standard deviation and average firm-level autocorrelations for lag1 and lag 3 are also provided. Panel C provides time-series average of cross-sectional mean, median, and standard deviation of equity market capitalization (size) ranks based on NYSE cutoffs for the overall corporate bond sample and various sub-samples

Panel A - Year by Year Statistics

	All		AAA/AA		A		BBB		<BBB	
Year	Nfirms	Nbonds	Nfirms	Nbonds	Nfirms	Nbonds	Nfirms	Nbonds	Nfirms	Nbonds
1973	195	327	61	135	89	131	32	37	22	24
1974	202	362	72	160	94	148	28	32	19	22
1975	352	1722	137	785	168	671	50	216	26	50
1976	428	2016	147	890	218	794	68	269	36	63
1977	452	2146	156	975	221	793	79	304	43	74
1978	479	2209	156	974	224	844	84	299	63	92
1979	490	2278	159	1007	228	872	81	295	72	104
1980	502	2316	158	985	239	899	84	324	76	108
1981	498	2345	154	954	226	941	79	345	62	105
1982	489	2329	161	961	202	889	84	321	65	158
1983	495	2363	166	1062	184	813	91	307	80	181
1984	484	2279	153	968	177	793	91	333	77	185
1985	515	2401	170	1088	185	827	80	309	109	177
1986	560	2656	173	1155	203	927	81	366	133	208
1987	575	2617	165	1110	184	866	92	396	159	245
1988	569	2571	168	1094	189	825	91	422	152	230
1989	596	2715	167	1170	196	861	109	456	156	228
1990	585	2645	164	1071	190	930	103	416	157	228
1991	594	2766	173	1001	211	1156	109	373	161	236
1992	658	3051	152	925	211	1308	131	429	212	389
1993	712	3108	136	848	217	1247	153	558	241	455
1994	710	2536	123	642	218	1001	152	476	236	417
1995	771	2553	135	666	225	975	169	457	271	455
1996	824	2641	134	735	228	886	181	502	305	518
1997	786	2403	124	662	224	835	174	460	284	446

Panel B: Summary Statistics on Monthly Returns and Factors

			AutoCorrelation	
Variable	Mean	Std.	Lag1	Lag3
LT Gov.bonds	0.76%	3.16%	0.09	-0.13
AAA/AA	0.77%	2.51%	0.14	0.18
A	0.79%	2.37%	0.13	0.20
BBB	0.84%	2.43%	0.12	0.22
<BBB	1.04%	2.57%	0.22	0.10
All Bonds	0.84%	2.29%	0.12	0.21
Def	0.05%	1.31%	-0.14	0.05
Term	0.18%	3.16%	0.10	-0.12

Panel C: Firm market capitalization (size) ranks

Sample	Mean	Median	Stdev
Overall corporate bond sample	7.45	8	2.39
Bond sample limited to availability of accruals	7.49	8	2.36
Bond sample limited to membership in Lehman indices and availability of accruals	8.06	9	1.95

Table 2
Operating Accruals and Stock Returns

This table summarizes results from investment and accrual portfolio strategies using stock returns from January 1973 to February 1997. To be included in the sample, each firm must have at least one non-convertible bond with three or more years to maturity and be rated by Moody's or S&P. In addition, each firm should have data available in Compustat, as discussed in the text, to compute *net new investment accruals* (NNI) and *working capital accruals* (WCA). NNI is defined as the growth in net operating assets and WCA is defined as the ratio of change in net operating working capital less depreciation and amortization to total assets. To compute NNI we use fiscal year data and to compute WCA we first use trailing four quarter data and if quarterly data is unavailable use fiscal year data. For trailing four quarters ending in the first three quarter a one month lag is provided between the end of the quarter and the portfolio formation date. For the fourth quarter and annual data a 4 month lag is provided. This is to ensure that all accounting information is available to investors as of the portfolio formation date. Stock returns are from CRSP. Stocks are matched with corresponding corporate bonds by CUSIP. Portfolio stock returns are equal-weighted by firm. Each month from January 1973 all available firms are sorted based on NNI or WCA and divided into 5 equal weighted portfolios. P1 represents portfolio consisting of firms with the lowest NNI or WCA and P5 represents the portfolio consisting of firms with the highest NNI or WCA. The returns from these portfolios over the next four quarters and next three years are presented below. Qtr = 1, 2, 3, and 4 are the next four quarter returns. The numbers in parentheses are Newey-West & Hansen-Hodrick auto-correlation corrected t-statistics. The number of lags used in the autocorrelation correction is 2 for quarterly returns and 11 for annual returns. *Sharpe Ratio* is the ratio of annual stock return of the (P5-P1) portfolio divided by the annual standard deviation of the stock return of the (P5-P1) portfolio computed using non-overlapping calendar year observations.

Panel A: Net New Investment Accruals (NNI)

Portfolio	NNI	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-32.87	3.38	3.48	3.45	3.68	20.56	19.85	18.50
		(5.39)	(5.64)	(5.59)	(7.24)	(7.94)	(8.71)	(7.67)
P3	5.93	2.64	2.77	2.71	2.96	16.63	17.99	16.79
		(5.41)	(5.61)	(5.40)	(5.50)	(6.53)	(7.64)	(7.93)
P5	117.53	2.36	2.56	2.70	3.09	13.92	16.58	17.22
		(3.27)	(3.45)	(3.48)	(3.85)	(4.55)	(5.48)	(6.32)
P5-P1		-1.02	-0.92	-0.75	-0.59	-6.64	-3.27	-1.28
		(-3.55)	(-3.00)	(-2.16)	(-1.43)	(-4.51)	(-2.16)	(-0.95)
Absolute Sharpe Ratio						0.71	0.33	0.14

Panel B: Net Working Capital Accruals (WCA)

Portfolio	WCA	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-13.39	3.22	3.20	3.03	2.11	17.87	16.84	17.22
		(5.04)	(5.03)	(4.82)	(5.04)	(6.38)	(6.82)	(7.30)
P3	-3.96	3.13	3.31	3.27	2.35	17.92	19.19	17.48
		(5.99)	(6.56)	(6.42)	(7.02)	(8.11)	(9.47)	(8.57)
P5	5.27	2.48	2.75	2.80	2.09	14.23	17.44	17.94
		(3.27)	(3.62)	(3.73)	(4.46)	(4.70)	(6.34)	(6.82)
P5-P1		-0.73	-0.45	-0.23	-0.01	-3.64	0.60	0.72
		(-2.39)	(-1.54)	(-0.81)	(-0.07)	(-2.71)	(0.58)	(0.61)
Absolute Sharpe Ratio						0.41	0.08	0.08

Table 3

Operating Accruals and Corporate Bond Returns

This table summarizes results from investment and accrual portfolio strategies using bond returns for the sample period from January 1973 to February 1997. To be included in a portfolio each month, each firm must have at least one non-convertible bond with three or more years to maturity and be rated by Moody's or S&P (see also the filters discussed in the text). In addition, each firm should have data available in Compustat, as discussed in the text, to compute *net new investment accruals* (NNI) and *working capital accruals* (WCA). NNI is defined as the growth in net operating assets and WCA is defined as the ratio of change in net operating working capital less depreciation and amortization to total assets. To compute NNI we use fiscal year data and to compute WCA we first use trailing four quarter data and if quarterly data is unavailable use fiscal year data. For trailing four quarters ending in the first three quarter a one month lag is provided between the end of the quarter and the portfolio formation date. For the fourth quarter and annual data a 4 month lag is provided. This is to ensure that all accounting information is available to investors as of the portfolio formation date. All data on individual corporate bonds, including bid prices, coupon, maturity, and call provisions are from the Lehman Brothers Fixed Income Database. Portfolio returns for bonds are equal-weighted by firm. If a firm has more than one bond outstanding, the returns for all bonds for that firm are value-weighted to form a composite bond return Each month from January 1973 all available firms are sorted based on NNI or WCA and divided into 5 equal weighted portfolios. P1 represents portfolio consisting of firms with the lowest NNI or WCA and P5 represents the portfolio consisting of firms with the highest NNI or WCA. The returns from these portfolios over the next four quarters and next three years are presented below. Qtr = 1, 2, 3, and 4 are the next four quarter returns. The numbers in parentheses are Newey-West & Hansen-Hodrick auto-correlation corrected t-statistics. The number of lags used in the autocorrelation correction is 2 for quarterly returns and 11 for annual returns. *Sharpe Ratio* is the ratio of annual bond return of the (P5-P1) portfolio divided by the annual standard deviation of the bond return of the (P5-P1) portfolio computed using non-overlapping calendar year observations. *Ratings* is the average rating of the portfolio where a higher number indicates a worse rating and *Duration* is Macaulay's duration. *NFRM* is the average number of firms in each portfolio.

Panel A: Net New Investment Accruals (NNI)

Portfolio	NNI	Rating	Duration	NFRM	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-32.87	9.9	6.4	81	2.72	2.64	2.48	2.34	10.63	10.68	10.36
					(7.18)	(7.35)	(7.16)	(5.78)	(6.18)	(6.30)	(5.97)
P3	5.93	7.7	7.2	82	2.47	2.42	2.30	2.18	9.71	10.24	10.09
					(6.26)	(6.33)	(6.20)	(4.99)	(5.55)	(5.71)	(5.38)
P5	117.53	9.1	6.6	81	2.35	2.33	2.28	2.21	9.48	10.03	10.44
					(6.35)	(6.45)	(6.49)	(5.18)	(5.72)	(5.96)	(5.72)
P5-P1					-0.37	-0.31	-0.20	-0.13	-1.15	-0.65	0.08
					(-5.29)	(-4.18)	(-3.00)	(-1.83)	(-4.15)	(-2.59)	(0.20)
Absolute Sharpe Ratio									0.65	0.36	0.03

Panel B: Net Working Capital Accruals (WCA)

Portfolio	WCA	Rating	Duration	NFRM	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-13.39	9.73	6.84	84	2.57	2.55	2.43	2.35	10.30	10.87	10.48
					(6.87)	(6.98)	(6.93)	(5.60)	(5.99)	(6.35)	(5.99)
P3	-3.96	8.47	7.30	84	2.41	2.40	2.33	2.25	9.75	10.43	10.17
					(6.18)	(6.37)	(6.30)	(5.17)	(5.63)	(5.95)	(5.50)
P5	5.27	9.32	6.81	84	2.43	2.32	2.22	2.10	9.37	9.87	10.35
					(6.71)	(6.60)	(6.48)	(5.07)	(5.70)	(6.17)	(5.69)
P5-P1					-0.13	-0.24	-0.20	-0.24	-0.93	-1.00	-0.14
					(-1.86)	(-3.26)	(-2.88)	(-2.80)	(-3.49)	(-3.28)	(-0.38)
Absolute Sharpe Ratio									0.49	0.52	0.06

Table 4

Operating Accruals and Corporate Bond Returns: Robustness Tests by Excluding Bonds with Special Features and Using Only the Most Recently Issued Bond

This table provides the results of bond accrual strategies in a sub-sample of bonds chosen to minimize concerns about illiquidity, data errors, and special features. To be included in a portfolio each month, in additional to the requirements listed in Table 3, each firm must have at least one unsecured non-convertible bond with three or more years to maturity, be rated by Moody's or S&P, be a constituent of the Lehman Brothers Bond Index, make semi-annual coupon payments, be non-callable and non-puttable, have no sinking fund provisions, with dealer quotes and have an original maturity of less than 35 years and pass a return reversal screen. Since these restrictions eliminate more than half the sample and lead to fewer than ten firms a year prior to 1987, the sample period for this analysis starts in 1987 and ends in 1997. The other significant change is that for each firm, instead of using the return on a value-weighted portfolio of all eligible bonds of the firm as in Table 3, we use the return on the most recently issued bond (since it is likely to be the most liquid bond). Panels A and B provide results using bond returns while Panels C and D provide returns using equity returns. These panels use data from 1987 to 1997. They also provide the returns earned by the zero-investment portfolio for the period 1992 to 1997 as an additional robustness test since Lehman started issuing bond indices for non-investment grade bonds only from 1992. NNI is defined as the growth in net operating assets and WCA is defined as the ratio of change in net operating working capital less depreciation and amortization to total assets. P1 represents portfolio consisting of firms with the lowest NNI or WCA and P5 represents the portfolio consisting of firms with the highest NNI or WCA. The returns from these portfolios over the next four quarters and next three years are presented below. Qtr = 1, 2, 3, and 4 are the next four quarter returns. The numbers in parentheses are Newey-West & Hansen-Hodrick auto-correlation corrected t-statistics. The number of lags used in the autocorrelation correction is 2 for quarterly returns and 11 for annual returns. *NFRM* is the average number of firms in each portfolio.

Panel A: Net New Investment Accruals (NNI)

Portfolio	NNI	NFRM	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-32.68	27	2.37	2.44	2.42	2.28	9.81	9.50	9.10
			(5.24)	(5.74)	(5.83)	(4.44)	(5.80)	(5.41)	(5.30)
P3	7.55	27	2.20	2.30	2.33	2.28	9.43	9.93	8.79
			(5.00)	(5.36)	(5.62)	(4.65)	(5.73)	(5.46)	(5.16)
P5	119.17	27	2.12	2.19	2.24	2.28	8.93	9.66	9.40
			(4.87)	(5.22)	(4.98)	(4.62)	(5.67)	(5.02)	(5.20)
P5-P1			-0.25	-0.25	-0.19	0.00	-0.88	0.16	0.30
			(-2.56)	(-2.20)	(-1.42)	(0.00)	(-3.75)	(0.29)	(0.76)
Absolute Sharpe Ratio							0.64	0.05	0.10
				Sample Period: 1992-1997					
P5-P1			-0.15	-0.18	-0.12	0.03	-0.48	-0.42	-0.22
			(-2.59)	(-2.62)	(-2.21)	(0.50)	(-2.48)	(-2.01)	(-1.07)
Absolute Sharpe Ratio							0.52	0.35	0.26

Panel B: Net Working Capital Accruals (WCA)

Portfolio	WCA	NFRM	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-11.60	34	2.27	2.33	2.30	2.35	9.51	9.68	8.50
			(5.13)	(5.40)	(5.62)	(4.80)	(5.86)	(5.78)	(5.04)
P3	-4.76	34	2.22	2.31	2.28	2.19	9.30	9.62	8.40
			(5.16)	(5.56)	(5.77)	(4.88)	(5.92)	(5.86)	(5.48)
P5	2.84	34	2.20	2.25	2.29	2.09	9.12	8.64	8.59
			(5.28)	(5.71)	(5.98)	(4.80)	(5.93)	(5.71)	(5.06)
P5-P1			-0.07	-0.09	-0.01	-0.26	-0.38	-1.04	0.08
			(-0.85)	(-0.89)	(-0.17)	(-3.20)	(-1.46)	(-3.91)	(0.14)
Absolute Sharpe Ratio							0.25	0.68	0.09
				Sample Period: 1992-1997					
P5-P1			-0.09	-0.11	-0.09	-0.21	-0.50	-0.42	-0.96
			(-1.77)	(-1.40)	(-0.91)	(-1.82)	(-1.55)	(-1.68)	(-1.79)
Absolute Sharpe Ratio							0.65	0.39	0.71

Panel C: Net New Investment Accruals (NNI) - Equity Returns

Portfolio	NNI	NFRM	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-32.68	27	4.36	4.78	4.54	5.41	20.46	20.69	17.20
			(3.69)	(4.15)	(3.91)	(5.30)	(5.85)	(5.31)	(4.27)
P3	7.55	27	3.72	3.67	3.39	4.01	15.85	15.64	14.10
			(3.78)	(3.72)	(3.62)	(4.36)	(4.79)	(5.68)	(4.83)
P5	119.17	27	3.42	3.61	3.30	3.97	15.54	17.17	18.38
			(2.68)	(2.75)	(2.32)	(2.51)	(2.95)	(3.33)	(3.82)
P5-P1			-0.94	-1.18	-1.24	-1.45	-4.92	-3.52	1.18
			(-1.91)	(-2.17)	(-1.83)	(-1.57)	(-1.83)	(-1.72)	(0.60)
Absolute Sharpe Ratio							0.40	0.37	0.14
				Sample Period: 1992-1997					
P5-P1			-0.96	-0.70	-1.32	-1.94	-5.67	0.12	1.41
			(-2.10)	(-1.36)	(-2.18)	(-2.88)	(-2.22)	(0.05)	(0.75)
Absolute Sharpe Ratio							0.69	0.02	0.22

Panel D: Net Working Capital Accruals (WCA) - Equity Returns

Portfolio	WCA	NFRM	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-11.60	34	3.99	4.29	3.80	4.30	16.47	17.34	15.98
			(3.74)	(4.00)	(3.64)	(5.24)	(7.02)	(5.83)	(4.77)
P3	-4.76	34	3.43	4.10	3.85	4.47	16.73	16.67	14.24
			(4.07)	(4.77)	(4.43)	(6.16)	(6.06)	(6.07)	(5.53)
P5	2.84	34	3.31	3.50	3.22	3.83	14.69	12.58	13.46
			(2.85)	(3.04)	(3.02)	(4.75)	(4.27)	(3.94)	(3.91)
P5-P1			-0.68	-0.79	-0.58	-0.46	-1.78	-4.76	-2.52
			(-0.98)	(-1.35)	(-1.19)	(-0.99)	(-0.94)	(-2.09)	(-1.05)
Absolute Sharpe Ratio							0.16	0.44	0.24
				Sample Period: 1992-1997					
P5-P1			-0.98	-0.76	-0.77	-0.68	-2.93	-2.46	-5.94
			(-1.88)	(-1.35)	(-1.34)	(-1.24)	(-1.24)	(-1.12)	(-1.61)
Absolute Sharpe Ratio							0.41	0.31	0.57

Table 5

Ratings and Duration Adjusted Corporate Bond Returns

This table summarizes ratings and duration adjusted corporate bond returns of investment and accrual portfolios using bond market returns for the full sample (as in Table 3) from January 1973 to February 1997. Portfolios are formed and the returns are defined as in Table 3. The raw returns are adjusted for bond rating and maturity as follows. First, all available bonds (including those that belong to firms for which accruals and net new investments data are not available) are sorted into three rating categories – AAA/AA, A and BBB and below BBB. Next, the firms are sorted in to three duration categories. We then subtract from each bond's return the return of the rating-duration portfolio to which the bond belongs to compute risk-adjusted bond return. The risk-adjusted bond returns of each firm are then value-weighted to compute the benchmark-adjusted bond return for each firm. These returns are the used to compute portfolio returns over the next four quarters and next three years as presented below. Qtr = 1, 2, 3, and 4 are the next four quarter returns. The numbers in parentheses are Newey-West & Hansen-Hodrick auto-correlation corrected t-statistics. The number of lags used in the autocorrelation correction is 2 for quarterly returns and 11 for annual returns.

Panel A: Net New Investment Accruals (NNI)

Portfolio	NNI	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-32.87	0.18	0.14	0.07	-0.04	0.51	-0.26	-0.11
		(3.38)	(2.35)	(1.00)	(-0.49)	(1.58)	(-0.90)	(-0.37)
P3	5.93	0.02	0.00	-0.05	-0.13	-0.18	-0.45	-0.58
		(0.63)	(0.07)	(-1.12)	(-2.14)	(-0.99)	(-2.37)	(-3.29)
P5	117.53	-0.11	-0.12	-0.11	-0.05	-0.51	-0.52	0.06
		(-1.87)	(-1.88)	(-1.81)	(-0.44)	(-2.24)	(-1.73)	(0.12)
P5-P1		-0.29	-0.26	-0.18	-0.01	-1.02	-0.26	0.17
		(-4.51)	(-3.83)	(-2.66)	(-0.06)	(-3.49)	(-0.66)	(0.31)

Panel B: Net Working Capital Accruals (WCA)

Portfolio	WCA	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-13.39	0.03	0.06	-0.01	-0.03	0.07	0.00	-0.22
		(0.56)	(1.01)	(-0.18)	(-0.29)	(0.25)	(0.01)	(-0.71)
P3	-3.96	-0.01	-0.01	0.00	-0.04	-0.07	-0.19	-0.35
		(-0.23)	(-0.15)	(0.04)	(-0.51)	(-0.32)	(-1.00)	(-1.96)
P5	5.27	-0.06	-0.14	-0.18	-0.24	-0.70	-1.00	-0.32
		(-0.97)	(-1.95)	(-2.41)	(-2.90)	(-2.80)	(-3.48)	(-1.25)
P5-P1		-0.09	-0.20	-0.17	-0.22	-0.77	-1.01	-0.09
		(-1.39)	(-2.98)	(-2.43)	(-2.67)	(-3.00)	(-3.41)	(-0.28)

Table 6
Factor Adjusted Corporate Bond Returns

This table presents the results from the following factor regression based on monthly calendar time excess returns of bond portfolios:

$$r_{bt} - r_{ft} = a + b\,Mkt_t + c\,SMB_t + d\,HML_t + e\,Def_t + f\,Term_t + g\,(r_{5et} - r_{1et}) + u_t$$

Panels A and B provide results using data for the full sample (as in Table 3) from January 1973 to February 1997. Excess returns are computed with respect to one month t-bill returns. The equity factors (Mkt, SMB, HML) are based on Fama-French (1993). The default factor (DEF) is defined as the difference between the return on a portfolio of bonds with at least 10 years to maturity and the return on the long-term government bond series from CRSP. ($r_{e5t} - r_{e1t}$) is the contemporaneous monthly excess return earned by the high accrual equity portfolio over the low accrual equity portfolio. The term factor (TERM) is the difference between long-term government bond return and the one-month T-Bill return. *P1* refers to low NNI or WCA portfolio and *P5* refers to high NNI or WCA portfolio. The intercept (Intpt.) represents the risk-adjusted return. The numbers in parentheses are White Heteroskedasticity corrected t-statistics.

Panel A: Net New Investment Accruals (NNI)								
Portfolio	Intpt.	Mkt	SMB	HML	Def	Term	Equity	R-Sq.
P1	0.11%	0.05	0.04	0.05	0.94	0.75	-0.01	92.80
	(2.94)	(3.37)	(4.05)	(3.11)	(27.85)	(50.12)	(-0.61)	
P3	0.05%	0.00	0.00	0.00	0.85	0.84	0.00	97.89
	(2.08)	(0.13)	(-0.01)	(0.39)	(44.92)	(99.20)	(-0.38)	
P5	0.03%	0.00	0.03	0.00	0.85	0.75	0.01	93.84
	(0.92)	(-0.31)	(2.72)	(0.20)	(28.02)	(55.53)	(0.60)	
P5-P1	-0.08%	-0.06	-0.02	-0.04	-0.08	0.00	0.02	15.75
	(-2.34)	(-4.05)	(-1.76)	(-3.25)	(-2.76)	(0.17)	(1.28)	
Panel B: Net Working Capital Accruals (WCA)								
Portfolio	Intpt.	Mkt	SMB	HML	Def	Term	Equity	R-Sq.
P1	0.10%	0.01	0.02	0.03	0.83	0.76	0.00	91.92
	(2.55)	(0.55)	(1.55)	(2.17)	(22.37)	(46.84)	(-0.20)	
P3	0.03%	0.00	0.01	0.02	0.89	0.82	-0.03	97.60
	(1.11)	(0.07)	(1.05)	(1.91)	(42.43)	(89.89)	(-3.01)	
P5	0.04%	-0.02	0.01	0.00	0.90	0.75	-0.03	93.90
	(1.22)	(-1.65)	(0.71)	(-0.20)	(29.16)	(55.28)	(-1.91)	
P5-P1	-0.06%	-0.03	-0.01	-0.04	0.07	-0.01	-0.03	3.83
	(-1.45)	(-1.82)	(-0.90)	(-2.20)	(1.79)	(-0.77)	(-1.31)	

Table 7
Cross-sectional Regressions Involving Investment or Accrual Ranks, Duration, Ratings, and Issue Dummies

This table reports the results from the following cross-sectional Fama-MacBeth regressions:

$$r_{i,t+K} = a + b\,Rnk_{i,t} + c\ Ratings_{i,t} + d\ Duration_{i,t} + e\ Issue_{i,t} + u_{i,t+k}$$

At the beginning of each month, the above cross-sectional regression is estimated based on data for all available firms. The dependent variables are future individual firm bond returns measured over the next three years (Year 1, 2 or 3). The independent variables are accrual ranks (Rnk = NNIRnk or WCARnk), Duration, Ratings, and a dummy for debt and equity issues. The ranks for individual firms are based on membership in decile investment or accrual portfolios each month where 1 is low investment or accrual and 10 is high investment or accrual. Issue is 1 if the firm issued debt or equity in the previous 12 months and 0 otherwise. The table reports time-series averages of slope coefficients and the t-statistics are reported in parentheses. Since the cross-sectional regression is estimated each month, the resulting slope coefficients are autocorrelated up to eleven lags in annual regressions. To correct for this problems, the t-statistics for the time-series means are computed using the Newey-West (1987) and Hansen-Hodrick (1980) standard error correction. Panel A reports regressions based on net new investment ranks (NNIRnk) accruals and Panel B reports regressions based on working capital accrual ranks (WCARnk). The regressions are run using monthly data from 1973 to 1997.

Panel A: Net New Investment Accruals (NNI)

Year	NNI Rnk	Ratings	Duration	Issue
1	-0.140			
	(-4.96)			
	-0.103	0.356	0.312	-0.229
	(-4.23)	(1.33)	(3.94)	(-1.44)
2	-0.085			
	(-3.25)			
	-0.063	0.523	0.390	0.227
	(-2.27)	(1.79)	(5.25)	(1.12)
3	-0.006			
	(-0.15)			
	0.032	0.630	0.386	0.066
	(0.81)	(2.13)	(5.19)	(0.32)

Panel B: Net Working Capital Accruals (WCA)

Year	WCARnk	Ratings	Duration	Issue
1	-0.107			
	(-3.69)			
	-0.086	0.336	0.300	-0.230
	(-3.17)	(1.27)	(3.48)	(-1.51)
2	-0.110			
	(-3.48)			
	-0.100	0.422	0.392	0.220
	(-3.29)	(1.57)	(4.68)	(1.31)
3	-0.005			
	(-0.12)			
	0.000	0.497	0.376	0.101
	(-0.01)	(1.77)	(4.62)	(0.56)

Table 8

Operating Accruals and Corporate Bond Returns: Sub-samples

This table summarizes results from investment and accrual portfolio strategies using bond returns for the sample period from January 1973 to February 1997. Panels A and B provide results for the period January 1989 to December 1993 and Panels C and D provide results for the rest of the sample period. To be included in a portfolio each month, each firm must have at least one non-convertible bond with three or more years to maturity and be rated by Moody's or S&P (see also the filters discussed in the text). In addition, each firm should have data available in Compustat, as discussed in the text, to compute *net new investment accruals* (NNI) and *working capital accruals* (WCA). NNI is defined as the growth in net operating assets and WCA is defined as the ratio of change in net operating working capital less depreciation and amortization to total assets. To compute NNI we use fiscal year data and to compute WCA we first use trailing four quarter data and if quarterly data is unavailable use fiscal year data. For trailing four quarters ending in the first three quarter a one month lag is provided between the end of the quarter and the portfolio formation date. For the fourth quarter and annual data a 4 month lag is provided. This is to ensure that all accounting information is available to investors as of the portfolio formation date. All data on individual corporate bonds, including bid prices, coupon, maturity, and call provisions are from the Lehman Brothers Fixed Income Database. Portfolio returns for bonds are equal-weighted by firm. If a firm has more than one bond outstanding, the returns for all bonds for that firm are value-weighted to form a composite bond return Each month from January 1973 all available firms are sorted based on NNI or WCA and divided into 5 equal weighted portfolios. P1 represents portfolio consisting of firms with the lowest NNI or WCA and P5 represents the portfolio consisting of firms with the highest NNI or WCA. The returns from these portfolios over the next four quarters and next one year are presented below. Qtr = 1, 2, 3, and 4 are the next four quarter returns. The numbers in parentheses are Newey-West & Hansen-Hodrick auto-correlation corrected t-statistics. The number of lags used in the autocorrelation correction is 2 for quarterly returns and 11 for annual returns.

Panel A: Net New Investment Accruals (NNI): 1989-1993

Portfolio	NNI	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1
P1	-30.73	3.08	2.69	2.57	2.35	11.28
		(5.93)	(5.49)	(5.46)	(4.06)	(4.77)
P3	3.95	2.79	2.31	2.06	1.85	9.25
		(6.45)	(5.51)	(5.14)	(3.50)	(5.14)
P5	62.47	2.73	2.39	2.29	2.28	10.03
		(5.14)	(4.20)	(4.26)	(3.36)	(4.69)
P5-P1		-0.35	-0.30	-0.28	-0.07	-1.25
		(-2.27)	(-1.70)	(-1.54)	(-0.42)	(-2.49)

Panel B: Net Working Capital Accruals (WCA): 1989-1993

Portfolio	WCA	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1
P1	-13.73	2.80	2.46	2.34	2.12	10.08
		(6.49)	(5.81)	(6.03)	(4.01)	(5.21)
P3	-4.74	2.81	2.35	2.20	1.94	9.73
		(6.61)	(5.38)	(5.25)	(3.37)	(4.76)
P5	3.09	2.74	2.09	1.99	1.85	8.94
		(6.88)	(5.26)	(5.41)	(3.61)	(5.05)
P5-P1		-0.06	-0.38	-0.36	-0.28	-1.14
		(-0.43)	(-2.61)	(-3.15)	(-2.66)	(-2.96)

Panel C: Net New Investment Accruals (NNI): Other Periods

Portfolio	NNI	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1
P1	-33.51	2.63	2.62	2.46	2.33	10.46
		(5.77)	(6.05)	(5.87)	(4.77)	(5.05)
P3	6.44	2.38	2.45	2.36	2.26	9.83
		(4.94)	(5.22)	(5.19)	(4.23)	(4.57)
P5	131.83	2.25	2.32	2.28	2.19	9.33
		(5.08)	(5.38)	(5.43)	(4.30)	(4.65)
P5-P1		-0.38	-0.31	-0.18	-0.15	-1.13
		(-4.78)	(-3.83)	(-2.59)	(-1.90)	(-3.47)

Panel D: Net Working Capital Accruals (WCA): Other Periods

Portfolio	WCA	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1
P1	-13.29	2.51	2.58	2.45	2.40	10.35
		(5.50)	(5.76)	(5.70)	(4.71)	(4.93)
P3	-3.76	2.31	2.42	2.37	2.33	9.76
		(4.84)	(5.24)	(5.23)	(4.38)	(4.62)
P5	5.83	2.36	2.38	2.29	2.17	9.48
		(5.31)	(5.54)	(5.43)	(4.27)	(4.71)
P5-P1		-0.15	-0.20	-0.16	-0.23	-0.88
		(-1.85)	(-2.43)	(-1.96)	(-2.21)	(-2.75)