Estimating the Amount of Estimation in Accruals

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Abstract

This paper examines the relation between the amount of estimation needed during the accrual generating process and the quality of accruals. Specifically, we identify estimation related linguistic cues contained in the notes and critical accounting policies sections of 10-K filings to measure the amount of estimation needed during the accruals generating process. Consistent with the conjecture in Sloan (1996), we find

1. Introduction

The accounting literature has long observed that accruals are less persistent than cash flows. One reason proposed for this lower persistence is the degree of estimation required during the accrual generating process (Sloan 1996; Richardson et al. 2005). In our study, we examine this conjecture by calculating the amount of estimation embedded in accruals, measured as the number of estimation-related linguistic cues in the notes and critical accounting policy (CAP) disclosures in the management discussion and analysis section of firm 10-K filings. We then use the amount of estimation as a measure of accruals quality to empirically investigate the association between accruals quality and the persistence of accruals.

Unlike cash flows, accruals incorporate estimates of future cash flows, cash flow deferrals, depreciation and amortization, and fair value estimates. However, prior research on accruals persistence has focused on the role of accrual components rather than an examination of how estimates impact

estimation word is an adjective to an object (e.g. "estimated costs"). We use statistical parsing techniques

to automate the search for these linguistic cues in the notes to the financial statements and CAP section of

being weaker in more recent years (Green et al. 2011). Robustness tests of these findings using a Carhart four-factor Alpha model yield similar results.

To check the robustness of our empirical results, we conduct a number of additional tests. First, we build pseudo word counts by randomly selecting a dictionary of words with similar frequencies as our estimation cue words in the 10-K samples. Our bootstrapping test shows a low probability of obtaining our results using a pseudo random dictionary. Second, we re-run our analyses including the non-CAP section of the management discussion and analysis section. The results from this analysis show no relation between the amount of estimation in this section and accruals or earnings quality. This suggests

Finally, our study contributes to the textual analysis accounting literature by using grammatical relations to extract meaning from qualitative financial information. These relations provide structure to

to disregard how the predictive ability of current earnings is affected by the persistence of accruals (Sloan 1996; Kraft et al. 2006). Accordingly, Sloan (1996) finds that future abnormal returns are negatively

identifying each section, we eliminate notes with fewer than 1,000 words and CAP disclosures with fewer than 400 words.

3.2 Measuring Accruals Estimation

After obtaining our sample, we next use textual analysis of the footnotes and CAP disclosures to capture the amount of accruals estimation. These sections provide a wealth of information not found in other sections of the 10-K filing, including information about a firm's accounting process and the assumptions made during the accrual generating process (Merkeley 2011; Riedl and Srinivasan 2010).

In particular, all 10-K documents filed after May 2002 are required to provide CAP disclosures that include a discussion of any accounting policies that entail highly uncertain assumptions for which differing estimates would have a material influence on the firm's financial statements (Billings 2011). Research on the impact of this 2002 SEC ruling has found an impact of the new disclosure requirements on investor valuation decisions (Levine and Smith 2011). Since our sample begins in 1993, we have CAP disclosures available for only the post-2002 portion of our sample.

The basis of our textual analysis is the identification of three distinct linguistic cues that signal estimation in the text of the 10-K footnotes and CAP disclosures. These linguistic cues are derived from a study of numerous notes and CAP disclosures. The first linguistic cue is the indication that an estimation action targets some object. For example, the phrase "we estimated receivables" contains the estimation action "estimated" which targets the object "receivables." This cue denotes that receivables were estimated. The second linguistic cue is the indication that a "use action" targets an estimate object. An example of this is the phrase "we used estimates" where the action "used" targets the object "estimates." Our third linguistic cue is the indication that the use of an estimate adjective to modify some object also conveys that something was an estimate. An example of this is "estimated costs" here the object "costs" is modified by the adjective "estimated" thereby conveying that the costs are estimates.

We use the Stanford open source statistical parser to parse each sentence into components including noun modifiers, direct object modifiers, adjective modifiers, and others (Marneffe et al. 2006).

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We then use these grammatical relations between words to identify the linguistic cues that convey that an estimate was used by management in the accruals generating process (see Appendix 1).

After parsing each sentence to determine the grammatical relations between words, we create fours dictionaries to help us extract meaning from the parsed sentences. The first dictionary contains Estimation Actions. Words in the Estimation Actions dictionary convey that an estimation actiann

coefficients estimated in model (1). The items associated with the greatest number of estimation-related linguistic cues include the following: the recording of Fair Value, Regulatory, Intangibles, Derivatives, Reinsurance, Restatement, Restructuring, Stock Compensation, Contingencies, and Segments. By contrast, the items associated with the lowest number of estimation-related linguistic cues include the following: Other Expenses, Long-Term Debt, Credit Arrangements, Significant Customers, Leases, Inventory, Accounting Policies, Stock Options, Taxes, and Home Loans.

3.3 Sample Preparation

To obtain our final sample for our analysis of the effect of the amount of accruals estimation on accruals persistence, we merge our firm sample from our textual analysis with firm financial information obtained from Compustat and equity market information from the Center for Research in Security Prices database (CRSP).[8] Any firm years with data missing from either Compustat or CRSP are eliminated, as are financial institutions, as these firms may have idiosyncratic accruals and disclosures.[9] This process gives us a final sample of 60,389 firm year observations. We calculate future one-year abnormal returns as the buy-and-hold returns of the firm minus the buy-and-hold returns of a value weighted market portfolio over the same window. We calculate one-year abnormal buy-and-hold returns beginning five days after the filing of the 10-K.

3.3.1 Summary Statistics

Table 1 presents the average estimation-related linguistic cues and the average total number of words found in the notes to the financial statements and CAP disclosures for the firms in our sample. Consistent with prior studies, we find that the average length of the footnotes and CAP disclosures has steadily

period 1993 to 11,971 words in 2012.[10] We also find that the number of estimation-related linguistic cues in the footnotes and CAP disclosures increased monotonically during our sample period, from an average of 36 in the fiscal period 1993 to an average of 155 in 2012. However, as shown in Figure 1, we see that

We begin our analysis by exploring the relation between the number of estimation-related linguistic cues and several determinants of accruals estimation identified in prior research, namely firm size, negative earnings, operating cycle, and volatility (Dechow and Dichev 2002; Francis et al. 2005). This examination serves two purposes. First, it provides some intuitive validation to our measure. Second, it indicates whether these determinants should be included as control variables in our subsequent analyses.

Size- Larger firms typically have more operational complexity than smaller firms. On the one hand, this suggests that greater estimation is needed to convey the activities of the firm through accruals. However, the transactions of these firms may have diversification effects, which may make the estimation of accruals more precise. For instance, firms with a diverse set of receivables may be able to estimate their bad debt ratio more precisely if their different sources of receivables offer some diversification. Therefore, ex ante, we do not have a clear prediction on the association between firm size and the amount of estimation in the accruals generation process.

Negative Earnings Accounting conservatism suggests that investors require more verification of good

possible explanation for this finding is that managers facing an uncertain environment may not book their accruals, as they are uncertain of their future cash flows.

4.2 Accruals Estimation and Persistence

To test our first prediction (P1), we examine how the amount of estimation in accruals is related to both the persistence of earnings and the persistence of accruals relative to cash flows. Following prior literature, we regress the following year's earnings on the current year's earnings (accruals and cash flows) to estimate the relation between current and future earnings (Sloan 1996; Li 2008). If the estimated coefficient on current earnings is high, then we would conclude that current earnings are highly persistent.

To measure the impact of estimation on the persistence of earnings, we include the interaction between the current year's earnings and the amount of estimation in the following model:

$$Earnings_{i,t+1} = \beta_0 + \beta_1 Earnings_{i,t} + \beta_2 Estimation_{i,t} \tag{3}$$
$$+ \beta_3 Earnings_{i,t} \times Estimation_{i,t} + Controls + Earnings_{i,t} \times Controls$$
$$+ Industry + Year + \varepsilon_{i,t}$$

where $Estimation_{i,t}$ is defined earlier and $Earnings_{i,t}$ is income before extraordinary items scaled by average total assets. We include the following control variables in the above estimation: size, operating cycle, standard deviation of sales, standard deviation of operating cash flows, the number of years over the past five years in which the firm had negative earnings, and the total length of its footnotes. Note that the first five control variables represent the determinants of the amount of estimation in accruals examined in Table 5. We include them in the above regression to ensure that Estimation does not simply capture these common firm characteristics. We include the total length of a firm's footnotes to ensure that Estimation does not simply proxy for the length of a firm's disclosure documents. We also include

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interactions between all control variables and earnings as well as auditor, year, and industry fixed effects.[12]

To disaggregate earnings into a cash flows component and an accruals component, we follow Hribar and Collins (2002) and calculate accruals using the statement of cash flows. If a greater amount of estimation in the accruals generation process lowers the association between the current year's accruals and the following year's earnings, then the interaction between our estimation measure and the accruals

variables (4). These results show that the coefficient on the interaction between estimation and earnings in the current year is negative and statistically significant at 1%. This suggests that earnings that entail greater estimation are less persistent. Economically, the effect of estimation on the persistence of earnings is approximately 17% of the estimated coefficient on the relation between current earnings and future earnings.

In Table 6 Column 3, we present the results for our regression of the next year's earnings on a firm's current year's earnings interacted with our two pieces of accruals estimation, BAE and WAE. These results show that the respective interactions between BAE and current earnings and WAE and current earnings are both statistically significant at the 1% level. Furthermore, these results show that the change in earnings persistence for BAE is greater than that for WAE (-0.053 and – 0.031, respectively), indicating that a one standard deviation change in BAE has a more significant economic impact on the persistence of earnings than WAE. Since an F-test of the difference between the coefficient estimates yields a probability of 0.77, we cannot reject our null hypothesis that the two coefficients will be equal.

In Table 7 Column 4, we present the results for our regression of the next year's earnings on each component of earnings interacted with the number of estimated-related linguistic cues.[14] These results show that the interaction between accruals and estimation is negative and statistically significant, consistent with our prediction that a greater amount of estimation leads to less accruals persistence. On the other hand, we find that the interaction between cash flows and estimation is not statistically significant. Specifically, the difference in the persistence of accruals for a one standard deviation change in estimation is -0.050; the estimated coefficient on the main effect of accruals is 0.549.

In Table 7 Column 5, we present the results for our regression of the next year's earnings on the interaction of BAE and WAE and both accruals and cash flows. Our results show that the respective interactions between the BAE and earnings and WAE and earnings are both statistically significant at the 1% level. Furthermore, an F-test of the coefficients on the respective interactions between BAE and

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[14] In untabluated results, consistent with prior research, we find that the persistence of accruals is less than that of cash earning and that the magnitudes of the coefficients are similar to those found in prior research.

accruals and WAE and accruals yields a probability of 0.84, suggesting that these coefficients are not statistically different. Economically, we find that BAE has a more significant impact on the persistence of the accruals portion of earnings than WAE (-0.629 and -0.349, respectively, for a one standard deviation change).

Finally, in Table 8, we present the results for our regression of future earnings on the persistence of accruals and cash flows including our three accruals quality measures: the absolute value of the magnitude of accruals, the standard deviation of the Dechow and Dichev (2002) residual, and special items. For the Dechow and Dichev (2002) residual, we use the standard deviation of the residual from the model over the past five years for each firm (McNichols 2002).

The results in Table 8 Columns 2, 3, and 4 Panel A show that all three measures of accruals quality are statistically significant at the 1% level and negatively associated with the persistence of accruals. Furthermore, the results in Column 5 suggest that, even after including alternate measures of estimation, our measure of estimation is still associated with a lower persistence of accruals at the 1% level of significance. When we exclude these alternate measures, the magnitude of the estimated coefficient on our measure of estimation decreases to -0.695 from -0.989. This finding suggests that our measure is informative about some aspect of accruals persistence not found in these other measures.

The results in Panel B show that the estimated coefficient on the interaction between BAE and accruals is negative and statistically significant at the 1% level while the estimated coefficient on the interaction between WAE and accruals is negative and statistically significant the 5% level. The estimated

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Specifically, a negative interaction would indicate that the market over-(under-) values positive (negative) accruals.

We make two changes to the specification of the model to better coincide with our research question. Sloan (1996) calculates future abnormal returns beginning four months after the end of the firm's fiscal period. Our abnormal returns accumulation begins five days after the 10-K filing date. Next, we use the raw amount of accruals in our model rather than a decile ranking. One of the purposes of Sloan (1996) is to show that a trading strategy can be implemented by purchasing stock in firms with extreme

financial statements: 5 rankings of accrual by 5 rankings of estimation. For each portfolio, we then estimate the four-factor alpha using the following model.

$$RETURN_{\varsigma} = \delta + \beta_1 MKTRF_{\varsigma} + \beta_2 GLM_{\varsigma} + \beta_3 SMB_{\varsigma} + \beta_4 WML_{\varsigma} + \epsilon \qquad (7)$$

where $RETURN_{\varsigma}$ is the monthly excess return of the value or equal weighted portfolios, $MKTRF_{\varsigma}$ is the monthly return of the value-weighted index minus the risk free rate, GLM_{ς} is the monthly premium of the book-to-market factor, SMB_{ς} is the monthly premium of the size factor, and WML_{ς} is the monthly premium on winners minus losers.[16]

4.4.1 Accruals Estimation and Returns

The results in Table 10 Column 3 show that the relation between the interaction between accruals and estimation and future abnormal returns is not statistically significant. Similarly, the results in Column 4 show that neither BAE nor WAE is informative of the relation between accruals and future abnormal returns. Together, these findings suggest that the market incorporates the estimation information found in the notes and CAP disclosures into their valuation of a firm.

Furthermore, the results in Table 11 for our test of P3 using the Carhart four-factor model show no evidence that the accrual anomaly is more concentrated in firms with a greater amount of estimation in their accruals. The results in Panel A show that using equal weighted hedged returns yields a significant relation between accruals and future abnormal returns. However, using value weighted hedge returns yields no significant relation between the two. Furthermore, the results in Panel A show no evidence that the accrual anomaly is exacerbated in firms with greater accruals estimation. This result is consistent with the hypothesis that investors utilize the estimation information found in the notes to the financial

Lastly, the results in Panel B show no discernible association between future abnormal returns and the amount of estimation and accruals when using either value-weighted or equal weighted returns for firms with high or low BAE and WAE.

5. Robustness Tests

5.1 Placebo Tests Based on Bootstrapping

To provide further confidence in our results, we conduct a number of robustness tests. First, we examine whether the results using our linguistic cues approach are "random" by conducting a bootstrap test of our main findings, Prediction 1 (P1) and Prediction 2 (P2). To do so, we begin by ranking all of the words in the notes to the financial statements in our sample by their frequencies. We next select the five words above and the five words below a word for each of the 47 unique words in our Estimation Actions, Estimation Objects, and Estimation Adjectives dictionaries that appears at least once in a firm's notes.[17] This process yields 10 unique dummy words for each estimation word and a total of 470 unique placebo estimation words. We list these words in a placebo dictionary that contains words which have a similar frequency of use as those in our main dictionaries but whose use variation differs.

We next randomly select 1 word from the 10 dummy words chosen for each estimation word and count the number of times each placebo word is mentioned in a firm's footnotes or CAP disclosures.[18] We then estimate the models for the tests of (P1) and (P2) substituting this placebo estimation count in place of our original count of the number of estimation related linguistic cues, repeating this process 1000 times.

Table 12 presents our results for the joint tests of significance (insignificance). These results show that only 2% of the bootstrap placebo tests yield results similar to those of our main findings for the persistence of earnings and the quality of accruals, (P1) and (P2) respectively. Specifically, only 2% of the bootstraps yield a negative and statistically significant result on the coefficient of earnings interacted

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[17] The words anticipating, approximation, approximations, beliefs, believing, estimations, and expecting are not mentioned in any of our sample firms' footnotes but are included in the original dictionaries for completeness.

[18] As an additional robustness check, we randomly select 47 words from the 470 placebo words instead of 1 word from the 10 placebo words chosen for each estimation word. This change in the selection process does not significantly affect the results of our simulation.

untabulated, we find that our results remain essentially the same if the competition measure and its interactions with earnings, accruals, and cash flows are included as additional control variables.

6. Conclusion

Motivated by the findings of Sloan (1996) and Richardson et al. (2005), this study examines whether the amount of estimation in the accruals generation process is associated with the persistence of accruals. In particular, previous studies propose that accruals generated with a greater degree of estimation are less precise as they are more likely to be recorded with error. By consequence, they are then less predictive of future earnings. Using the notes to the financial statements and CAP disclosures from a sample of 10-K filings, we examine the association between the estimation involved during the accrual generating process and the persistence of accruals.

Our results provide evidence consistent with the conjecture that the estimation needed during the accrual generating process plays a key role in the persistence of accruals. Specifically, we find that when

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Table 1 - Number of Estimation Linguistic Cues by Fiscal Year

This table presents the average number of estimation related linguistic cues and the total number of words found in the notes to the financial statements and the critical accounting policies sections of the 10-K. Our sample of firms spans from fiscal year 1993 to fiscal year 2012.

Fiscal Year	Estimation	Length	N
1993	36	3,725	802

Figure 1 – Average Number of Estimation Linguistic Cues in the Footnotes and Critical Accounting Policies Section by Fiscal Year

Figure 1 presents the average number of estimation linguistic cues for each fiscal year and average number of words the notes to the financial statements and the critical accounting policies section between fiscal years 1993 and 2012. The average total number of words is represented by the solid red line and its scale is represented by the left y-axis. The average number of

Table 2 - Average Number of Words and Estimation Linguistic Cues in the Footnotes and Critical Accounting Policies Section by Industry

This table shows the average number of estimation related linguistic cues and the average number of words in the notes to the financial statements and critical accounting polices section by industry for the fiscal periods between 1993 and 2012.

Industry	SIC Code	Estimation	Length	N
Agricultural Production Crops	1	30	3,348	17
Metal Mining	10	123	8,892	261
Coal Mining	12	158	13,034	73
Oil And Gas Extraction	13	109	8,390	2,449
Mining And Quarrying Of Nonmetallic Minerals, Except Fuels	14	77	5,578	65
Building Construction General Contractors And Operative Builders	15	86	7,303	454
Heavy Construction Other Than Building Construction Contractors	16	111	8,878	182

Table 2 - Average Number of Words and Estimation Linguistic Cues in the Footnotes and Critical Accounting Policies Section by Industry (continued)

Industry	SIC Code	Estimation	Length	N
Railroad Transportation	40	48	5,023	46
Motor Freight Transportation And Warehousing	42	71	5,393	536
Water Transportation	44	98	8,595	261
Transportation By Air	45	94	7,405	456

Table 3 - Summary Statistics

Table 3 presents the summary statistics for the main sample. Earnings is the firm's income before extraordinary items scaled by average total assets. Accruals are total accruals scaled by average total assets. Operating Cash Flows are operating cash flows scaled by average total assets. Estimation is the number of estimation related linguist

Table 4 - Pearson and Spearman Univariate Correlations

This table presents the Spearman (above diagonal) and Pearson (below diagonal) correlation for the main variables used in this study. Earnings is the firm's income before extraordinary items scaled by average total assets. Accruals are total accruals scaled by average total assets. Operating Cash Flows are operating cash flows scaled by average total assets. Estimation is the number of estimation related linguistic cues in the footnotes and the critical accounting policies section of the firm's 10-K. Between Account Estimation and Within Account Estimation is estimation broken down into the differences between estimation between accounts and differences in the amount of estimation within a specific account scaled by 1,000, estimated by industry and year. Length is measured as the total number of words in the footnotes and the critical accounting policies section of the 10-K scaled by 1,000. Operating Cycle is the log of the operating cycle of the firm. Size is measured as the log of the market value of the firm's equity calculated as the share price of the firm's stock at the filing date multiplied by the number of shared outstanding. σ(Operating Cash Flows) is the standard deviation of the operating cash flows over the past 5 years. σ(Sales) is the standard deviation of sales over the past 5 years. Negearn is the number of years in which the company had negative earnings over the past 5 years.

	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	Earnings	1.00	0.41	0.67	-0.08	-0.05	-0.06	-0.12	0.39	-0.01	-0.25	-0.07	-0.67
2	Accruals	0.63	1.00	-0.24	-0.10	-0.09	-0.04	-0.11	0.09	0.23	-0.09	0.02	-0.25
3	Operating Cash Flows	0.79	0.05	1.00	0.01	0.03	-0.04	-0.04	0.37	-0.19	-0.27	-0.11	-0.53
4	Estimation	-0.01	-0.07	0.04	1.00	0.90	0.33	0.88	0.35	-0.09	-0.14	-0.13	0.10
5	Between Account Estimation	0.01	-0.05	0.05	0.88	1.00	-0.06	0.80	0.32	-0.09	-0.14	-0.13	0.08
6	Within Account Estimation	-0.05	-0.04	-0.02	0.48	0.00	1.00	0.27	0.10	0.00	-0.03	-0.02	0.05
7	Length	-0.06	-0.07	-0.03	0.70	0.60	0.35	1.00	0.31	-0.10	-0.10	-0.10	0.15
8	Size	0.33	0.14	0.32	0.36	0.35	0.12	0.24	1.00	-0.05	-0.40	-0.30	-0.42
9	Operating Cycle	-0.03	0.13	-0.14	-0.05	-0.06	0.01	-0.06	-0.01	1.00	0.10	-0.06	0.00
10	σ(Operating Cash Flows)	-0.46	-0.18	-0.46	-0.10	-0.11	-0.01	-0.04	-0.28	0.04	1.00	0.47	0.43
11	σ(Sales)	-0.08	-0.02	-0.10	-0.12	-0.13	-0.02	-0.06	-0.25	-0.11	0.34	1.00	0.18
12	Negearn	-0.59	-0.28	-0.55	0.06	0.04	0.06	0.10	-0.40	-0.01	0.41	0.12	1.00

**Table 5 – Regression of the Number of Estimation
Linguistic Cues on Determinants of Accruals Estimation**

This table presents the tobit model left censored at 0 of the number of estimation linguistic cues found in the notes to the financial statements and the critical accounting policies section of the 10-K on determinants of accruals estimation scaled by 1,000. *Size* is measured as the log of the market value of the firm's equity is calculated as the share price of the firm's stock at the filing date multiplied by the number of shared outstanding. *Operating Cycle* is the log of the operating cycle of the firm. σ(*Sales*) is the standard deviation of sales over the past 5 years. σ(*Operating Cash Flows*) is the standard deviation of the firms operating cash flows over the past 5 years. *Negative Earnings* is the number of years in which the company had negative earnings over the past 5 years. P-values are reported in parenthesis below their

Table 7 - Regression of Future Earnings on Current Accruals and Cash Flows Interacted with the Number of Estimation Linguistic Cues

This tables presents the regression of the next year's earnings on the current year's accruals and operating cash flows interacted with the number of estimation linguistic cues in the notes to the financial statements and critical accounting policies section of the 10-L. Accrualsare

Table 8 - Estimation on Persistence with other Measures of Accruals Quality

Table 8 Panel A presents the results for our tests of estimation on the persistence of cash flows and accruals including other

Table 8 - Estimation on Persistence with other Measures of Accruals Quality

Panel B: Between Account and Within Account Estimation and Accruals Persistence with Other Measures of Accruals Quality

	Earnings t+1	Earnings t+1	Earnings t+1	Earnings t+1
Accruals	0.3033***	0.3693***	0.4113***	0.3964***
	(0.000)	(0.000)	(0.000)	(0.000)
Operating Cash Flows	0.6110***	0.6871***	0.7141***	0.7282***
	(0.000)	(0.000)	(0.000)	(0.000)
Between Account Estimation	-0.0627*	-0.0570	-0.0906***	-0.0857**
	(0.055)	(0.102)	(0.008)	(0.012)
Between Account Estimation x Accruals	-0.9014***	-0.8838***	-0.8817***	-0.7676***
	(0.000)	(0.000)	(0.000)	

Table 9 – Regression of the Standard Deviation of the Dechow-Dichev Residual on the Number of Estimation Linguistic Cues

This table shows the association between accrual quality, as measured by the Dechow and Dichev (2002) residual, and the number of estimation linguistic cues in the notes to the financial statements and the critical accounting policies section of the 10-K scaled by 1,000. σ(DD Residual) is the standard deviation of the Dechow and Dichev resi

Table 10 – Fama-Macbeth Regression of Future Abnormal Returns on Accruals Interacted with Estimation

This table presents the association between one-year abnormal returns beginning 5 days following the filing date and accruals. Accruals are total accruals scaled by average total assets. Estimation is the number of estimation related linguistic cues in the footnotes and the critical accounting policies section of the firm's 10-K scaled by

Table 11 - Estimation and Future Abnormal Returns Using Fama-French Carhart Four-Factor Alpha

This table presents the results for association between estimation and future abnormal returns using the Carhart Four-Factor Alpha. All regressions were estimated using ordinary least squares. P-values are reported in parenthesis below their respective coefficients. ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10% significance levels respectively.

Panel A: Accruals Estimation

	Equal Weighted Returns			Value Weighted Returns		
	Accruals			Accruals		
	Low	High	Hedge	Low	High	Hedge

Table 12 - Joint Tests of Prediction 1 and Prediction 2 Using Placebo Dictionaries

Table 12 presents the results of our joint tests of Predictions 1 and 2 using placebo estimation dictionaries. Placebo estimation dictionaries were created by randomly choosing a placebo word from the list of 10 nearest words in terms of frequency for each of the words in our Estimation Actions, Estimation Objects, and Estimation Adjectives dictionaries. We repeat this procedure 1,000 times

Appendix 1 - Overview of Grammatical Relations

"We estimated receivables and purchased inventory."

[nsubj(estimated-2, We-1), nsubj(purchased-5, We-1), dobj(estimated-2, receivables-3),

conj_and(estimated-2, purchased-5), dobj(purchased-5, inventory-6)]

We see that the object "receivables" is the direct object of the action (verb) "estimated." This linguistic cue indicates that the sentence is conveying that receivables

Appendix 2 - Estimation Dictionaries and Grammatical Relations

Estimation Dictionaries

We construct four dictionaries to help measure the estimation conveyed in each firm's notes to the financial statements:

Estimation Actions - Estimate, Estimating, Estimated, Anticipate, Anticipates, Anticipating, Anticipated, Approximate, Approximates, Approximated, Approximating, Assess, Assesses, Assessed, Assessing, Believe, Believed, Believes, Believing, Determine, Determined, Determining, Determines, Evaluate, Evaluated, Evaluating, Evaluates, Expect, Expects, Expected, Expecting, Forecast, Forecasts, Forecasted, Forecasting

Estimation Objects - Estimate, Estimates, Estimation, Estimations, Approximation, Approximations, Assumption, Assumptions, Belief, Beliefs, Forecast, Forecasts

Estimation Adjectives - Estimated, Anticipated, Approximate, Approximately, Expected, Forecasted, Likely, Probable

Use Words - Make, Makes, Made, Making, Use, Uses, Used, Using, Include, Includes, Included, Including

Estimation Actions are verbs which convey that an estimation action was performed (e.g. "we estimated accruals")ake8 -2.303

Grammatical Relations

We use the following grammatical relations in conjunction with the Estimation Dictionaries above to find the linguistic cues that infer that estimation was needed.

Direct Object – This relation identifies the accusative object of an action (i.e. "estimate receivables" or "used estimates"). For this grammatical relation, we look for when a word from the Estimation Action dictionary targets some object or when a word from the Use Word dictionary targets a word from the Estimation Object dictionary. An example of the first case is "estimate receivables." Here the action "estimate" targets the object "receivables" thereby implying that receivables were estimated. An example of the second scenario is "used estimates." In this example, one of the words from the Use Words dictionary, "used," targets a word from the Estimation Object dictionary, "estimates," which implies that they used an estimate.

(Passive) Nominal Subject – This grammatical relation is similar to the direct object in that it relates information about an object. The relation that we look for is the same as for the direct object.

Adjective Modifier – Adjective Modifiers modify the meaning of an object (i.e. "likely receivable" or "anticipated value"). For this grammatical relation, we identify when a word from the Estimation Adjective dictionary targets some object – this implies that the object was estimated.

Quantifier Phrase Modifier – This grammatical relation is a modifier to a number (i.e. "approximately $100"). This grammatical association is similar to the adjective modifier but specific to numbers. Here, we look for when a word from the Estimation Adjectives dictionary targets a number.

Noun Compound Subjects – This indicates when a noun is used to modify another noun (i.e. "value estimates"). This grammatical relation is similar to the adjective modifier except that a word from the Estimation Object dictionary is modifying another object.

Appendix 3 - Top 10 and Bottom 10 Accrual Accounts by Estimation

This table presents the accrual accounts with the highest and lowest coefficients on the accrual account dummies from the regression of estimation on accrual account flags. The regression was performed using OLS with an intercept as described in equation (1).

Top 10	Bottom 10
Fair Value	Other Expenses
Regulatory	Long-Term Debt
Intangibles	Credit Arrangements
Derivatives	Significant Customers
Reinsurance	Leases
Restatement	Inventory
Restructuring	Accounting Policies
Stock Compensation	Stock Options
Contingencies	Taxes
Segments	Home Loan