Disclosure and the Cost of Capital: Evidence from Firms' Responses to the Enron Shock*

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Abstract

This paper examines the link between disclosure and the cost of capital. We exploit an exogenous cost of capital shock that the Enron scandal in Fall 2001 created for other U.S. firms and analyze whether and how firms respond to this shock. These tests are opposite to the typical research design that analyzes cost of capital responses to disclosure changes. In reversing the tests and using an exogenous shock, we mitigate endogeneity concerns in traditional cross-sectional disclosure studies. Our analysis is based on a unique method that allows us to estimate shocks to firms' betas as well as subsequent changes in systematic risk due to firms' disclosure responses to the transparency crisis. Our analysis shows that beta shocks around the Enron scandal are associated with increased disclosure. Firms expand the number of pages of their annual 10-K filings, notably the sections containing the financial statements and footnotes. The increase in disclosure is particularly pronounced for firms that have positive cost of capital shocks and larger financing needs. We also find that firms respond with additional interim disclosures (e.g., 8-K filings) and provide evidence suggesting that these disclosures are complementary to the increase in 10-K disclosures. Finally, we show that firms' disclosure responses reduce the impact of the transparency crisis on firms' costs of capital.

JEL classification: G14, G15, G30, K22, M41, M42

Key Words: *Transparency, Disclosure, Cost of capital, Capital-market shocks, Financial crisis, Annual reports, Accounting scandals*

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1. Introduction

The link between disclosure of financial information and firms' cost of capital is one of the most fundamental relations in finance and accounting. Understanding this link is of substantial interest to firms that provide information to capital markets as well as to financial market regulators. Various theoretical models predict that an increase in a firm's commitment to disclosure is negatively related to its cost of capital (e.g., Diamond and Verrecchia, 1991; Easley and O'Hara, 2004; Lambert et al., 2007). Despite its importance and plausibility, the nature of this link is still an open question. Much of the empirical literature provides cross-sectional evidence that firms with more extensive voluntary disclosures exhibit less information asymmetry and have a lower cost of capital.[1] However, there are substantial concerns about whether this relation can be interpreted in a causal way. First, firms likely choose disclosures with the effect on their cost of capital in mind. Second, there are reasons to believe that the same factors that drive firms' disclosure choices could also directly affect the cost of capital.

To mitigate these concerns, this paper exploit the Enron debacle and relates exogenous cost of capital shocks to firms' disclosure responses, which is essentially the reverse experiment to the prior literature. The events surrounding the collapse of Enron led to substantial concerns about the transparency of financial statements and disclosures of *other* U.S. firms. If disclosure and the cost of capital are related as predicted by economic theory, these concerns about the lack of transparency should increase firms' costs of capital, which in turn should lead firms to re-evaluate their disclosure policies and trigger changes in their disclosure behavior. By exploiting this natural experiment, we provide new and complementary evidence that disclosure and the

[1] See, e.g., Botosan (1997), Healy et al. (1999), Leuz and Verrecchia (2000), Botosan and Plumlee (2002), Easley et al. (2002), Schrand and Verrecchia (2005). In addition, see studies of the cross-sectional relation between accruals quality and the cost of capital (e.g., Francis et al., 2004 and 2005).

cost of capital are related as predicted by economic theory and that firms can influence their cost of capital through firm-specific disclosures.[2]

Our analysis focuses on the period when the news about Enron's losses and accounting irregularities hit the market in Fall 2001. The news quickly grew into widespread concerns about the transparency of U.S. firms' financial statements in general and, in particular, about the disclosures of special purpose vehicles, off-balance sheet financing, and related-party transactions (see Appendix). The concerns culminated in the passage of the Sarbanes-Oxley Act in August 2002.

Our sample comprises 1,868 U.S. firms with December fiscal-year ends and required financial data from 1999 to 2001. We measure shocks to their costs of capital around the Enron events using an econometric technique suggested by Lockwood and Kadiyala (1988) that allows for a quadratic shape to the beta estimate during the event window as the transparency crisis was unfolding. We focus on the shock to systematic risk in an attempt to separate shocks to the cost of capital from updated assessments of firms' future cash flows. The quadratic form is important because it can accommodate the impact of a firm's interim disclosure responses during the event period on its cost of capital. The main analysis examines firms' disclosure responses to the information-related cost of capital shock. We analyze responses in firms' mandatory annual SEC filings (Form 10-K), which occur after the event period, as well as potentially more immediate responses in 8-K filings, conference calls and earnings announcements.

We document that the cost of capital shocks over the Enron event period are associated with an increase in the firms' disclosures in their subsequent annual 10-K filings. Firms extend the number of pages in their 10-K filings, notably the sections containing narrative discussions

[2] The latter has been heavily debated in the estimation risk literature in finance (e.g., Barry and Brown, 1984 and 1985; Coles and Loewenstein, 1988; Coles et al., 1995). See also the recent model in Lambert et al. (2007).

like the management discussion & analysis and related-party transactions as well as the financial statements and footnotes. This evidence shows that firms respond to transparency concerns and cost of capital shocks with additional disclosures. The documented link between cost of capital shocks and 10-K disclosure responses is robust to a broad set of alternative specifications and robustness checks.

The increase in disclosure is particularly pronounced for firms that experience positive beta shocks and are likely to be more sensitive to their cost of capital because they have larger external financing needs and more growth opportunities. This finding is consistent with the idea that the firms most affected by the shock are most likely to respond. We also find that Arthur Anderson clients respond stronger to the beta shocks, increasing the 10-K pages and the section on related-party transactions compared to firms with other auditors. This finding is consistent with the idea that the disclosures are a response to the transparency concerns created by the Enron scandal.

We do not find a significant relation between the beta shocks and the changes in the number of words in the firms' annual earnings announcements. However, an analysis of firms' disclosures in the period immediately after the shock suggests that firms respond by increasing the number of 8-K filings. We show that the 8-K disclosures mitigate the effects of the shock but such interim disclosures do not eliminate the relation between the beta shocks and disclosure in the 10-K. This finding is noteworthy because it suggests that firms view the annual 10-K filing as a relevant disclosure mechanism to improve transparency and alleviate investor concerns, despite its lack of timeliness.

A potential alternative explanation is that firms increase their disclosures not to mitigate transparency concerns or to address changes in their cost of capital, but to avoid future litigation

or to thwart a regulatory response. This alternative explanation, however, does not predict the cross-sectional result, described previously, that firms with the largest disclosure responses are those that have larger external financing needs and more growth opportunities. Moreover, the notion that firms provide more but not necessarily more informative disclosures is difficult to reconcile with our set of analyses showing that 10-K disclosure increases are associated with abnormal volume reactions around the 10-K filing and with a subsequent decline in systematic risk. These findings suggest that the additional disclosures are informative to investors and indeed lower the cost of capital. The latter result is important because it implies that even if the Enron scandal did not lead to *cost of capital* shocks but triggered changes in other firms' disclosures, these disclosures are related to subsequent declines in the cost of capital.

This study contributes to the prior literature on disclosure and firms' cost of capital in several ways. First, by linking information-related beta shocks to firms' disclosure responses, we provide evidence on a link between disclosure and the cost of capital that is less likely to reflect an omitted variable that jointly affects disclosures and the cost of capital. Prior studies generally provide cross-sectional analyses relating the level of disclosure to the cost of capital (e.g., Leuz and Wysocki, 2008). There are a few studies that examine changes in firms' disclosure policies (e.g., Healy et al., 1999; Leuz and Verrecchia, 2000) or exploit firms' disclosure choices in situations where they access capital markets, essentially assuming that cost of capital benefits drive their choices (e.g., Lang and Lundholm, 2000; Schrand and Verrecchia, 2005). But none of these studies identifies an exogenous event that alters the cost-benefit trade-offs in firms' disclosure decisions. Second, our study provides novel evidence that firms respond to transparency crises and credibility shocks in markets with increases in their disclosures. Interestingly, the documented disclosure increases occur shortly after the Enron scandal and

ahead of the Sarbanes-Oxley Act of 2002. Third, we show that firms' disclosure responses can mitigate the impact of the cost of capital shocks, which also addresses concerns about the diversifiability and hence relevance of firm-specific disclosures for the cost of capital.

The paper is organized as follows. Section 2 develops the hypotheses and explains our research design exploiting the Enron events in 2001. In section 3, we define our disclosure and cost of capital proxies. Sections 4 and 5 present the results on the relation between the cost of capital shocks and firms' subsequent disclosure responses. Section 6 presents the analysis of subsequent market responses to firms' disclosure responses. Section 7 concludes the paper.

2. Hypothesis development and research design

Several theories link corporate disclosures and firms' cost of capital. One strand of literature that provides a direct link between information and a firm's beta factor and hence can serve as a conceptual underpinning for our analysis is based on the notion of estimation risk. It starts from the premise that parameters of the distribution of stock returns, like a firm's beta factor, have to be estimated and then analyzes the role of information for firms' cost of capital (e.g., Brown, 1979; Barry and Brown, 1984 and 1985; Coles and Loewenstein, 1988). More recently, Lambert et al. (2007) re-examine the issue of estimation risk using information structures that lend themselves more naturally to an interpretation as firm-specific disclosures. They model disclosures as being informative about a firm's expected future cash flows and show that the assessed covariances of a firm's cash flows with the cash flows of other firms decrease as the precision of the disclosure increases. This effect reduces the required risk premium and moves the firm's cost of capital closer to the risk-free rate. Lambert et al. (2007) also show that this information effect is not diversifiable because it is present for all covariance terms with other firms and that it should manifest itself in firms' beta factors as well as the market risk premium

for the economy.[3] Another stand of literature in finance demonstrates that a link between information quality and the cost of capital can also arise from adverse selection in secondary share markets (e.g., Amihud and Mendelson, 1986; Diamond and Verrecchia, 1991; Garleanu and Pedersen, 2004).

Regardless of the specific link, theories that relate information to cost of capital imply that a shock to the market's assessment of the informativeness of firms' financial disclosures leads to changes in their cost of capital. That is, assuming that a firm was optimizing its disclosure policies with respect to its cost of capital prior to the shock, the shock should lead to a reassessment.[4] In particular, firms with increases in their cost of capital are predicted to respond with an increase in disclosures, *ceteris paribus*. Moreover, firms that are more sensitive to the cost of capital, for example, because they have greater external financing needs are expected to increase their disclosures more than firms that are less sensitive.

To test these predictions, we exploit news about the events at Enron as a shock to other firms. On October 16, 2001, Enron announced a third quarter loss of $618 million and hinted at problems with its partnerships. On November 29, 2001, Enron announced it would restate its earnings back to 1997 and add $628 million of debt to its 2000 balance sheet. Subsequently, Enron was removed from the S&P 500, its debt was downgraded to junk and, eventually, it filed for bankruptcy. Appendix A.1 provides more details on the sequence of events.

Two features of the news surrounding Enron's collapse make this event an economically and statistically powerful setting to examine the predicted link between

[3] As Lambert et al. (2008) show, the link between disclosure and the cost of capital in Easley and O'Hara (2004) is also driven by the precision of firms' disclosures and hence very similar to link described above, except that Easley and O'Hara (2004) model the precision effects for firm-specific variances only, which makes them diversifiable.

[4] It is not necessary for our analysis that the cost of capital shock stems from transparency concerns. All we need for our research design is an exogenous shock to the cost of capital, which in turn changes the disclosure and cost of capital tradeoff. Moreover, this response can be, but does not have to be rational. An irrational market reaction, which arguably is even more likely to be exogenous, can still trigger a disclosure response.

disclosure and the cost of capital. First, because the financial reporting system was blamed, at least in part, for allowing Enron to hide its economic and financial condition, the Enron scandal led to investor concerns about a systematic lack of transparency in U.S. financial reporting.[5] Although the shock likely had an impact on cash flows for some firms as well,[6] for many firms it was primarily an information-related shock. Hence, it seems reasonable to expect firms to respond with additional disclosures to ameliorate the shock. Second, the shock was triggered by Enron-specific events and hence is exogenous to other U.S. firms. One might argue that the Enron scandal is not really exogenous if it is a symptom of a larger transparency crisis. However, our empirical strategy requires only that the timing of the scandal is exogenous to other firms.

Our analyses focus on shocks to firms' beta factors. To the extent that the Enron events led to an economy-wide transparency crisis, theory also predicts a change in the equity premium. However, shocks to the equity premium apply to all firms and are constant across firms. The beta factor exacerbates or dampens any premium shocks for a given firm and, as a result, appropriately captures cross-sectional differences in the cost of capital shock. Without estimating changes in the equity risk premium, we cannot quantify the full magnitude of the cost of capital shock, but doing so is not necessary for a cross-sectional design.[7] In focusing on beta, we also make an explicit attempt to separate updated assessments of firms' future cash flows and

[5] See Appendix A.1 for citations to articles in the financial press that suggest that the market viewed the Enron scandal as indicative of widespread transparency and governance problems in the U.S. rather than an Enron-specific event.

[6] We address the issue of cash flow shocks in a number of ways. First, we use beta changes and not abnormal returns. Second, we include industry controls and check that our results are not driven by or sensitive to the inclusion of energy firms, for which the shock may not be exogenous. Third, we conduct robustness checks including explicit controls for changes in (analysts') earnings expectations.

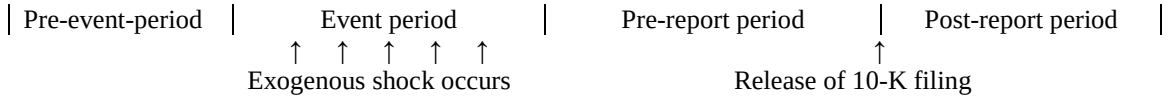
[7] The average (value-weighted) beta for the economy is by definition equal to 1. However, firms with (small) negative beta shocks may still experience an increase in the cost of capital due to an increase in the equity premium.

changes in systematic risk, which then allows us to examine the link between disclosure and the cost of capital as predicted by theory.

In the first part of our analysis, we estimate variations of the following general specification of a cross-sectional model:

$$\text{Change in disclosure} = f(\text{Cost of capital shock}) + \text{control variables} + \varepsilon \quad (1)$$

As dependent variables, we use changes in disclosures in firms' 10-K filings, earnings announcements, and 8-K filings. On the right-hand side, we include control variables that explain (normal) changes in disclosure absent the Enron shock. The following stylized timeline illustrates important periods that we distinguish in our analysis and the timing of the cost of capital shocks:



The news of Enron's problems was a surprise to the market and occurred during a relatively short window. However, the window is long enough that a firm may respond to the shock during the event period, or shortly thereafter. Responses could be interim disclosures, such as conference calls or press releases, or costly financial signals, such as changes in the dividend policy or stock repurchases. As the shock occurred during the *fourth* quarter of 2001, firms could respond in their annual financial reporting, i.e., the 10-K filing. The latter may be particularly appropriate to address transparency concerns considering that they contain audited financial statements and are reviewed by the SEC. Put differently, interim disclosures may not be sufficient to eliminate the concerns or, alternatively, they may require confirmation by (complementary) disclosures in the 10-K that are subject to stricter enforcement.

The cost of capital shock is measured during the event period and again during the pre-report period to account for the possibility that firms respond to the shock with interim disclosures (or costly signals). If interim disclosures and disclosure responses in the 10-K are substitutes, there may be no association between the initial cost of capital shock in the event period and firms' 10-K responses. If, in contrast, interim and 10-K disclosures are complements, the relation between the remaining cost of capital shock and the 10-K disclosure responses is attenuated unless we control for the interim responses. We explore this issue in our analysis.

We consider seven different window specifications to define the pre-event period, the event period, and the pre-report period (see Appendix A.2). In all cases, the pre-event window starts on May 1, 2001, which for firms with December fiscal-year ends is after the year 2000 annual report season, and runs through August 31, 2001. This period precedes the market closings caused by the terrorist attacks on September 11. These events are also excluded from the event period, which starts at the earliest on October 15, 2001. The pre-report period ends either on January 15, 2002 or January 28, 2002, prior to the annual earnings announcement season. Choosing the later date increases the length of the pre-report period and hence the power to measure systematic risk during the period, but it is more likely that the estimate includes the effects of early earnings announcements. Similarly, the choice among the different windows involves trading off a longer event period, which allows us to more precisely measure the effects of the Enron events, against a shorter pre-report period, which reduces the power of our estimation procedure during this period.

Throughout the paper, we present results for Window 1, which is centered on November 8 and has an event period length of 39 days. The event period ends on January 15, 2002. The Appendix provides evidence to justify this choice. The results are robust to alternative windows,

in particular, if we focus on those that maximize the length of the period over which the respective betas are estimated. The post-report period is consistent across all analyses and is defined as May 1, 2002 to August 31, 2002.

In the second part of our analysis, we invert the model in equation (1) and examine subsequent market reactions to firms' disclosures responses after the Enron shock. In doing so, we investigate the alternative hypothesis that firms increase their disclosure following the crisis merely to address concerns about litigation or to thwart future regulation. If firms provide additional disclosures that are not informative to investors (but reduce litigation risk), we do not expect the disclosure changes to be related to subsequent declines in the cost of capital.[8] This analysis is a more traditional design in which we measure the cost of capital response to a disclosure change, which is more in the spirit of traditional disclosure studies, except that we use cross-sectional variation in disclosure that is generated by an exogenous shock to examine the relation with the cost of capital.

Finally, we note that there are several reasons the predicted relations may not be borne out by the data. First, the Enron crisis may not have resulted in an information-related shock for other firms, despite widespread claims in the press at the time. Second, the link between financial disclosure and the cost of capital may not exist in the way predicted by theory. Third, it is conceivable that managers do not expect that they are able to address the transparency concerns via increased disclosure, and thus they do not respond in this way.

[8] Note that if firms provide additional disclosures in response to the Enron debacle but not necessarily to the cost of capital shocks, our analysis of subsequent changes in the cost of capital is still valid as long as the Enron shock produces exogenous variation in firms' disclosure choices.

3. Empirical proxies and descriptive statistics

The sample includes all firms on Compustat that have fiscal year ends on December 31st and non-missing values for total assets and earnings announcement dates in each of the three years from 1999 – 2001. We exclude firms with non-December fiscal years ends to align firms with respect to the timing of their disclosures. We exclude REITS, Limited Partnerships, Trusts and Funds from the sample. In addition, we eliminate 233 firms that likely were significantly influenced by the events of September 11. First, we exclude all airlines and insurance carriers from our sample. Carter and Simkins (2004) show that the events of September 11 had a significant effect on airlines (SIC 45), in part due to significant uncertainty about pending government regulation.[9] Similarly, Doherty et al. (2003) document significant effects of the events of September 11 on insurance carriers (SIC 63). Second, we eliminate firms that file an 8-K that mentions the terrorist attacks and is filed between September 11 and the peak of our event period (November 8), suggesting that the events of September 11 had a material impact. While our event period does not start until mid October, excluding these firms mitigates our concern that the returns and beta estimates for these firms reflect ongoing valuation adjustments associated with the terrorist attacks.

We require data for 1999 and 2000 to create control variables and also benchmarks to measure changes in disclosure. The final sample contains 1,868 firm observations for which we have return data to compute the cost of capital shocks, Compustat data to compute the primary control variables, and 10-K filings data to create the disclosure proxies.

[9] Our beta analyses show that firms in the airlines industry exhibit the largest initial shock, suggesting that there still is an impact from the events on September 11. Although the effect fades over time, airlines remain among the worst affected after the event period, i.e., approximately 90% of them have a positive remaining shock.

3.1 Disclosure proxies

We examine changes in a number of different annual disclosures: the 2001 10-K filing, the related party disclosures in the 10-K or the proxy statement, the fourth quarter 2001 earnings announcement, and 8-K filings. Our main proxy for a change in disclosure is the percent change in the page count of the 10-K for 2001 from 2000 ($\%\Delta PAGES$). Page count data are from the Global Securities Information (GSI) database, which covers all SEC filings that are available in the EDGAR database. We eliminate all filings with less than 10 pages. Most of these observations are references to a fuller document and not the page count of the 10-K.[10] The page counts are for the body of the 10-K (i.e., Items 1 through 15), which includes the exhibits and financial statement schedules in Item 15. The page counts exclude separate exhibits and appendices to the 10-K filing beyond Item 15. While those exhibits and appendices could include useful information, such as material contracts, they are not sufficiently standardized (in format and content) such that changes in page counts would provide a meaningful proxy for variation in information content or disclosure.

We also measure page count changes for three sections within the 10-K. For all three variables, we exclude observations that appear to have rearranged the location of information within the 10-K.[11] The variable $\%\Delta MDA$ is the percent change in pages for item 7, Management's Discussion and Analysis of Results of Operations and Financial Condition (MD&A). The variable $\%\Delta FS$ is the percent change in the pages of 10-K sections that commonly include financial tables. The sections used to create this proxy are Item 6 (Selected

[10] Fifty-six sample firms switch from (to) filing a 10-K to (from) a 10-KSB. Using a different form likely affects the page count. However, the results are virtually the same if we drop these firms.

[11] Observations that report an item in the current year that was incorporated by reference in the previous year (or vice versa) are eliminated under this criterion. We identify observations that potentially rearranged the 10-K using various data filters. For these observations, we examine the 10-K to verify that disclosures within the 10-K were rearranged across various sections.

Financial Data), Item 8 (Financial Statements and Supplementary Data), and Item 15 (Exhibits, Financial Statement Schedules, and Reports on Form 8-K). The variable %ΔDISCUSS is the percent change in the pages of 10-K sections that commonly include narrative discussions of the type of information we expect to be informative in response to a transparency crisis. The sections used to create this proxy are Item 1 (Business), Item 2 (Properties), and Item 7 (MD&A). These two proxies (%ΔFS and %ΔDISCUSS) provide a sense for the type of disclosure responses that firms choose and should address concerns that the page changes for the entire 10-K occur in less important parts. . By combining multiple items, these two proxies also mitigate problems associated with small numbers of pages in the individual sections and with rearranging the location of information within the 10-K.

For all of the percent change variables, the benchmark is the page count in the prior year. We create an alternative proxy that uses the average of the 1999 and 2000 page counts. Results are robust to this alternative specification and are not presented. We truncate %ΔPAGES above the 98th percentile and below the 2nd percentile. For the other percentage change variables, we have manually screened for rearranging of information within the 10-K, which often produces outliers, and hence we truncate only above the 99th percentile and below the 1st percentile to conserve sample size.[12] Winsorizing rather than truncating the variables yields similar results.

Table 1, Panel A reports descriptive statistics for the page count variables. The average 10-K in 2001 has 64 pages ($PAGES_{2001}$), which is almost a 17% increase over 2000. This increase is statistically different from zero and it exceeds the average page change from 1999 to 2000, which equals only 3.4% (untabulated). The difference between the increase from 1999 to

[12] Truncating the percentage change in total pages at the 99th and 1st percentile as well does not materially alter our results. However, the 43 additional observations that are gained due to the milder truncation at the 1% level are flagged by common outlier procedures. The inspection of these observations for the 10-K part analysis also confirms this assessment, which is why we choose to truncate at the 98th and 2nd percentile.

2000 and from 2000 to 2001 is statistically significant below the 1% level. These findings suggest that firms significantly expanded their 10-K filings in 2001 beyond the normal rate.

The MD&A section in 2001 has on average 13.3 pages, which is a 39% increase over 2000. The section with narrative discussions (financial tables and footnotes) has on average 27 (34) pages, which represents an increase of 22% (18%) over year 2000. The MD&A, narrative, and financial sections are longer than in 2000 for over 75% of the sample observations.

As the Enron scandal involved special purpose vehicles and partnerships that were run by corporate insiders, we also create a proxy for disclosure changes about related-party transactions. In doing so, we face two challenges.[13] First, while the 10-K requires disclosures on related-party transactions (Item 13), firms generally satisfy this requirement with a reference to their proxy statement. We therefore examine both the 10-K and the proxy statement and select the page count from the appropriate document for each year before computing a change. Second, disclosures on related-party transactions are often only one or two pages long, which can create a small denominator problem when computing percentage changes. Moreover, it creates the issue that changes of plus or minus one page can produce substantial percentage changes, even though they are essentially measurement error because one year a one-page long related-party section started at the top of the page and next year it started half way down the page and spread to the next. We therefore classify page changes of -1 and +1 as a zero change.

After these adjustments, we compute the percentage change in the number of pages relative to the fiscal 2000 related-party disclosure section ($\%\Delta REL\_PAR$). The page counts are derived from the 2001 10-K or the proxy statement with a filing date between December 31, 2001 and June 30, 2002. We delete extreme percentage changes that are in the 1st or the 99th

[13] In addition, there is the issue that a very meaningful (but short) disclosure may be to simply state that the firm has or had no related-party transactions.

percentile. Table 1, Panel A shows that the average related-party disclosure has 5 pages, but the median is only equal to one page. From 2000 to 2001, the related-party disclosures increase by 19.4% which is statistically different from zero.

The proxy for a disclosure change in the fiscal 2001 earnings announcement is the change in the number of words relative to the fiscal 2000 earnings announcement (%ΔWORDS). The number of words in each announcement is determined based on a manual search of earnings announcements for our sample firms on Dow Jones Interactive. We use only announcements on *Business Wire* or *PR Newswire*, as these two sources furnish unmodified press releases.[14] We delete extreme changes in the word count that are in the 1st and 99th percentile. Panel A of Table 1 reports that the average earnings announcement has 2,003 words ($WORDS_{2001}$), which is a 15.5% increase over the number of words in the earnings announcement around the same time in the previous year.

The next disclosure proxy is constructed from 8-K filings. Firms are required to use the form 8-K to notify investors of any unscheduled material event that is important to shareholders or the SEC. The SEC defines required reportable events (e.g., shutting down a plant or certain executive changes), and it also requires more generally that firms use the 8-K form to update any information in previous SEC filings such as 10-Ks or 10-Qs. Short-window abnormal returns around 8-K filings suggest that they are informative to investors (e.g., Beneish et al., 2005). In our context, 8-K filings could be used to respond to the Enron shock and alleviate transparency concerns.[15]

[14] We eliminate firms if the earnings announcement in any of the three years was within 30 days of the start of trading for the firm on CRSP. These observations are likely the IPO announcement.

[15] For example, on December 5, 2001, American Express filed an 8-K updating its Regulation FD Disclosure, which simply reported: "In view of the situation involving Enron, the company is analyzing its exposure, but preliminarily believes any impact will not be material." Another 8-K followed on February 6, 2002 and stated: "First, in terms of the financial impact of Enron's bankruptcy, back in early December we filed an 8-K indicating that we preliminarily

We count each firm's 8-K filings during the period from October 15, 2001, which is the beginning of our event period using Window 1, to March 31, 2002 and the same period one year earlier (8KCOUNT). In these counts, we exclude filings related to the terrorist attacks on September 11, 2001, deleting those that refer to this date or include related words. We then compute the difference in the 8K counts from 2000 to 2001 (Δ8KCOUNT). We set all differences that are larger than three in absolute value equal to 3 and -3, respectively. Table 1, Panel A shows that sample firms file on average about one 8-K during the period, although the median number of filings is zero. Excluding 8-K filings related to the events of September 11th, the average change in the number of filings is close to zero.

Our last disclosure proxy is based on changes in the number of conference calls. As for the 8-K filings, we count the number of conference calls from October 15, 2001 to March 31, 2002 (CONFCALL) and then compute the difference relative to the same window the year earlier (ΔCALL). We again set all increases (decreases) that are larger than three in absolute value equal to 3 (–3). Table 1, Panel A shows that, on average, firms hold one conference call over the measurement period and the number of calls decreases slightly relative to the prior year.

Table 1, Panel B presents descriptive statistics for the control variables in the analyses. They represent proxies for firm characteristics that are commonly viewed as determinants of firms' disclosures, i.e., firm size, performance, financing needs and growth opportunities (e.g., Lang and Lundholm, 1993; Leuz and Wysocki, 2008). We truncate all control variables at the 1st percentile and the 99th percentile and measure them as of the beginning of the fiscal year, unless noted otherwise. In untabulated regressions, we confirm that the levels of our disclosure proxies

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believed the impact from Enron would not be material. Having now completed our review, this statement is still true. Second, we have also reviewed our business and accounting practices in light of Enron's recent issues. Based on this review, we can see no parallels between our businesses and what we understand the practices were at Enron. Here are a few specifics." The 8-K continues with a discussion of special purpose entities, off-balance-sheet financing, and employee conflict of interest, all three of which were problems at Enron.

exhibit meaningful and similar associations with the control variables and hence the determinants of disclosure.

3.2 Cost of capital shocks

To construct measures of systematic risk in the pre-event period, the event period, and the pre-report period, we employ a regime-switching model suggested by Lockwood and Kadiyala (1988) to estimate event-induced changes in systematic risk. The method, which nests traditional methods, permits systematic risk to change gradually during the event period and exit the period at higher or lower levels than the pre-event period. It provides period-specific beta estimates, which we use to construct cost of capital shocks during the event period and pre-report period. Separately, we estimate the post-report period beta after the annual report season from May 1, 2002 to August 31, 2002 using a standard market model.

Following Lockwood and Kadiyala (1988) and Cyree and DeGennaro (2002), the model specification is:

$$R_{it} = a_i + b_{it} R_{mt} + \varepsilon_{it} \tag{B1}$$

$$b_{it} = b_{i1} + b_{i2}(T1 - t)(t - T2)D1_{it} + b_{i3}[(T2 - T1)D2_{it} + (t - T1)D1_{it}] \tag{B2}$$

where R_{it} is the daily holding period return for firm i from CRSP on day t (including dividends) and R_{mt} is the value-weighted return on the market from CRSP for day t. Systematic risk varies as a function of the trading day t (equation B2). T1 and T2 define the event period. They are specified as the number of trading days in the event period relative to day t. For example, our event period in window 1 extends from October 15 through December 5 (inclusive), which contains 39 (CRSP) trading days. Returns observations on November 8 (the center trading day) are assigned a date of t = 0, T1 is set at -19 and T2 is set at 19. D1 and D2 are indicator variables

that equal one when the return observation is for a day t that is during the event period or during the pre-report period, respectively.[16]

From the model parameters, we create separate cost of capital measures for the pre-event, event, and pre-report periods. First, systematic risk for the pre-event period (BETA_PRE) is equal to $\hat{b}_{i1}$. This parameter is a constant throughout the pre-event period. Consistent with the assumption that the pre-event period is one during which firms were in equilibrium, this estimate serves as a benchmark for the firm's beta prior to the transparency shock. During the event period, when D1 = 1 and D2 = 0, systematic risk is determined by the parameter estimates for $\hat{b}_{i1}$, $\hat{b}_{i2}$, and $\hat{b}_{i3}$. The quadratic specification allows for the initial cost of capital shock to be either positive or negative. The parameter $\hat{b}_{i2}$ captures the direction and curvature of the initial shock. The quadratic specification also allows for (but does not require) a recovery of the shock during the event period. The quadratic form is the benefit of the regime-switching model because it can accommodate the impact of interim disclosure responses on firms' costs of capital during the event period. We later confirm that the curvature and firms' interim disclosures are, in fact, related as hypothesized.

We compute the event period beta (BETA_EVT) at day t = 0, which represents the peak given the quadratic specification. This beta is computed from (B2) by setting t = 0 and recognizing that our event window is symmetric and hence T2 = -1*T1:

$$\hat{\beta}_{i2} = \hat{b}_{i1} + \hat{b}_{i2}(T2)^2 + \hat{b}_{i3}T2 \qquad \text{(B3)}$$

[16] The event window includes the third quarter earnings announcement period. We repeat the estimation excluding return observations on the earnings announcement date and the previous day. The estimates of $\hat{b}_{i1}$ and $\hat{b}_{i3}$ are virtually identical. Since most third quarter earnings announcements occur in mid-to late October, which coincides with the event period, the exclusion of returns on these days has a bigger impact on $\hat{b}_{i2}$. However, the impact is economically small (at the 5th digit) and the estimates are not significantly different. The results presented in the paper are based on the estimates that include the returns on the third quarter earnings announcement date.

After the shock and during the pre-report period, systematic risk is:

$$\hat{\beta}_{i3} = \hat{b}_{i1} + \hat{b}_{i3}(T2 - T1) \tag{B4}$$

The measure represents the beta that remains (BETA_REM) after the market has incorporated the transparency crisis and the firms' immediate responses to the crisis, but before firms have responded in their earnings announcement or 10-K filings. Like the pre-event beta, the pre-report period beta (BETA_REM) is constrained to be a constant across the period.

To provide intuition for the parameters, Figure 1 illustrates time-series patterns of systematic risk for the pre-event period, the event period, and the pre-report period under alternative estimates for $\hat{b}_{i2}$ and $\hat{b}_{i3}$. Panels A through C illustrate the behavior of systematic risk in the cases of HIGH positive $\hat{b}_{i2}$ (equals 0.100), LOW positive $\hat{b}_{i2}$ (equals 0.002), and negative $\hat{b}_{i2}$ (equals -0.002), respectively. Within each panel, we present estimates of systematic risk in the pre-report period for five levels of $\hat{b}_{i3}$. In all three panels, the pre-event period beta estimates are constant over the pre-event period. The pre-report period betas also are constant throughout the period, but they can be higher or lower than the pre-event beta. When $\hat{b}_{i3}$ is positive, the pre-report beta is higher than the pre-event beta. Furthermore, the pre-report period beta can be higher than the event period beta, even when $\hat{b}_{i2}$ is positive. This follows from comparing (B3) and (B4) and requires that $\hat{b}_{i3}T2 > \hat{b}_{i2}(T2)^2$.

Before computing the shocks, we truncate the beta estimates in each period at the 1st and the 99th percentile. In addition, we drop observations for which the beta appears to unstable as indicated by a significantly positive estimate in the pre-event period but a significantly negative estimate in the post period (or vice versa). The criterion eliminates 20 observations but does not

materially affect our results. We then use beta *level* estimates over the three periods to create proxies for *changes* in firms' cost of capital (i.e., shocks) as a result of the Enron events. We define the initial shock (INIT_SHOCK) as the difference between the event period beta in (B3) and the pre-event period beta: INIT_SHOCK = BETA_EVT - BETA_PRE. Recalling that BETA_EVT is the peak of the quadratic beta estimate, the initial shock metric captures the extent to which a firm's systematic risk increases during the Enron crisis. We define the remaining shock (REM_SHOCK) as the difference between the pre-report beta and the pre-event beta, i.e., REM_SHOCK = BETA_REM - BETA_PRE. The remaining shock captures the extent to which a firm's systematic risk continues to be elevated after the transparency crisis, and the firm's potential immediate disclosure responses, but before the 10-K is filed.

Table 2, Panel A, provides descriptive statistics for the parameter estimates, systematic risk and the beta shocks based on Window 1, which is centered on November 8. The average pre-event beta for the sample firms, which serves as a benchmark and control variable in the analysis, is 0.670 (and close to 1 computing a value-weighted average). The shocks variables exhibit considerable cross-sectional variation and a reasonable parameter range. Panel B reports the average initial shock (INIT_SHOCK) and the average remaining shock (REM_SHOCK) by 2-digit SIC industry code and the proportions of positive observations in each industry. The industries with the largest initial shocks are Furniture (SIC 25), Building products (SIC 15), and Auto dealers/gas stations (SIC 55). Industries that have a high proportion (i.e., greater than 80%) of firms with positive remaining shocks are Furniture (SIC 25), Building/Construction (15), Personal services (72), Apparel (SIC 23), Oil and gas extraction (SIC 13), Motion Pictures (78), and Water transportation (SIC 44). In the Appendix, we further characterize the shock variables computed from the quadratic model and conduct various validity checks.

4. Analysis of disclosure responses to cost of capital shocks

4.1 Main results

The first analysis relates the percentage changes in the 10-K page count to the cost of capital shocks. We implement the following specification of the general model in equation (1):

$$\begin{aligned} \%\Delta PAGES = \alpha + \beta_S SHOCK + \beta_E BETA\_PRE + \\ \delta_1 SIZE + \delta_2 ROA + \delta_3 DERATIO + \delta_4 MB + \delta_5 PPE + \varepsilon_{PGS} \end{aligned} \quad (2)$$

We estimate the model including *either* the initial shock (INIT_SHOCK) or the remaining shock (REM_SHOCK). We predict a positive association between the initial shock and the percent change in pages under the assumptions that 1) the 10-K is a mechanism for firms to increase transparency, and 2) increases in transparency reduce the cost of capital, as predicted by theory. This prediction further assumes that a firm responds to the initial shock by expanding its 10-K regardless of a potential recovery from the initial shock in the interim. This issue does not arise for the remaining shock, for which we also predict a positive association with the percent change in pages.

The analysis includes the pre-event beta (BETA_PRE) as a control variable.[17] In addition, we include control variables for commonly cited determinants of disclosure such as firm size, performance, leverage and financing needs (Lang and Lundholm, 2000; Leuz and Wysocki, 2008). The proxies for these constructs are the natural log of total assets at December 31, 2000 ($LASSETS_{2000}$); return of operating income on average assets for the year ended December 31, 2000 (ROA_{2000}); the debt-equity ratio at December 31, 2000, which is the book value of long-term debt scaled by the market value of equity plus the book value of long-term debt and preferred shares ($DERATIO_{2000}$); the market-book ratio at December 31, 2000 (MB_{2000})

[17] Standard diagnostic tests suggest that multicollinearity is not a problem.

where observations with a negative book value of equity are set to missing; and the ratio of property, plant and equipment, net, to total assets (PPE/TA_{2000}) as a proxy for capital intensity. An extended model also includes changes in several of these variables from 2000 to 2001. All models include industry-fixed effects based on one-digit SIC codes and a separate indicator variable for firms in Enron-related industries (defined as SIC2 equal to 13, 29 or 49).

Table 3, Panel A presents results for eight model specifications. Our subsequent inferences are based on standard errors that are clustered at the two-digit SIC level. We cluster at the industry level to allow for cross-correlation in the error terms that arises when the Enron shock affects firms in an industry similarly.[18] The results for models (1) - (4), which include the initial shock variable and four variations of control variables, show a positive and significant relation between the initial shock (INIT_SHOCK) and the percentage change in the page count of the 10-K. The results for models (5) - (8), which include the remaining shock variable and four variations of control variables, show that the relation between the remaining shock (REM_SHOCK) and page count changes also is significantly positive. These results are robust to alternative sets of control variables. In particular, the results are similar and the inferences the same if we use the market value in computing firm size, employ contemporaneous, rather than lagged controls, and include only changes in the control variables in the model.

The positive associations for the initial and remaining shock with the disclosure changes in the 10-K are consistent with our hypotheses and the notion that firms' disclosures reduce their cost of capital. Although we do not make *ex ante* predictions about the control variables, the results are consistent across all eight models and accord with our intuition. Firms with higher pre-event period betas, deteriorating operating performance, and with greater and growing firm size increase their 10-K disclosures more.

[18] Alternatively, we cluster our standard errors by auditor and obtain very similar inferences.

We next analyze the determinants of page count increases in specific sections of the 10-K that are likely to contain relevant disclosures. The variable %ΔMDA is the percent change in pages for the MD&A; %ΔFS is the percent change in the pages of the 10-K sections that commonly include financial tables; and %ΔDISCUSS is the percent change in the pages of 10-K sections that commonly include narrative discussions of the type of information we expect to be informative in response to a transparency crisis. We also examine the percent change in the pages of the 10-K or the proxy statement that include firms' related party disclosures (%ΔREL_PAR).

Table 3, Panel B, presents the results for the initial shock (INIT_SHOCK) or the remaining shock (REM_SHOCK), the four disclosure changes, and the levels of the same control variables and industry dummies as in Panel A (model 2).[19] We find that the initial shock is positively associated with the page count changes in all three 10-K sections but the relation is statistically significantly only for the page count changes in the financial statement sections of the 10-K. For %ΔMDA and %ΔDISCUSS, the p-values for the coefficients are close to conventional significance levels. The remaining shock is significantly associated with %ΔFS, %ΔDISCUSS and with the percent change in the related party disclosures (%ΔREL_PAR).

Next, we estimate the same models as in Table 3 using the percentage change in the word count of the earnings announcement in 2001 relative to 2000 (%ΔWORDS) as our disclosure response variable. In these regressions, the association between %ΔWORDS and the cost of capital shocks is generally insignificant with p-values that are far from conventional significance levels. For brevity, we do not tabulate these results. We subject the word count proxy to numerous refinements, e.g., we adjust the word counts for the occurrence of unusual corporate

[19] The results are similar but stronger when we use model 1 and weaker but consistent when we include changes in the control variables (model 3).

events and by industry; we convert the percentage changes into a simple variable indicating increases, decreases and approximately no change in the size of the earnings announcement; we focus on large changes only, drop small earnings announcements (< 500 words), and use log changes. These refinements do not change the result that the association of interest is insignificant. Thus, it does not appear that noise in the earnings announcement proxy generates this (non-)result. While we are cautious about interpreting this finding, it is possible that earnings announcements are simply not well suited to address the transparency concerns that arose from the Enron collapse. They tend to be rather brief and they are not audited or subject to the same enforcement as official SEC filings. Another (but more minor) issue is that firms' earnings announcements and our pre-report beta estimation may overlap, which could result in confounding effects.

4.2 Robustness tests

We subject the results in the previous section to a large battery of robustness tests to address a number of potential concerns. First, in an effort to rule out spurious correlations as an explanation for the results, we examine whether the initial shock and remaining shock variables have any explanatory power for the percent change in page counts from 1999 to 2000. They do not; the coefficients of interest in these "placebo" regressions are close to zero, as they should be.

Second, in Panel C of Table 3, we address a number of concerns about the use of betas to measure cost of capital shocks. For brevity, we report only the key coefficients of interest. But the models from the relation between %ΔPAGES and the cost of capital shocks include the full set of control variables from Models 2 and 6 in Panel A. In the first model, we use beta shocks derived from a linear market model. While quadratic beta estimates over the event period are

conceptually preferred and better suited for our setting (e.g., to capture interim responses), we obtain similar results using linear beta estimates, which is reassuring.

Another potential concern is that beta estimates for infrequently traded stocks are downward biased (Scholes and Williams, 1977). As a result, the estimated beta shocks may in part reflect differences in liquidity, which matters because liquidity and corporate disclosure are known to be related (e.g., Welker, 1995; Healy et al., 1999; Leuz and Verrecchia, 2000). To address this potential issue, we examine the relation between %ΔPAGES and the two beta shocks for a subsample of stocks with a share price above $5, which are less likely to have non-synchronous returns. As reported in Panel C, the $5 restriction reduces the sample size to 1,387 observations, but the results are very similar and the inferences are the same (see Model 2). The results are also robust to controlling for the log of average daily volume as a proxy for the downward bias in the beta estimates (not tabulated).[20]

Next, we address the concern that changes in the market's expectations about future cash flows as a result of the Enron scandal (or the September 11 terrorist attacks) unduly affect our findings. By using changes in beta, rather than abnormal returns, we should in principle separate cost of capital and valuation changes that result from updated assessments of future cash flows. Furthermore, our primary sample excludes airlines, insurance companies, and firms that file an 8-K that mentions the September 11 terrorist attacks. Nevertheless, we include the revision in the analysts' consensus forecast for next year's earnings, computed from August 2001 to December 2001, as a proxy for the change in cash flow expectations over the event period. The coefficient estimate on this variable is significantly negative, indicating that firms with larger

[20] Another way to gauge the issue is to analyze the correlation between the residuals from the switching regime model and volume. This analysis (untabulated) reveals that the correlation are on average small, approximately 5-6%, with approximately 20-30% of the correlations being significant and positive and 5-15% of the correlations being significant and negative. The correlations are similar across the pre-event, event, and pre-report periods.

downward revisions provide more disclosures. However, controlling for the forecast revisions does not alter our findings for the beta shocks.[21] Model 3, in Panel C, shows that the coefficients on INIT_SHOCK and REM_SHOCK are not attenuated and, if anything, increase compared to Panel A, alleviating concerns that our results are driven by changes in cash flow expectations.

The last model in Panel C includes a control variable for idiosyncratic return volatility to address the concern that (a) the quadratic beta model insufficiently separates systematic and idiosyncratic components of risk and (b) that stocks with higher volatility are simply also more responsive in their disclosures. Model 4 shows that controlling for idiosyncratic volatility, which is measured from the residual of a linear market model over the pre-event period. The results are similar and the inferences the same if we use raw volatility over the pre-event period or idiosyncratic volatility over the event period as controls.

We also perform several robustness checks related to specific variable definitions (results not tabulated). First, we adjust the changes in page count and word count for the existence of events that may reflect a fundamental change in the firm's operations during the period that is correlated with both its beta and its required disclosures. For example, discontinued operations may be associated with changes in systematic risk and it is likely to be associated with changes in page counts given the SEC disclosure requirements associated with discontinued operations. Our reviews of financial statements as well as SEC disclosure requirements suggest that the existence of the following irregular items (IRREGITEM) in the current year and two previous years can affect the length of the financial statements: discontinued operations, new segments, extraordinary items, accounting changes, certain special items (specifically litigation reserves or restructuring charges), and acquisition activity. We create seven indicator variables equal to one

[21] This result also holds if we use the two-year ahead consensus forecast revision, rather than next year's revision. Simply controlling for analyst following also does not alter our findings or inferences.

if the firm has evidence of these events based on Compustat data for the three years 1999, 2000, and 2001. We regress the changes in the page count on these indicator variables and use the residuals from the following model (firm subscripts omitted) as dependent variable in our regressions in Table 3, Panel A:

$$\%\Delta PAGES = d + \sum_{y=1999}^{2001} \sum_{j=1}^{7} k_{jy} IRREGITEM_{jy}$$

While these adjustments provide a useful sensitivity check, it is *a priori* not obvious that the adjusted proxies dominate the unadjusted page (or word) changes. The transparency concerns after Enron and the cost of capital shocks may have induced firms to make decisions that would result in such irregular items. For instance, "coming clean" on certain transactions is likely to result in extraordinary or special items. Nevertheless, our results are unaffected by these adjustments. That is, the positive association between the cost of capital shocks and the page changes continues to be significant and, more importantly, the coefficients of key interest are not materially altered, indicating that unusual corporate events and fundamental changes in the firm are not responsible for our findings.

Finally, we include controls for past performance, specifically for past losses as they may trigger additional language in firms' earnings announcements and annual reports (Li, 2007). Models (2) and (6) already include both ROA_{2000} and other models in Panel A of Table 3 include the change in ROA from 2000 to 2001. But given that operating performance generally lags stock returns, we expand these models to include the cumulative stock return over the pre-event period, the event or the pre-report period. In addition, we include an indicator variable for loss firms (in 2001 and, alternatively, 2000). The results are robust to the inclusion of these variables and the inferences remain the same.

4.3 Cross-sectional analysis of the 10-K responses

In this section, we present a cross-sectional analysis of the 10-K responses. We identify potential sources of cross-sectional variation in the expected benefits to expanding disclosures in the 10-K, which should lead to cross-sectional variation in the response. Exploiting this cross-sectional heterogeneity in the expected benefits of expanded 10-K disclosures improves identification and the confidence in our earlier findings.

We argue in Section 3 that we expect the strongest disclosure response for firms that have high external financing needs and larger growth opportunities. These firms are more likely to be sensitive to shocks to their cost of capital as they are expected to be more frequently accessing capital markets. We also expect firms with positive shocks to respond more strongly, as there may not be any cost savings to decreasing disclosure, and disclosure decreases may in fact increase expected litigation costs.

Therefore, we estimate our main page change model separately for firms with positive shocks and a high sensitivity to cost of capital shocks vs. the (residual) sample of firms that have *either* a negative shock *or* low financing needs. This specification allows the control variables to vary across subsamples and hence is more general than an interaction term. We use two proxies to identify firms that are more likely to be sensitive to cost of capital shocks because they have high financing needs: 1) Firms with an above-median investment cash flow during fiscal 2001 scaled by total assets, and 2) Firms with an above-median difference between the average growth rate over two years and the maximum growth rate that can be financed by internal funds. Following Demirgüc-Kunt and Maksimovic (1998), we compute the maximum internally-financed growth as ROA/(1–ROA). We consider alternative partitioning variables for firms' financing needs and growth opportunities, e.g., splitting by the market-to-book ratio, and obtain

similar results. There are 946 (820) observations with a positive initial (remaining) shock and 922 (1,048) observations with a negative one. We do not have data for our financing needs variables for all firms and hence have fewer observations than in Table 3. All models include the control variables from specifications (2) and (6) in Table 3 including the industry-fixed effects. The coefficients for the control variables are not presented to conserve table space.

Table 4, Panel A presents the cross-sectional results for %ΔPAGES. Columns (1) through (4) present results using above-median investment cash flow to identify firms that are more sensitive to positive cost of capital shocks. Columns (5) through (8) present results using above-median external financing needs to identify high-sensitivity firms. The coefficient estimates on INIT_SHOCK in models (1), (2) and (6) are significant at the 10% level or better. The coefficient estimate on REM_SHOCK is significant in model (7). More importantly, the coefficients on the shock variables, INIT_SHOCK and REM_SHOCK, for the group with positive shocks and high financing needs are much larger in magnitude than either the coefficients for the residual group or the coefficients on the shocks in Panel A of Table 3. We test whether the differences in the coefficients on the shocks are statistically significant across the two subsamples and can reject the null hypothesis for models (7) and (8). For models (1) and (2), the p-value is close to conventional significance levels (0.14), especially when considering that we cluster our standard errors at the industry level and hence draw conservative inferences.

In Panel B, we report the same model specifications for the page changes in the MD&A. We observe the same patterns for the coefficients on %ΔMDA as for the 10-K page changes. That is, the estimated coefficient on %ΔMDA for firms with positive shocks and high financing needs exceeds the respective coefficient for the residual group. With the exception of the first model, the shock coefficients are not statistically significant but their magnitudes far exceed

those in Panel B of Table 3, suggesting that the small sample size and hence lack of power are primarily responsible for the low t-statistics.

On November 29, 2001, the SEC expanded its investigation to include Enron's auditor, Arthur Andersen LLP (AA). The audit firm was indicted in 2002 and eventually went out of business as a result of the Enron collapse. We therefore split the sample into AA clients and non-AA clients. The idea behind this split is AA clients are more likely to experience shocks to their credibility and hence more likely to respond by increasing their disclosure.[22] Consistent with this expectation, Panel C shows that AA clients exhibit larger coefficients on the initial shock using %ΔPAGES, %ΔMDA and %ΔREL_PAR. The difference in the coefficients between AA clients and non-AA clients is statistically significant for the 10-K page changes and the related party disclosure changes.

In a final set of cross-sectional tests (untabulated), we drop the beta shocks and the pre-event beta from the models in Panel A of Table 4 and re-estimate the models splitting the sample into firms with high and low financing needs. We then compare the constants across the subsamples. The idea behind this analysis is to see whether firms that ex ante are predicted to be more affected by a transparency crisis do in fact increase their disclosures more than other firms. This analysis does not rely on our beta shocks and is merely built on the premise that the Enron scandal posed an exogenous transparency shock. We find that firms with larger financing needs, as measured by the same proxies as in Panel A, exhibit significantly larger disclosure increases.

Overall, the cross-sectional evidence presented in this section is reassuring and increases the confidence in our earlier inferences.

[22] As discussed in Ball (2009), the Enron scandal was a more severe blow to the credibility of AA audit clients than prior financial reporting scandals (for AA or other audit firms).

5. Analysis of the role of interim disclosures

In this section, we analyze the relation between the cost of capital shocks and firms' immediate disclosure responses. The results in Tables 3 and 4 indicate that firms with greater *initial* shocks respond with expanded disclosures in their 10-K filings, irrespective of subsequent changes to systematic risk (e.g., due to interim disclosures) already suggests that firms view the 10-K filings as complements to other more immediate responses to the transparency shock. One explanation for this finding is that any interim disclosures (or other actions) need to be backed up by expanded 10-K filings.

To examine how interim disclosures and 10-K responses are related, we explicitly include proxies for firms' interim disclosures as controls in our 10-K page changes regressions. We analyze four different variables that capture a more immediate disclosure response to the transparency shock: 8-K filings, conference call activity, disclosure in the earnings announcement, and a market-based summary measure of the firm's response to the transparency shock derived from the regime switching model, i.e., the parameter estimate for $\hat{b}_{i2}$. If interim disclosures and 10-K filings are complements, we expect a positive relation between the interim disclosure and the 10-K page changes. Moreover, the inclusion of interim variables could attenuate the relation between the initial shock and the 10-K page changes because the two disclosure variables capture essentially the same decision. Conversely, introducing the interim disclosures should strengthen the relation between the remaining shock and the 10-K page response because if the two disclosures are complements the decline in beta in response to interim disclosure occurs with the expectation that firms still respond at the 10-K. Thus, controlling for the interim disclosures should help the relation between REM_SHOCK and %ΔPAGES.

We expand the regression models (2) and (6) from Table 3 to include proxies for the four interim disclosure proxies. Table 5 reports the results from these regressions. Models (1) and (2) include Δ8KCOUNT and Models (3) and (4) include ΔCALL. The coefficient estimates on INIT_SHOCK and REM_SHOCK remain significant in both cases. The change in the number of 8-K filings is positively associated with the percentage change in 10-K pages. However, the association between the changes in the number of conference calls and the change in the 10-K page counts is negative, although it is not significant.

Models (5) and (6) include the percent change in words in the annual earnings announcement (%ΔWORDS). These models provide little evidence that changes in firms' earnings announcements, as measured by word count changes, are related to increased disclosure in the 10-K. This result is consistent with our earlier findings that suggest that changes in earnings announcement are not suited to address investors' transparency concerns as a result of the Enron collapse. Given these findings, it is not surprising that the coefficients on the initial shock and the remaining shock variables remain positive and significant.

Model (7) includes the $\hat{b}_{i2}$ parameter from the regime switching model as a proxy for a firm's immediate responses to the initial beta shock and, hence, is estimated for the remaining shock only. As illustrated in Figure 1, $\hat{b}_{i2}$ captures the direction of the beta shock and the curvature of quadratic event period beta. One explanation for this curvature is that a firm has responded to the initial shock, for example, through interim disclosure or other actions that enhance a firm's credibility, such as changes in dividend policies. In this sense, $\hat{b}_{i2}$ is a market-based measure of a firm's responses to the initial shock and should capture the effects of *all* actions the firm takes during the event period, regardless of whether we can identify or measure them. The downside of this measure, however, is that $\hat{b}_{i2}$ may also capture changes in the cost

of capital unrelated to a firm's direct actions, including recoveries in the cost of capital due to information transfers from other firms. However, as long as these other changes are not systematically biased, they should introduce only noise into our analysis.

The percent change in 10-K pages has a positive and significant association with $\hat{b}_{i2}$, which indicates that there are complementarities between a firm's immediate responses to the shock and the disclosure responses in the 10-K filing. Moreover, including $\hat{b}_{i2}$ significantly increases the coefficient on REM_SHOCK, which is expected if interim responses and the 10-K are complements.[23]

Next, we directly examine the relation between firms' interim disclosure responses and the cost of capital shocks. Table 6 is the analog to the analysis of 10-K responses in Table 3, but using the two immediate disclosure responses as dependent variables. Model (1) in Table 6 shows that the association between changes in firms' 8-K filings and the initial shock is positive and significant, suggesting that firms respond to the shock with the release of 8-K filings. As the measurement of the change in 8-K filings and the event period overlap, we re-run the model measuring the change in 8-K filings starting in the middle of the event period (i.e., November 8), so that the shock is measured largely before the disclosure response. Again, the association between the shock and the 8-K response is positive and significant. Next, to see whether the 8-K filings help mitigate the cost of capital shocks, we restrict the change in 8-K filings to those that occur over the second-half of the event period, i.e., after the peak of the event period beta and up to the start of the pre-event period (i.e., December 6, 2001). Model (2) shows that the coefficient

[23] We conduct a test for the difference in the coefficient on REM_SHOCK excluding and including $\hat{b}_{i2}$.

on REM_SHOCK is negative and significant, consistent with the idea that immediate 8-K responses mitigate the initial shock.[24]

Models (3) and (4) perform the same tests for the change in the number of conference calls. We do not find a positive association with the initial shock, but the coefficient on the remaining shock is close to conventional significance levels (p=0.185, two-sided), which is consistent with the 8-K findings. The latter association is significant at the 1% level if we use changes in the conference calls over the entire event window, i.e., from October 15 to December 6, 2001.

Models (5) and (6) estimate the relation between the interim disclosure responses and the $\hat{b}_{i2}$ parameter from the regime switching model to see whether the curvature in the quadratic event beta is indeed related to the interim responses. Columns (7) and (8) show a positive association for both interim disclosures, consistent with the idea that the curvature reflects among other things firms' immediate responses, but the relation is only significant for the 8-K filings. The weaker findings for the conference calls could stem from the fact that they are purely voluntary.

Taken together, the results in Tables 5 and 6 emphasize that using a quadratic estimate of beta during the event period is an important feature of our analysis. We intentionally define the event period to be long enough to capture the series of Enron-related events that led to the transparency crisis. However, having an extended event period increases the likelihood of confounding events during the event period, in particular, due to firms' responses to the initial shock. Our regime-switching model addresses this problem by being flexible enough to capture these interim responses in the beta estimation.

[24] We also confirm that the decline in the beta from the event period peak to the pre-report beta is significantly related to the change in 8-K filings.

6. Analysis of market reactions to 10-K filings

In this final section, we examine whether increases in disclosure have market reactions and hence whether the disclosure responses are effective. These tests are similar to those in traditional cross-sectional disclosure studies that examine the impact of a firm's disclosure activity on its cost of capital. However, the Enron setting may offer an advantage in terms of power to detect an effect of disclosure, given the magnitude of the information-related problems in this environment. Moreover, these tests round out our analyses and shed light on the question of whether the additional disclosures are indeed valuable to market participants.

Although these tests for the effectiveness of the disclosures complete the analysis, we note that it is not necessary that we observe a cost of capital reaction to the changes in disclosure in order to justify managers' decisions to increase disclosure. We may not observe a reaction to the increased disclosure if capital markets do not view the information as credible and hence the the disclosures do not reduce the transparency concerns. Furthermore, firms may have increased "irrelevant" disclosures if they believed that providing them would mitigate litigation risk (Rogers, 2005).

We analyze both post 10-K filing changes in systematic risk and short-window abnormal volume responses to the 10-K filing. We begin with the beta response. We define the beta response (BRESPONSE) as the change in systematic risk between the event period and the post-filing period. We estimate the post-filing period beta (BETA_POST) after the annual report season from May 1, 2002 to August 31, 2002 using a standard market model. Thus, BRESPONSE = BETA_EVT - BETA_POST. A positive value of the beta response variable suggests a *greater* recovery of the beta relative to the peak level of systematic risk during the

event period. We are able to estimate BRESPONSE for 1,797 observations. The average (median) response is -0.085 (-0.12).

The measure of abnormal volume is a firm-specific measure (Asthana et al., 2004) that has been applied specifically to the context of 10-K filings. We define abnormal volume ($AVOL_t^i$) for firm *i* on day *t* as:

$$AVOL_t^i = \frac{VOL_t^i - \mu^i(VOL_d^i)}{\sigma^i(VOL_d^i)}$$

where VOL_t^i represents daily trading volume for firm *i* on day *t*. Consistent with Asthana et al. (2004), we define the normal (non-filing) period as the 45 days from 49 days before to five days before the 10-K filing date, and we measure the mean (μ) and standard deviation (σ) of daily trading volume for each firm *i* over this non-filing period. We compute abnormal volume for a five day event window around the 10-K filing date (-1,+3).

Table 7, Panel A presents the analysis for the beta response using various combinations of control variables. We find that the percentage change in the 10-K page is significantly related to the decline in beta for all three models. These findings are consistent with the interpretation that the 10-K disclosure responses are effective in addressing the transparency concerns.

Table 7, Panel B presents the analysis of abnormal volume. The models include control variables consistent with Asthani et al. (2004). In particular, we control for last year's abnormal volume response to the 10-K to ensure that any effect for %ΔPAGES stems indeed from the increase in pages and not a cross-sectional difference in firms' volume responses to the 10-K. Furthermore, we include a control variable capturing the delay in the filing of the 10-K, which Asthana et al. (2004) document as being related to the abnormal volume response. We again

find that the %ΔPAGES is significantly related to the abnormal volume reaction in all three models. This finding is consistent with the interpretation that the additional disclosures in the 10-K are informative to investors and hence lead to greater turnover at the filing of the 10-K.

7. Conclusions

In this paper, we analyze the relation between disclosures and the cost of capital using an exogenous cost of capital shock created by the Enron scandal in Fall 2001. These tests are opposite to the typical research design that analyzes cost of capital responses to disclosure changes. In reversing the tests and using an exogenous shock, we mitigate endogeneity concerns in traditional cross-sectional disclosure studies, especially with respect to omitted factors that jointly determine firms' disclosure and their cost of capital. Our analysis is based on a unique method that allows us to estimate shocks to firms' betas as well as accommodate subsequent changes in beta due to firms' disclosure responses to the transparency crisis.

Our analysis shows that beta shocks around the Enron scandal are associated with increased disclosure. Firms expand the number of pages of their annual 10-K filings, notably the sections containing the narrative disclosures like the MD&A and related-party transactions as well as the financial statements and footnotes. The increase in disclosure is particularly pronounced for firms that have positive cost of capital shocks and larger financing needs and for firms that have larger credibility issues. We also find that firms respond with additional interim disclosures (e.g., 8-K filings) and provide evidence suggesting that these disclosures are complementary to the increase in 10-K disclosures. Finally, we show that firms' disclosure responses have significant subsequent market reactions and are effective in reducing the impact of the transparency crisis on firms' costs of capital.

These results complement prior disclosure studies by explicitly linking information-related cost of capital shocks to firms' disclosure responses. In doing so, we increase our confidence in empirical support for the fundamental link between disclosure and firms' cost of capital. Our study also provides novel evidence that firms respond to shocks to the credibility of their financial reports. This evidence is important as it shows that firms can mitigate the impact of a wider transparency crisis and that firm-specific disclosures can influence the cost of capital.

Appendix

Section A.1 describes Enron-related events between October 16, 2001 and January 26, 2002. From these, we identify seven potential sets of pre-event – event – pre-report windows that are outlined in Section A.2. The final section reports the results of an *ex post* analysis of the beta estimates over the various windows to assess their validity.

A.1 Event dates related to Enron

We identify potentially significant events from published timelines of the Enron scandal (e.g., Platts, 2002; Washington Post, 2002), and from independent searches of news reports. Potentially important event dates in the context of our study are those that changed investors' prior beliefs about the likelihood or magnitude of private information about the sample firm.

We identify three types of event dates. First, we identify six Enron-specific events that are also indicators that financial reporting or corporate governance problems may be widespread.

Oct. 16: Enron first announces its huge losses and hints of conflict-of-interest problems with its partnerships.
Oct.22: Enron announces that the SEC has launched an inquiry.
Oct 29: The SEC moves its inquiry to DC signaling a higher likelihood of securities violations.
Oct 31: The SEC initiates a formal investigation.
Nov 8: Enron restates earnings back to 1997.
Nov 29: The SEC's investigation is expanded to include Arthur Andersen LLP.

These events are specific to Enron, but they are not necessarily the most significant for Enron based on an analysis of its stock returns. This set does not include events such as a credit rating downgrade of Enron's debt or a takeover offer of Enron which are significant for Enron but unlikely (in our view) to have broad implications for information problems at other firms.

Second, we identify events that directly indicate that the information problems at Enron are expected to be systemic.

Nov 19: Representative John Dingell requests that the Public Oversight Board (POB) review Andersen's audits of Enron

Nov 29: SEC Chairman Harvey Pitt calls pro forma earnings "unstructured and undisciplined" and suggests that the SEC is focusing attention on misleading financial reporting.

Dec 4: The Big-five firms pledge to work together to address financial reporting problems.

Jan. 7: It is reported that the Big Five have petitioned the SEC to improve disclosure regulation.

Jan 9: The Senate Banking Committee, headed by Sen. Paul Sarbanes, announces its plans to hold a hearing Feb. 12 to examine accounting and investor protections. The US Justice Department's fraud section also announces that it will form a special task force to examine the collapse of Enron.

Third, we identify financial press discussions that suggest that the Enron scandal was not an isolated problem but rather an indicator of corporate transparency and corporate governance problems.

Nov 5: "What Enron's Financial Reports Did – and Didn't – Reveal --- Auditor Could Face Scrutiny on Clarity of Financial Reports" (*Wall Street Journal*, p. C1)

Nov 8: In a DJ Newswire column, the author speculates that Enron's partnership accounting problems, which resulted in significant earnings restatements, could push the FASB to prioritize its projects on SPEs from having standards of ownership including provisions for minimum ownership by unaffiliated outsiders to control-based standards. The article also questions Arthur Andersen's responsibilities given the restatements.

Nov 26: *Business Week* cover story is "CONFUSED ABOUT EARNINGS? You're not alone. Here's what companies should do--and what investors need to know."

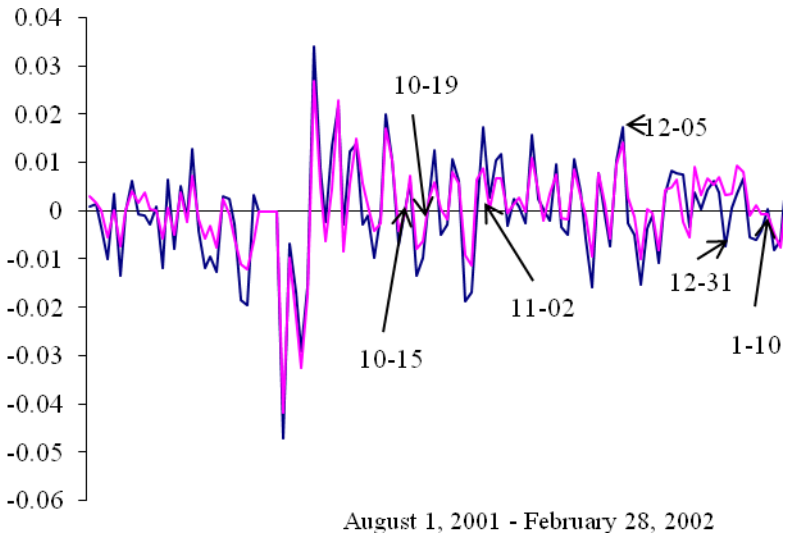
Jan 26: "Trying not to be the next Enron, companies scrutinize practices" appears on p.1 of the *New York Times* Saturday business section.

These articles are not events *per se*. However, it is possible (or even likely) that the articles affected public opinion about the systemic nature of the transparency problem. Existing research has shown that articles in the financial press do affect investor opinions (e.g., Foster, 1979; Foster, 1987; Chang and Suk, 1998; Pruitt et al. 1999; Huberman and Regev, 2001). It is also possible that the articles reflect public opinion rather than create it, which is another reason to search for and consider these dates. We end our search for such articles in January 2001 because that is the start of the earnings announcement season.

A.2 Identification of event windows

Figure A1 shows the value-weighted and equal-weighted index from August 1, 2001 through February 28, 2002 and provides some context for the window selection. The figure illustrates the high volatility period associated with the September 11th terrorist attacks. The arrows point to the start dates and the end dates that we consider for the event period.

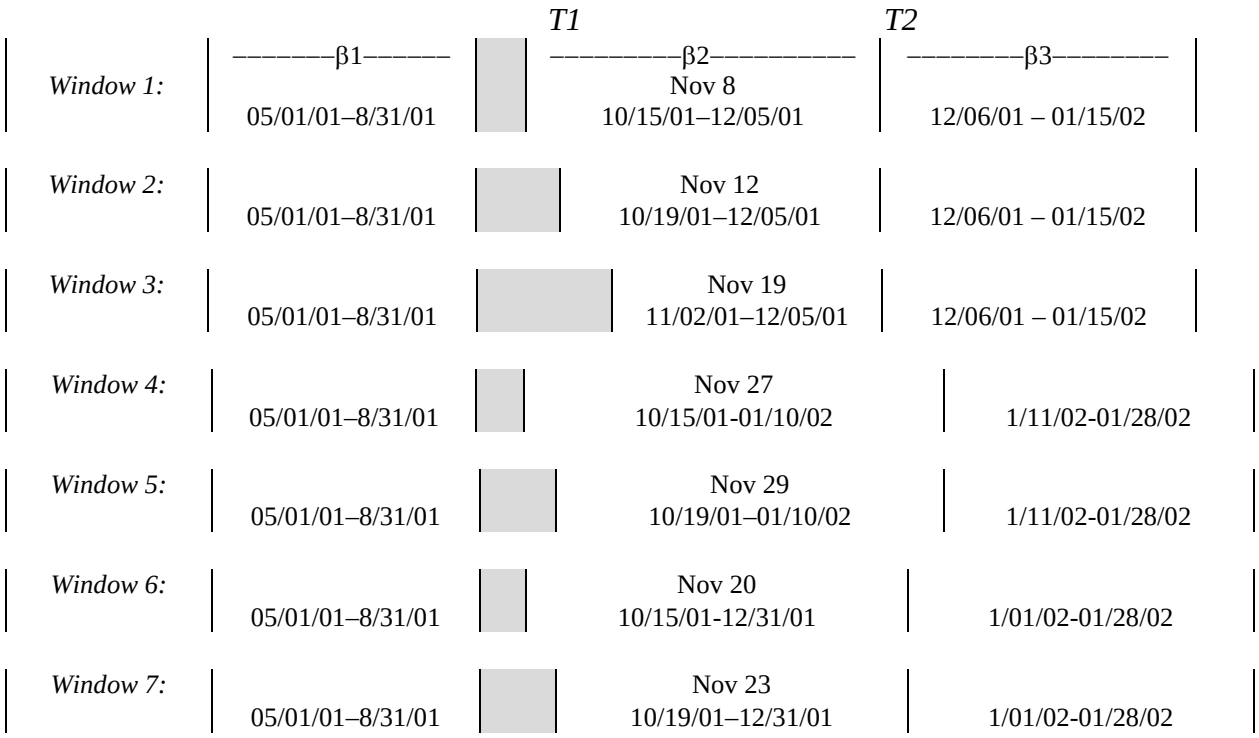
Figure A1: Index returns



We identify seven combinations of windows to estimate systematic risk for the pre-event period (BETA_PRE), the event period (BETA_EVT), and the pre-report period (BETA_REM). In the timelines below, T1 and T2 define the endpoints of the event period. The center date of the event period is noted for each window. In all scenarios, the end of the pre-event period is August 31, 2001. There is a discontinuity between the end of the pre-event period and the beginning of the event period ranging from 44 to 62 days. The discontinuity allows us to avoid

the week-long trading halt and subsequent high volatility period associated with September 11. In addition, the discontinuity is advantageous because the pre-event period is not contaminated when we do not properly identify the start of the event period. The discontinuity does not affect the estimation procedure.

Alternative Windows for the Beta Estimation



We consider three start dates for the event window: October 15, October 19, and November 2, 2001. October 15 is day t-1 relative to Enron's announcement that it lost $618 million, which provided the first indication of possible conflict-of-interest questions related to the Fastow-run partnerships and the "quality" of Enron's prior-period earnings. October 19 is *trading* day t-1 relative to Enron's announcement of an SEC investigation of the partnerships and of suspicions by analysts that Enron will release additional bad news (October 22). November 2 is the start date that makes November 19 the center of the event window. November 19 is significant because on that day it is first reported that Representative John Dingell requested that

the Public Oversight Board (POB) review Andersen's audits of Enron (and Waste Management). The public oversight Board declines to review specific cases but indicates that it will consider a systemic review.[25]

We consider two end dates for the event window. The end date in windows 1-3 is December 5, which is day t+1 relative to the pledge by the big-five firms to work together to address financial reporting problems, especially related to SPEs and market risks. The event periods in these windows include all of the Enron-specific events and all but three of the systemic and financial press events. The pre-report period begins December 6 and ends on January 15, 2002, which is the first percentile of fourth quarter earnings announcement dates.

In windows 4 and 5, the event period extends to January 10, 2002, which is day t+1 relative to the last systemic event and it includes all but the last financial press event. Because of the longer event period, we are forced to extend the length of the pre-report period to January 28 in order to have a sufficiently long pre-report period to estimate the model. January 28 represents the first quartile of earnings announcement dates. In windows 6 and 7, we arbitrarily set the end of the event window at December 31, 2001. This specification provides more equally-sized windows for the event-period and the pre-report period.

A.3 Analysis of beta estimates

We use beta estimates from window 1.[26] In choosing among the windows, the primary trade-off is that a longer *event* window, which is more inclusive of important events,

[25] An analysis of cumulative abnormal returns (CARs) on the individual event dates (not tabulated) suggests that November 19 is a consistently important event. Explanations for the rally on the 19th in the financial press were pre-Thanksgiving volume, and that it was a continuation of a rally due to lower oil prices and the fact that no bad news had been released.

[26] There is no ex post model diagnostic tool that establishes the best window. Lockwood and Kadiyala (1988) estimate the model for every combination of event windows with a start date within 30 days prior to the one day event (T1) and an end date within 30 days after the event (T2). The window (T1, T2 combination) that maximizes the log likelihood function is chosen as the best *firm-specific* model.

mechanically shortens the *pre-report* window given that the report date (either the earnings announcement date or the 10-K date) is fixed.

Several analyses favor the shorter event periods (windows 1-3). The means (medians) of the adjusted R^2s from the model estimation are higher for these windows than for the other windows (although the differences are not significant). Windows 1-3 also produce the smallest number of negative $\hat{b}_{i1}$ estimates (regardless of the start date). Finally, the residuals for windows 1, 2 and 3 are mean zero during the pre-event period and the event period. They are significantly positive during the pre-report period (at approximately the 10% level). In windows 4-7, the residuals during the event (pre-report) period are positive (negative) and significant. None of the analyses indicate a difference between windows 1-3. Thus, we report results for the window that allows the earliest possible start date (window 1).

The beta shocks estimated from window 1 have expected associations and exhibit cross-sectional variation that support their validity. For example, the median initial shock for the 45 firms that have Enron-related 8-Ks is 0.21, which is significantly greater than the median initial shock for the remaining 2,056 firms of 0.006. The median remaining shocks also are greater (0.18 vs. 0.10), but the difference is not significant. The median initial shocks for the Arthur Andersen clients are not significantly different (0.04 for AA clients vs. 0.005 for non-AA clients), but the remaining shocks are significantly higher by 0.043 at the 10% level. This pattern is consistent with the fact that Arthur Andersen was not implicated in the scandal until later in the event window. There is a significant positive correlation between the initial shock and firm size (measured either by market capitalization or total assets) and leverage (measured by the debt-equity ratio). There is a significant positive correlation between the remaining shock and firm size, leverage, and operating leverage (measured by the ratio of PPE/total assets), and a

significant negative correlation between analyst following and the initial shock. This last result suggests that firms with ex ante better information environments have smaller shocks to the Enron-related transparency crisis.

References

Amihud, Y. and H. Mendelson, 1986. The Effects of Beta, Bid-Ask Spread, Residual Risk and Size on Stock Returns. Journal of Finance, 479-486.

Asthana, S., S. Balsam, and S. Sankaraguruswamy, 2004, Differential Response of Small versus Large Investors to 10K Filings on Edgar 79, 571-589.

Ball, R., 2009, Market and Political/Regulatory Perspectives on the Recent Accounting Scandals, Journal of Accounting Research 47, forthcoming.

Barry, C., and S. Brown, 1984, Differential Information and the Small Firm Effect, Journal of Financial Economics 13, 283-294.

Barry, C., and S. Brown, 1985, Differential Information and Security Market Equilibrium, Journal of Financial and Quantitative Analysis 20, 407-422.

Beneish, M., P. Hopkins, I. Jansen, and R. Martin, 2005, Do Auditor Resignations Reduce Uncertainty About the Quality of Firms' financial reporting?, Journal of Accounting and Public Policy 24, 357-390.

Botosan, C., 1997, Disclosure Level and the Cost of Equity Capital, The Accounting Review 72, 323-349.

Botosan, C., and M. Plumlee, 2002, A Re-Examination of Disclosure Level and the Expected Cost of Equity Capital, Journal of Accounting Research 40, 21-40.

Brown, S., 1979, The Effect of Estimation Risk on Capital Market Equilibrium, Journal of Financial and Quantitative Analysis 15, 215-220.

Carter, D., and B. Simkins, 2004, The Market's Reaction to the Unexpected, Catastrophic Events: The Case of Airline Stock Returns and the September 11th Attacks, Quarterly Review of Economics and Finance 44 , 539-558.

Chang, S., and D. Suk, 1998, Stock Prices and the Secondary Dissemination of Information: The WSJ's Insider Trading Spotlight Column, Financial Review 33, 115-128.

Coles, J., and U. Loewenstein, 1988, Equilibrium Pricing and Portfolio Composition in the Presence of Uncertain Parameters and Estimation Risk, Journal of Financial Economics 22, 279-303.

Coles, J., U. Loewenstein, J. Suay, 1995, On equilibrium pricing under parameter uncertainty, The Journal of Financial and Quantitative Analysis 30, 347-374.

Cyree K.,. and R. DeGennaro, 2002, A Generalized Method for Detecting Abnormal Returns and Changes in Systematic Risk, Review of Quantitative Finance and Accounting 19, 399-416.

Diamond, D., and R. Verrecchia, 1991, Disclosure, Liquidity, and the Cost of Capital, Journal of Finance 46, 1325-1359.

Doherty, N., J. Lamm-Tennant, and L. Starks, 2003, Insuring September 11th: Market Recovery and Transparency, Journal of Risk and Uncertainty 26, 179-199.

Easley, D., S. Hvidkjaer , and M. O'Hara , 2002, Is Information Risk a Determinant of Asset Returns?, Journal of Finance 57, 2185-2221.

Easley, D., and M. O'Hara, 2004, Information and the Cost of Capital, Journal of Finance, 59, 1553-1583.

Francis, J., LaFond, R., Olsson, P., and Schipper, K., 2004. Costs of Equity and Earnings Attributes. The Accounting Review 79, 967-1010.

Francis, J., LaFond, R., Olsson, P., and Schipper, K., 2005. The Market Pricing of Accruals Quality. Journal of Accounting and Economics 39, 295-327.

Garleanu, N., and L. Pedersen, 2004, Adverse Selection and the Required Return. Review of Financial Studies 17, 643-665.

Healy, P., A. Hutton, and K. Palepu, 1999, Stock Performance and Intermediation Changes Surrounding Sustained Increases in Disclosure, Contemporary Accounting Research 16, 485-520.

Huberman, G., and T. Regev, 2001, Contagious Speculation and a Cure for Cancer: A Non-Event that Made Stock Prices Soar, Journal of Finance, 56, 387-396.

Lambert, R., C. Leuz, and R. Verrecchia, 2007, Accounting Information, Disclosure, and the Cost of Capital, Journal of Accounting Research 45, 385-420.

Lang, M., and R. Lundholm, 2000, Voluntary Disclosure and Equity Offerings: Reducing Information Asymmetry or Hyping the Stock?, Contemporary Accounting Research 17, 623.

Leuz, C., and R. Verrecchia, 2000, The Economic Consequences of Increased Disclosure, Journal of Accounting Research 38, 91-124.

Leuz, C, and P. Wysocki, 2008, Economic Consequences of Financial Reporting and Disclosure Regulation: A Review and Suggestions for Future Research, University of Chicago Working Paper.

Lockwood, L., and K. Kadiyala, 1988, Risk Measurement For Event-Dependent Security Returns, Journal of Business and Economic Statistics 6, 43-49.

Pruitt, S., B. Van Ness and R. Van Ness, 2000, Clientele Trading in Response to Published Information: Evidence from the 'Dartboard' Column, Journal of Financial Research 23, 1-13.

Rogers, J., 2005, Disclosure quality and management trading incentives, Ph.D. Dissertation, University of Pennsylvania.

Scholes M, and J. Williams, 1997, Estimating betas from nonsynchronous data, Journal of Financial Economics 5, 309-327.

Schrand, C., and R. Verrecchia, 2005, Information Disclosure and Adverse Selection Explanations for IPO Underpricing, Working paper, University of Pennsylvania.

Welker, M., 1995, Disclosure Policy, Information Asymmetry, and Liquidity in Equity Markets, Contemporary Accounting Research 11, 801-827.

Table 1
Descriptive statistics on disclosure proxies and firm characteristics

The sample comprises a maximum of 1,868 firms with a December 31 fiscal year end and sufficient data to estimate subsequent models. We eliminate airlines, insurance carriers, and firms that are majorly affected by the September 11th terrorist attacks. Panel A provides descriptive statistics for the disclosure proxies in our analyses. It presents counts of the number of pages for the entire 10-K in 2001 ($PAGES_{2001}$); the management discussion and analysis (MDA_{2001}) section (Item 7); the sum of Items 6 (Selected Financial Data), 8 (Financial Statements and Supplementary Data), and 15 (Exhibits, Financial Statement Schedules, and Reports on Form 8-K), which commonly include financial tables (FS_{2001}); and the sum of Items 1 (Business), 2 (Properties), and 7 (MD&A), which commonly include narrative discussions about the firm ($DISCUSS_{2001}$). We also present the percent changes (%Δ) in these variables relative to the year 2000. We select the disclosures on related-party transactions from the 10-K or the proxy statement. REL_PAR_{2001} is the number of pages of this section. %ΔREL_PAR is the percentage change in these pages counts from 2000 to 2001, after setting changes of plus or minus one page to zero. $WORDS_{2001}$ is the word count for the fourth quarter and annual 2001 earnings announcement and %ΔWORDS is the percent change in the word count relative to the prior year. The preceding change variables are truncated at the 1st and 99th percentile, except %ΔPAGES, which is truncated at 2nd and 98th percentile. 8KCOUNT is the number of 8-K filings between October 15, 2001 and March 31, 2002, but excluding filings related to the September 11th terrorist attacks. Δ8KCOUNT is the difference in the count over the same period in 2000, winsorized at +3 and –3. CONFCALL is the number of conference calls from October 15, 2001 to March 31, 2002. ΔCALL denotes the difference in the number of calls relative to the same period one year earlier, winsorized at +3 and –3. *** (†††) and * (†) indicate that the mean (median) change in the respective variable is significantly different from zero at the 1% and 10% level, respectively.

Panel A: Disclosure proxies

	N	Mean	Std dev	p25	Median	p75
10-K Page counts						
$PAGES_{2001}$	1,868	63.619	29.720	44	62	79
MDA_{2001}	1,116	13.320	8.574	7	11	18
$DISCUSS_{2001}$	1,163	26.693	13.793	17	25	34
FS_{2001}	1,163	34.013	16.995	25	32	40
%ΔPAGES	1,868	16.6%***	31.5%	0.0%	9.0%†††	23.6%
%ΔMDA	1,116	38.7%***	44.7%	10.0%	30.4%†††	57.1%
%ΔDISCUSS	1,158	22.2%***	32.1%	3.7%	17.6%†††	35.0%
%ΔFS	1,145	17.6%***	56.6%	0.0%	8.0%†††	22.6%
Proxy statement counts						
REL_PAR_{2001}	1441	4.822	9.003	0	1	4
%ΔREL_PAR	1312	19.4%***	99.5%	0	0	0
EA Word counts						
$WORDS_{2001}$	1,788	2,003	1,262	1,197	1,706	2,446
%ΔWORDS	1,715	15.5%***	32.2%	-5.1%	9.0%†††	28.9%
8-K counts						
8KCOUNT	1,868	0.904	1.771	0	0	1
(without Sept 11)	1,868	0.760	1.568	0	0	1
Δ8KCOUNT	1,868	0.052*	1.220	0	0	0
(without Sept 11)	1,868	0.004	1.159	0	0	0
Conference Call						
CONFCALL	1,868	1.140	0.955	0	1	2
ΔCALL	1,868	-0.074***	0.642	0	0	0

Table 1 (continued)
Descriptive statistics on disclosure proxies and firm characteristics

Panel B provides descriptive statistics on firm characteristics that we use as control variables in subsequent models. LASSETS is natural log of total assets. LSIZE is the natural log of the market value of common equity plus the book value of preferred stock and long-term debt. ROA is return on assets using the operating income after depreciation and amortization and scaling it by the average of total assets at the beginning and the end of the fiscal year. CUMRET is the cumulative return from September 1, 2000 to August 31, 2001. DERATIO is long-term debt scaled by total assets at the end of the fiscal year. MB is the market-to-book ratio of common shareholders' equity, setting the ratio to zero for book value < 0. PPE/TA is the book value of net property, plant and equipment scaled by total assets. All variables are reported for the fiscal year 2001 and truncated at the 1th and 99th percentile of the respective distribution.

Panel B: Firm characteristics

	N	Mean	Std dev	p25	Median	p75
TOTASS	1,868	3,585.363	30,600.336	94.316	372.936	1,325.523
SIZE	1,864	3,389.331	19,644.624	99.521	371.023	1,383.122
ROA	1,842	-0.002	0.189	-0.020	0.032	0.097
CUMRET	1,849	0.035	0.636	-0.394	0.020	0.359
DERATIO	1,849	0.270	0.257	0.023	0.201	0.466
MB	1,763	3.777	3.557	1.904	2.909	4.441
PPE_TA	1,828	0.238	0.235	0.049	0.158	0.354

Table 2
Descriptive statistics on model parameter estimates, systematic risk and beta shocks

Panel A reports descriptive statistics for the parameter estimates from the regime switching beta model in equations (B1) and (B2), measures of systematic risk over four time periods and the beta shocks. The pre-event period beta is equal to $\hat{b}_{i1}$ (BETA_PRE). During the event period, $\hat{\beta}_{i2} = \hat{b}_{i1} + \hat{b}_{i2}(T1-t)(t-T2) + \hat{b}_{i3}(t-T1)$. We compute the event period beta (BETA_EVT) at day t = 0. The pre-report period beta (BETA_REM) is $\hat{\beta}_{i3} = \hat{b}_{i1} + \hat{b}_{i3}(T2-T1)$. We report parameter and beta estimates choosing T1 and T2 according to Window 1 in Appendix A.2. During the post-report period, systematic risk (BETA_POST) is estimated using a market model from May 1, 2002 to August 31, 2002. The initial shock (INIT_SHOCK) is BETA_EVT - BETA_PRE. The remaining shock (REM_SHOCK) is BETA_REM - BETA_PRE.

Panel A:

	N	Mean	Std dev	p25	Median	p75
Model parameters						
$\hat{b}_{i1}$	1,868	0.66684	0.6898	0.18972	0.53558	0.95633
$\hat{b}_{i2}$	1,868	-0.00029	0.00268	-0.00168	-0.00021	0.00107
$\hat{b}_{i3}$	1,868	0.002	0.02398	-0.00936	0.00289	0.01457
Estimates of systematic risk						
BETA_PRE	1,868	0.66684	0.6898	0.18972	0.53558	0.95633
BETA_EVT	1,868	0.59982	0.97357	-0.00566	0.54162	1.12409
BETA_REM	1,868	0.74266	1.01538	0.08332	0.68691	1.27465
BETA_POST	1,797	0.67755	0.47763	0.30236	0.67339	0.97329
Estimates of shocks						
INIT_SHOCK	1,868	-0.06702	0.94982	-0.56727	-0.01294	0.42015
REM_SHOCK	1,868	0.07582	0.91106	-0.35574	0.10998	0.55355

Table 2 (continued)
Descriptive statistics on model parameter estimates, systematic risk and beta shocks

Panel B reports the means for the initial and the remaining shock by industry as well as the proportions of positive initial and remaining shocks in each industry. We report only industries with more than 5 sample observations.

Panel B:

SIC		N	INIT_SHOCK	% POS	N	REM_SHOCK	% POS
25	Furniture and Fixtures	6	0.6402	0.8333	6	0.5301	0.8333
55	Auto Dealers, Gas Stations	9	0.5488	0.7778	9	0.2675	0.7778
15	Bldg Cnstr-Gen Contr, Op Bldr	10	0.5215	0.8000	10	0.3981	0.9000
24	Lumber and Wood Pds, Ex Furn	7	0.4201	0.7143	7	0.1426	0.7143
23	Apparel & Other Finished Pds	6	0.3861	0.6667	6	0.2990	0.8333
72	Personal Services	7	0.3260	0.5714	7	0.7008	1.0000
57	Home Furniture & Equip Store	6	0.2949	0.6667	6	-0.3993	0.3333
82	Educational Services	6	0.2640	0.6667	6	0.1451	0.6667
29	Pete Refining & Related Inds	8	0.2596	0.3750	8	-0.1416	0.7500
34	Fabr Metal, Ex Machy, Trans Eq	29	0.2083	0.6207	29	0.2081	0.6552
31	Leather and Leather Products	9	0.1957	0.6667	9	0.4491	0.7778
40	Railroad Transportation	6	0.1714	0.6667	6	0.2418	0.6667
65	Real Estate	20	0.1324	0.5500	20	0.1214	0.4500
37	Transportation Equipment	35	0.1151	0.6571	35	0.1690	0.5714
49	Electric, Gas, Sanitary Serv	59	0.0988	0.5593	59	0.0746	0.4746
20	Food and Kindred Products	36	0.0848	0.5278	36	0.0638	0.4722
79	Amusements, Recreation	16	0.0715	0.5000	16	0.1330	0.6250
30	Rubber & Misc Plastics Prods	22	0.0622	0.6364	22	-0.1174	0.5455
62	Security & Commodity Brokers	21	0.0618	0.6667	21	0.3465	0.7143
61	Nondepository Credit Instn	17	0.0591	0.5294	17	0.5249	0.6471
17	Construction-Special Trade	6	0.0540	0.6667	6	-0.0408	0.3333
64	Ins Agents, Brokers & Service	8	0.0471	0.3750	8	-0.0381	0.3750
48	Communications	59	0.0398	0.5932	59	0.3605	0.6441
27	Printing, Publishing & Allied	24	0.0311	0.5417	24	0.2801	0.7083
58	Eating and Drinking Places	24	0.0205	0.4167	24	0.1284	0.7083
60	Depository Institutions	252	0.0162	0.5278	252	0.1332	0.6071
67	Holding, Other Invest Offices	29	-0.0213	0.5862	29	0.0816	0.5517
35	Indl,Comml Machy, Computer Eq	93	-0.0294	0.5807	93	-0.0468	0.5484
80	Health Services	39	-0.0440	0.4359	39	-0.2189	0.3590
26	Paper and Allied Products	17	-0.0767	0.5882	17	0.1145	0.5294
38	Meas Instr; PhotoGds; Watches	96	-0.0816	0.4167	96	-0.0812	0.4896
32	Stone, Clay, Glass, Concrete Pd	15	-0.0823	0.5333	15	0.2790	0.7333
39	Misc Manufacturing Industries	15	-0.0933	0.4667	15	-0.4003	0.4667
33	Primary Metal Industries	27	-0.1140	0.3704	27	0.3667	0.6296
36	Electr, Oth Elec Eq, Ex Cmp	113	-0.1332	0.4336	113	0.0753	0.5487
13	Oil and Gas Extraction	71	-0.1358	0.4366	71	0.4118	0.8028
73	Business Services	217	-0.1411	0.4839	217	0.0467	0.5438
50	Durable Goods-Wholesale	49	-0.1631	0.4082	49	0.2468	0.5306
47	Transportation Services	6	-0.2330	0.3333	6	0.0114	0.5000
51	Nondurable Goods-Wholesale	22	-0.2421	0.4091	22	0.2576	0.6818
28	Chemicals & Allied Products	163	-0.2812	0.4110	163	-0.2656	0.3742
10	Metal Mining	10	-0.2854	0.5000	10	0.3835	0.7000
42	Motor Freight Trans, Warehouse	21	-0.2957	0.3810	21	0.1334	0.6667
59	Miscellaneous Retail	19	-0.3042	0.3684	19	0.0181	0.6842
70	Hotels, Other Lodging Places	17	-0.3445	0.2941	17	-0.0311	0.5294
87	Engr, Acc,Resh, Mgmt, Rel Svcs	53	-0.3662	0.3396	53	-0.3568	0.3208
44	Water Transportation	10	-0.4219	0.4000	10	0.3883	0.8000
78	Motion Pictures	6	-0.5024	0.5000	6	0.7753	1.0000
16	Heavy Constr; not Bldg Cntractrs	8	-0.5086	0.2500	8	0.4448	0.5000
22	Textile Mill Products	8	-0.7936	0.5000	8	0.0101	0.5000

Figure 1

Illustrations of the time-series patterns in the systematic risk estimates for the pre-event period, the event period, and the pre-report period for alternative values of $\hat{b}_{i2}$. Panels A through C illustrate levels of systematic risk in the case of a HIGH positive $\hat{b}_{i2}$ (equals 0.100), a LOW positive $\hat{b}_{i2}$ (equals 0.002), and a negative $\hat{b}_{i2}$ (equals -0.002), respectively. Within each panel, we present estimates of systematic risk in the pre-report period for five levels of $\hat{b}_{i3}$.

Panel A: HIGH Positive $\hat{b}_{i2}$ *Panel B: LOW Positive* $\hat{b}_{i2}$ *Panel C: Negative* $\hat{b}_{i2}$

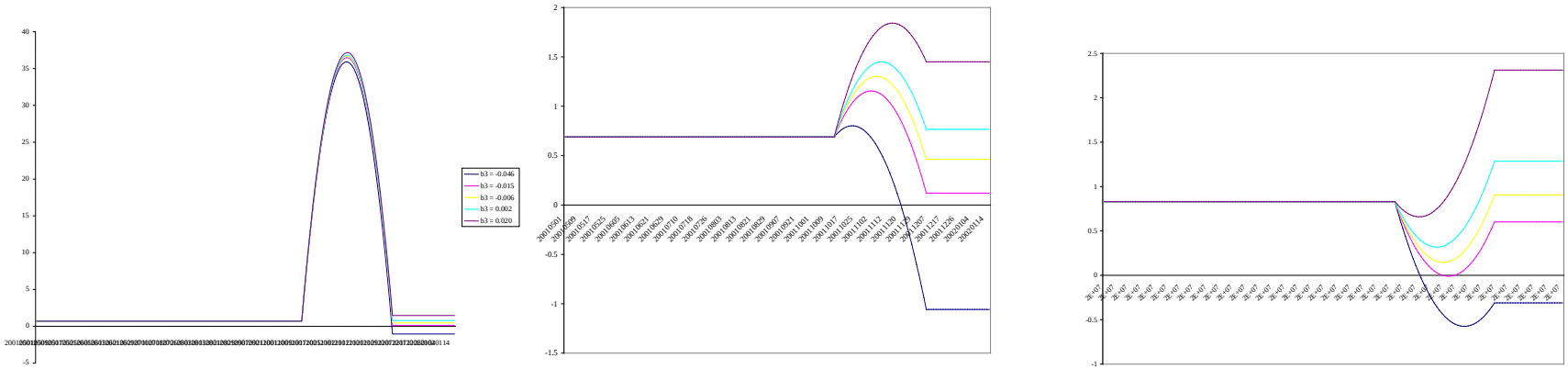


Table 3
Relation between 10-K disclosure changes and cost of capital shocks

The sample comprises a maximum of 1,868 firms with a December fiscal year end and sufficient data to estimate subsequent models. We eliminate airlines, insurance carriers, and firms that are majorly affected by the September 11th terrorist attacks as described in Section 3. Panel A reports results for eight models regressing the percent change in page counts (%ΔPAGES) on combinations of initial shock (INIT_SHOCK), remaining shock (REM_SHOCK), pre-event beta (BETA_PRE), and control variables. LASSETS is natural log of total assets. ROA is the return on assets. DERATIO is long-term debt scaled by total assets. MB is the market-to-book ratio. PPE/TA is the book value of net PPE scaled by total assets. The control variables are measured as of fiscal year 2000. The changes in the control variables are measured from 2000 to 2001, except in for the market-to-book ratio which uses the market values of equity. The regression models include, wherever noted, industry-fixed effects based on one-digit SIC codes and a separate dummy for firms in Enron-related industries (defined as SIC2 equal to 13, 29 or 49). The t-statistics are reported in parentheses and based on standard errors that are clustered at two-digit SIC level. *** {**} (*) indicate significance at the 1%, 5%, 10% level (two-sided).

Panel A:

	Model specification							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.1072***	0.1015*	0.0697	0.1274***	0.1057***	0.1067**	0.0602	0.1173***
	(4.17)	(1.92)	(1.27)	(3.02)	(4.02)	(2.03)	(1.11)	(2.93)
INIT_SHOCK	0.0289***	0.0259***	0.0231***	0.0255***				
	(4.25)	(3.88)	(3.56)	(3.68)				
REM_SHOCK					0.0237***	0.0242***	0.0174*	0.0207**
					(2.88)	(3.15)	(1.85)	(2.23)
BETA_PRE	0.0501***	0.0434**	0.0431**	0.0463***	0.0429***	0.0368**	0.0359*	0.0401**
	(3.21)	(2.36)	(2.27)	(2.81)	(2.80)	(2.03)	(1.87)	(2.38)
$LASSETS_{2000}$	0.0055	0.0078**	0.0080**		0.0062	0.0085**	0.0092**	
	(1.19)	(2.10)	(2.29)		(1.32)	(2.13)	(2.30)	
ROA_{2000}	0.0089	0.0006	-0.0524		0.0074	0.0006	-0.0515	
	(0.40)	(0.03)	(1.48)		(0.33)	(0.03)	(1.56)	
$DERATIO_{2000}$	-0.0180	0.0017	0.0068		-0.0239	0.0014	0.0054	
	(0.54)	(0.05)	(0.19)		(0.74)	(0.04)	(0.15)	
MB_{2000}		-0.0004*	-0.0006			-0.0003	-0.0006	
		(1.77)	(0.76)			(1.61)	(0.75)	
PPE/TA_{2000}		0.0432	0.0433			0.0316	0.0337	
		(0.68)	(0.64)			(0.50)	(0.50)	
ΔASSETS			0.0573**	0.0506**			0.0607**	0.0544**
			(2.15)	(2.03)			(2.35)	(2.24)
ΔROA			-0.1826**	-0.1423*			-0.1718**	-0.1294
			(2.40)	(1.71)			(2.29)	(1.54)
ΔDERATIO			0.0217	0.0372			0.0179	0.0324
			(0.29)	(0.52)			(0.24)	(0.46)
ΔMB			0.0147	0.0177*			0.0151	0.0175*
			(1.26)	(1.71)			(1.35)	(1.77)
Industry controls	NO	YES	YES	YES	NO	YES	YES	YES
Observations	1,868	1,793	1,687	1,707	1,868	1,793	1,687	1,707
R-squared	0.0169	0.0245	0.0253	0.0236	0.0147	0.0237	0.0236	0.0218

Table 3 (continued)
Relation between 10-K disclosure changes and cost of capital shocks

Panel B reports results for regression models of percent changes in page counts for three sections of the 10-K and one section from the proxy statement on combinations of initial shock (INIT_SHOCK), remaining shock (REM_SHOCK), pre-event beta (BETA_PRE), and control variables (described in Panel A). The percentage changes in the page counts refer to the management discussion & analysis (%ΔMDA), the sections that are generally narrative (%ΔDISCUSS) and the sections that include financial tables (%ΔFS). See Table 1, Panel A for more details. The regression models include industry-fixed effects based on one-digit SIC codes and a separate dummy for firms in Enron-related industries (defined as SIC2 equal to 13, 29 or 49). The t-statistics are reported in parentheses and based on standard errors that are clustered at two-digit SIC level. *** {**} (*) indicate significance at the 1%, 5%, 10% level (two-sided).

Panel B:

	Dependent variable							
	%ΔMDA	%ΔDISCUSS	%ΔFS	%ΔREL_PAR	%ΔMDA	%ΔDISCUSS	%ΔFS	%ΔREL_PAR
Constant	0.3903***	0.1394***	0.0631	0.4637	0.3916***	0.1325***	0.0791	0.4513
	(3.49)	(2.85)	(0.98)	(1.56)	(3.60)	(2.72)	(1.23)	(1.50)
INIT_SHOCK	0.0166	0.0193	0.0343***	0.0343				
	(1.37)	(1.63)	(2.84)	(0.98)				
REM_SHOCK					0.0086	0.0181*	0.0492*	0.0473*
					(0.62)	(1.88)	(1.70)	(1.72)
BETA_PRE	0.0352	0.0149	0.0640**	0.0037	0.0278	0.0091	0.0594	0.0008
	(1.37)	(0.58)	(2.06)	(0.07)	(1.08)	(0.38)	(1.62)	(0.02)
$LASSETS_{2000}$	0.0110	0.0102	0.0108	-0.0065	0.0122	0.0108	0.0104	-0.0068
	(1.23)	(1.10)	(1.19)	(0.38)	(1.39)	(1.30)	(0.98)	(0.44)
ROA_{2000}	-0.0160	0.0611**	0.0172	-0.1202	-0.0184	0.0570*	0.0080	-0.1212
	(0.35)	(2.04)	(0.44)	(1.15)	(0.40)	(1.97)	(0.21)	(1.13)
$DERATIO_{2000}$	-0.1149**	-0.0627	-0.0060	0.0448	-0.1185**	-0.0625	0.0038	0.0500
	(2.03)	(1.31)	(0.08)	(0.36)	(2.01)	(1.38)	(0.05)	(0.39)
MB_{2000}	0.0000	-0.0003	-0.0009**	0.0008	0.0001	-0.0003	-0.0009**	0.0007
	(0.07)	(1.00)	(2.30)	(0.21)	(0.09)	(1.06)	(2.27)	(0.20)
PPE/TA_{2000}	-0.0176	-0.0989**	0.1003	-0.1234	-0.0224	-0.1074**	0.0819	-0.1428
	(0.28)	(2.02)	(1.03)	(0.69)	(0.36)	(2.23)	(0.90)	(0.80)
Industry controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,069	1,109	1,096	1,257	1,069	1,109	1,096	1,257
R-squared	0.0505	0.0411	0.0163	0.0107	0.0496	0.0405	0.0192	0.0114

Table 3 (continued)
Robustness analysis with respect to the beta shocks

Robustness analysis of the results presented in Table 3. All of the models regress the percent change in page counts (%ΔPAGES) on either the initial shock or remaining shock, the pre-event beta, and the control variables from Models (3) and (7) in Table 3. In Model 1, INIT_SHOCK, REM_SHOCK, and the pre-event beta are estimated using coefficient estimates from a linear market model that includes the CRSP value-weighted return on the market, rather than from the quadratic model described in Table 2. In Model 2, the sample excludes firms with a stock price at December 31, 2001 of less than $5. In Model 3, we include an additional control variable that measures the change in the mean (consensus) analyst forecast of next-fiscal-year annual earnings during the period from August 2001 to December 2001 scaled by price (FCSTREV). In Model 4, we include an additional control variable equal to the standard deviation of the firm's idiosyncratic risk during the pre-event period (FIRMRETVOL). Idiosyncratic risk is the residual from the linear market model that includes the CRSP value-weighted return on the market. The t-statistics are reported in parentheses and are based on standard errors that are clustered at the two-digit SIC level. *** {**} (*) indicate significance at the 1%, 5%, 10% level (two-sided).

Panel C:

	(1) Shocks computed using linear market-model betas		(2) Sample excludes stocks with price < $5		(3) Model includes control for analyst forecast revision activity		(4) Model includes control for idiosyncratic risk volatility	
Constant	0.0593	0.0506	0.1054	0.0910	0.1624***	0.1694***	0.0438	0.0479
	(1.12)	(0.97)	(1.62)	(1.45)	(2.85)	(2.90)	(0.71)	(0.80)
INIT_SHOCK	0.0428***		0.0308***		0.0276***		0.0248***	
	(3.82)		(3.34)		(2.70)		(3.54)	
REM_SHOCK		0.0211***		0.0323***		0.0327***		0.0229***
		(3.29)		(2.74)		(3.24)		(3.00)
Additional control variables:								
FCSTREV					-0.2652*	-0.2935*		
					(1.68)	(1.89)		
FIRMRETVOL							0.9826**	0.9967**
							(2.10)	(2.18)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,784	1,784	1,387	1,387	1,220	1,220	1,792	1,792
R-squared	0.0282	0.0245	0.0219	0.0224	0.0180	0.0194	0.0265	0.0257

Table 4
Cross-sectional analysis of the relation between disclosure changes and cost of capital shocks

Panels A and B present results on the relation between the beta shocks and firms' disclosure choices for firms with a positive beta shock and high financing needs. The first four columns present results partitioning the sample based on a positive initial or remaining shock *and* high financing needs (POS&HIGH=1), where the latter is defined as having a cash flow from investing activities scaled by total assets above the sample median. The last four columns present results partitioning the sample based on a positive initial or remaining shock *and* high financing needs (POS&HIGH=1), where the latter is defined as having external financing needs above the median for the sample. External financing needs are measured as the difference between a firm's average asset growth rate over two years and the maximum growth it can finance internally, which is ROA/(1-ROA), where ROA is income before extraordinary items over total assets. Panel A presents results for the percent change in the page counts of the 10-K (%ΔPAGES). Panel B presents results for the percent change in the page counts in the MD&A (%ΔMDA). The regression models include control variables as defined for Models (2) and (6) in Table 3 and industry-fixed effects based on one-digit SIC codes and a binary indicator for Enron-related industries. The coefficients of the control variables are not presented. The t-statistics are reported in parentheses and based on standard errors that are clustered at two-digit SIC level. *** {**} (*) indicate significance at the 1%, 5%, 10% level (two-sided). The last row presents the p-value of a (Chow) test whether the coefficients on the beta shock are statistically different across the two subsamples.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Proxy for financing needs:	*Cash flow from Investment*				*External financing needs*			
	POS&HIGH		POS&HIGH		POS&HIGH		POS&HIGH	
	=1	=0	=1	=0	=1	=0	=1	=0
Panel A: % page changes in the 10-K								
Constant	0.1563	0.1155**	-0.0149	0.0946**	0.0482	0.1097*	-0.0224	0.0034
	(1.12)	(2.52)	(-0.22)	(2.49)	(0.72)	(1.83)	(-0.32)	(0.08)
INIT_SHOCK	0.0521**	0.0167**			0.0348	0.0202**		
	(2.04)	(2.25)			(1.44)	(2.34)		
REM_SHOCK			0.0495	0.0108			0.0669**	0.0101
			(1.31)	(1.27)			(2.53)	(1.02)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	376	1,127	433	1,070	444	1,349	512	1,281
R-squared	0.0285	0.0286	0.0498	0.0237	0.0347	0.0249	0.0466	0.0260
p-value for difference	0.1401		0.3075		0.5743		0.0389	
Panel B: % page changes in MDA								
Constant	0.6157	0.2729***	0.6980	0.2747***	0.2116*	0.2994***	0.2564**	0.3096***
	(1.32)	(3.44)	(1.50)	(3.52)	(1.82)	(4.08)	(2.54)	(4.25)
INIT_SHOCK	0.1121**	-0.0049			0.0509	-0.0144		
	(2.03)	(-0.35)			(1.07)	(-1.01)		
REM_SHOCK			0.0447	-0.0117			0.0106	0.0031
			(0.90)	(-0.71)			(0.28)	(0.19)
All controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	232	695	232	695	280	789	280	789
R-squared	0.1066	0.0249	0.0968	0.0255	0.0627	0.0589	0.0600	0.0581
p-value for difference	0.0478		0.2718		0.1515		0.8585	

Table 4 (continued)
Cross-sectional analysis of the relation between disclosure changes and cost of capital shocks

Panel C results on the relation between the beta shocks and firms' disclosure choices for Arthur Andersen audit clients versus other firms. The first two columns use %ΔPAGES as dependent variable. The next columns focus on page changes in the MD&A and the last two columns report results for regressions using %ΔREL_PAR. The regression models include control variables as defined for Models (2) and (6) in Table 3 and industry-fixed effects based on one-digit SIC codes and a binary indicator for Enron-related industries. The t-statistics are reported in parentheses and based on standard errors that are clustered at two-digit SIC level. *** {**} (*) indicate significance at the 1%, 5%, 10% level (two-sided). The last row presents the p-value of a (Chow) test whether the coefficients on the beta shock are statistically different across the two subsamples.

Panel C: Split by auditor

	%ΔPAGES		%ΔMDA		%ΔREL_PAR	
	AA clients	Non-AA clients	AA clients	Non-AA clients	AA clients	Non-AA clients
Constant	0.1307	0.0211	0.3094**	0.3931***	0.1515	0.4364**
	(1.20)	(0.38)	(2.07)	(5.01)	(0.34)	(2.00)
INIT_SHOCK	0.0612***	0.0193**	0.0241	0.0149	0.2990***	-0.0222
	(2.74)	(2.11)	(0.75)	(0.91)	(3.66)	(0.66)
BETA_PRE	0.0519	0.0434***	0.0044	0.0319	0.2084*	-0.0435
	(1.54)	(3.01)	(0.09)	(1.19)	(1.65)	(0.81)
All controls	YES	YES	YES	YES	YES	YES
Observations	333	1,460	206	863	249	1,008
R-squared	0.0764	0.0205	0.0755	0.0644	0.1083	0.0104
p-value for difference	0.0439		0.6963		0.0016	

Table 5
Relation between 10-K disclosure changes and cost of capital shocks controlling for interim disclosure changes

Results from regressions of the percent change in pages (%ΔPAGES) on the cost of capital shocks and proxies for firms' interim disclosures. The interim disclosure proxies are: Δ8KCOUNT, which equals the change in the number of 8-K filings from 2000 to 2001; ΔCALL, which equals the change in the number of conference calls; %ΔWORDS, which is the percentage change in the number of words in the fourth quarter 2001 earnings announcement; and a market-based measure of interim disclosure, the parameter $\hat{b}_{i2}$ from the regime-switching model. See Tables 1 and 2 for more details on these variables. All models include control variables as defined for Models (2) and (6) in Table 3 and industry-fixed effects based on one-digit SIC codes and a binary indicator for Enron-related industries. The t-statistics are reported in parentheses and based on standard errors that are clustered at two-digit SIC level. *** {**} (*) indicate significance at the 1%, 5%, 10% level (two-sided), respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.0990*	0.1040*	0.1019*	0.1070**	0.0603	0.0486	0.1110**
	(1.88)	(1.98)	(1.93)	(2.03)	(1.07)	(0.88)	(2.12)
INIT_SHOCK	0.0254***		0.0258***		0.0259***		
	(3.78)		(3.87)		(3.84)		
REM_SHOCK		0.0244***		0.0241***		0.0299***	0.0334***
		(3.24)		(3.15)		(3.56)	(3.78)
BETA_PRE	0.0431**	0.0369**	0.0434**	0.0368**	0.0477**	0.0423**	0.0495**
	(2.34)	(2.04)	(2.36)	(2.03)	(2.41)	(2.14)	(2.47)
$LASSETS_{2000}$	0.0084**	0.0091**	0.0078**	0.0085**	0.0092**	0.0095**	0.0061
	(2.21)	(2.23)	(2.10)	(2.13)	(2.39)	(2.30)	(1.53)
ROA_{2000}	-0.0013	-0.0016	0.0005	0.0005	-0.0133	-0.0155	0.0011
	(0.06)	(0.08)	(0.02)	(0.02)	(0.58)	(0.66)	(0.05)
$DERATIO_{2000}$	0.0008	0.0006	0.0016	0.0012	0.0034	0.0037	0.0083
	(0.02)	(0.02)	(0.05)	(0.04)	(0.09)	(0.10)	(0.24)
MB_{2000}	-0.0004*	-0.0003	-0.0003*	-0.0003	-0.0003	-0.0003	-0.0004*
	(1.78)	(1.65)	(1.69)	(1.53)	(1.45)	(1.40)	(1.89)
PPE/TA_{2000}	0.0439	0.0325	0.0427	0.0312	0.0446	0.0323	0.0362
	(0.69)	(0.52)	(0.68)	(0.50)	(0.66)	(0.48)	(0.58)
Industry controls	YES	YES	YES	YES	YES	YES	YES
Δ8KCOUNT	0.0080*	0.0092*					
	(1.77)	(1.96)					
ΔCALL			-0.0032	-0.0027			
			(0.45)	(0.39)			
%ΔWORDS					0.0154	0.0163	
					(0.68)	(0.72)	
b_{i2}							8.4903***
							(3.63)
Observations	1,793	1,793	1,793	1,793	1,646	1,646	1,793
R-squared	0.0253	0.0249	0.0245	0.0238	0.0275	0.0288	0.0279

Table 6
Relation between interim disclosures and cost of capital shocks

The first four columns of the table present results from four regression models of proxies for interim disclosures on combinations of initial shock (INIT_SHOCK), remaining shock (REM_SHOCK), pre-event beta (BETA_PRE), and control variables. Column 1 presents results for changes in the number of 8-K filings as defined in Table 1 (Δ8KCOUNT). In Column 2, we restrict the analysis to changes in the number of 8-K filings during the second-half of the event period and hence before the pre-report period during which the remaining shock is measured. Column 3 presents results for changes in the number of conference calls as defined in Table 1 (ΔCALL). In Column 4, we restrict the analysis to changes in the number of conference calls during the second-half of the event period. Columns 5 and 6 present results from regressing $\hat{b}_{i2}$ on Δ8KCOUNT and ΔCALL, respectively, relating the curvature of the quadratic beta estimate to firms' immediate disclosure responses. The control variables are measured as of fiscal year 2000. The models include industry-fixed effects based on one-digit SIC codes and a binary indicator for Enron-related industries. The t-statistics are reported in parentheses and based on standard errors that are clustered at two-digit SIC level. *** {**} (*) indicates significance at the 1%, 5%, 10% level in a two-sided test, respectively.

	Δ8KCOUNT		ΔCALL		$\hat{b}_{i2}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.3157***	0.1103***	0.1143	0.0333*	-0.0049	-0.0009
	(3.21)	(3.56)	(1.39)	(1.69)	(0.18)	(0.03)
INIT_SHOCK	0.0637**		-0.0136			
	(2.19)		(0.71)			
REM_SHOCK		-0.0220**		-0.0085		
		(2.25)		(1.34)		
BETA_PRE	0.0412	-0.0154	-0.0157	0.0029	-0.1128***	-0.1127***
	(0.76)	(1.28)	(0.44)	(0.29)	(16.15)	(15.72)
$LASSETS_{2000}$	-0.0724***	0.0211***	-0.0114	0.0013	0.0177***	0.0186***
	(3.98)	(3.52)	(0.82)	(0.32)	(3.95)	(4.15)
ROA_{2000}	0.2421	-0.1069***	-0.0434	-0.0081	0.0021	-0.0035
	(1.36)	(3.39)	(0.79)	(0.33)	(0.07)	(0.12)
$DERATIO_{2000}$	0.1102	-0.0581	-0.0437	0.0269	-0.0426	-0.0457
	(0.81)	(1.60)	(0.66)	(0.85)	(1.47)	(1.57)
MB_{2000}	-0.0001	0.0010	0.0029*	0.0006	0.0004	0.0005
	(0.03)	(1.17)	(1.95)	(1.04)	(1.26)	(1.35)
PPE/TA_{2000}	-0.0967	0.0001	-0.1373	-0.0136	-0.0852**	-0.0867**
	(0.67)	(0.00)	(1.38)	(0.28)	(2.19)	(2.23)
Δ8KCOUNT					0.0247**	
					(2.63)	
ΔCALL						0.0080
						(0.57)
Industry controls	YES	YES	YES	YES	YES	YES
Observations	1,793	1,793	1,793	1,793	1,793	1,793
R-squared	0.0204	0.0335	0.0122	0.0085	0.0770	0.0745

Table 7
Analysis of market responses to the changes in the 10-K filings

Panel A presents an analysis of beta response from the event period to the post-report period: BRESPONSE = BETA_EVT - BETA_POST. The models include page changes in the 10-K (%ΔPAGES) and control variables. LSIZE is the natural log of firm size as defined in Table 1. DERATIO is long-term debt scaled by total assets and MB is the market-to-book ratio as defined in Table 1. The control variables are measured as of fiscal year 2001. The changes in the controls are measured from 2000 to 2001. The t-statistics are reported in parentheses and based on standard errors that are clustered at the firm level. *** {**} (*) indicate significance at the 1%, 5%, 10% level (two-sided).

Panel A: Post 10-K beta response

	(1)	(2)	(3)
Constant	-0.2543**	-0.2957***	-0.2062*
	(2.32)	(2.66)	(1.77)
%ΔPAGES	0.1726***	0.1767***	0.1649***
	(2.82)	(2.81)	(2.58)
$LSIZE_{2001}$	0.0106	0.0106	0.0166
	(1.03)	(0.93)	(1.43)
$DERATIO_{2001}$		0.0353	-0.0133
		(0.35)	(0.13)
MB_{2001}		-0.0003	-0.0013
		(0.04)	(0.19)
ΔLSIZE			-0.0438
			(0.65)
ΔDERATIO			0.3148
			(1.36)
ΔMB			0.0609
			(0.88)
Industry controls	YES	YES	YES
Observations	1,794	1,700	1,641
R-squared	0.0168	0.0178	0.0201

Table 7 (continued)
Analysis of market responses to the changes in the 10-K filings

Panel B presents models the short-window abnormal volume response around the 10-K filing on the percentage change in 10-K pages and control variables. Abnormal volume is defined as stated in Section 6. We include the abnormal volume generated by last year's 10-K filing as a control (ABN_VOL). FIL_DELAY measures the number of days the 10-K filing is delayed relative to the filing dates in 2000, adjusted for its delay relative to 1999. LSIZE is the natural log of firm size as defined in Table 1, DERATIO is long-term debt scaled by total assets and MB is the market-to-book ratio as defined in Table 1. The control variables are measured as of fiscal year 2001. The regression models include industry fixed effects. The t-statistics are reported in parentheses and based on standard errors that are clustered at the firm level. *** {**} (*) indicate significance at the 1%, 5%, 10% level (two-sided).

Panel B: Short-window abnormal volume response to the 10-K

	(1)	(2)	(3)
Constant	1.0010	0.9116	0.8903
	(1.62)	(1.34)	(1.47)
%ΔPAGES	0.1040*	0.1127*	0.1138*
	(1.66)	(1.71)	(1.83)
ABN_VOL_{2000}	0.0465	0.0316	0.0323
	(1.62)	(1.10)	(1.15)
FIL_DELAY_{0199}	-0.0015	-0.0013	-0.0022
	(0.86)	(0.66)	(1.29)
$LSIZE_{2001}$	-0.0242**	-0.0265**	
	(2.46)	(2.30)	
MB_{2001}		0.0037	
		(0.39)	
$DERATIO_{2001}$			0.1379
			(1.47)
$LASSETS_{2001}$			-0.0357***
			(2.89)
ROA_{2001}			0.1681
			(1.36)
Industry controls	YES	YES	YES
Observations	1,389	1,316	1,361
R-squared	0.0173	0.0174	0.0205