The Extent of Informational Efficiency in the Credit Default Swap Market: Evidence from Post-Earnings Announcement Returns

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Abstract: Under semi-strong market efficiency future returns are unpredictable from previously released information. We test the degree of semi-strong form market efficiency in the credit default swap (CDS) market by examining the relationship between subsequent CDS returns and previously announced quarterly earnings surprises and quarterly accruals, both of which have been the source of stock market anomalies. We conduct our analysis over three time periods: (1) prior to the credit crisis of 2007 and 2008, (2) during the credit crisis and (3) after the credit crisis. Prior to the credit crisis, the CDS market was efficient, exhibiting no systematic relation between subsequent CDS returns and previously announced accounting information. During the credit crisis, however, we find that both quarterly earnings surprises and quarterly accruals are associated with systematic patterns in subsequent CDS returns that are consistent with underreaction to both measures. In the immediate aftermath of the crisis, the pattern reverses with the CDS market overreacting to both measures although the overreaction dissipates in later quarters. Collectively, our results indicate that the CDS market is efficient during periods of relative economic stability but call into question its resilience during less stable economic periods.

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1. Introduction

A growing body of literature examines the role of accounting information in the credit market. Several studies demonstrate the relevance of accounting information for the pricing of credit risk by documenting long window associations between earnings and alternative measures of credit risk such as credit default swap (CDS) spreads, bond returns and credit ratings (e.g. Callen, Livnat, and Segal, 2009; Easton, Monahan, and Vasvari, 2009; Jiang, 2008). Several other studies demonstrate the credit market's specific reliance on earnings information when revising its assessment of credit risk by documenting that credit markets react over short windows to earnings announcements (e.g. Hotchkiss and Ronen, 2002; Easton, Monahan, and Vasvari, 2009; DeFond and Zhang, 2009; Callen, Livnat, and Segal, 2009; Greatrex, 2009). Evidence from prior studies that the credit market responds immediately to the release of accounting information suggests a fair degree of informational efficiency in the credit market. However, the exclusive focus on credit markets' *initial* reaction to accounting information in prior studies does not permit a complete assessment of the informational efficiency of credit markets because it is possible for initial reactions to be incomplete or inappropriate. Therefore, we provide comprehensive evidence on the informational efficiency of the credit market by building on the classic definition of semi-strong form market efficiency wherein future returns are not predictable based on previously released public information. We examine the degree of semi-strong form market efficiency in the CDS market by examining the relationship between subsequent movements in CDS prices and previously announced accounting information.

The question of the degree of informational efficiency in the CDS market is one of some urgency given the apparent failure of the CDS market to appropriately price the default risk of mortgage-backed securities during the recent economic crisis. Skepticism about the functioning

of the CDS market led to the standardization of CDS contracts, the establishment of a CDS clearinghouse in November 2008 and greater regulation of the derivative market as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. Although it is widely acknowledged that the CDS market performed poorly in pricing mortgage default risk, it is not clear ex ante that this same tendency towards mispricing extends to corporate debt. While the significant opacity about the true nature of mortgages underlying collateralized debt obligations likely hindered the credit market's ability to accurately price default risk, the degree of regulation, disclosure requirements, and audit scrutiny to which publicly traded issuers of corporate debt are subject contribute to a richer information environment that may facilitate better pricing of default risk in the corporate debt market. On the other hand, given that the U.S. stock market has historically experienced anomalies such as the post-earnings announcement drift (e.g. Bernard and Thomas, 1989; Collins and Hribar, 2000) and the accrual anomaly (e.g. Sloan, 1996; Collins and Hribar, 2000), it is not obvious that the CDS market for corporate debt would be immune from mispricing, particularly given the strong theoretical links between stock prices and CDS spreads (Lok and Richardson, 2011). Moreover, the effect of the increasingly speculative use of CDSs is unclear. While speculation could lead to irrationality, Stulz (2010) argues that speculation promotes well-functioning markets by allowing informed trading. Therefore, the degree of informational efficiency of the CDS market is ultimately an empirical question.

Using daily CDS quotes from Datastream for a sample of CDS contracts related to 692 firms that announced earnings from January 2003 through July 2010, we examine the relation between post-announcement CDS returns and quarterly deciles formed on the basis of seasonally differenced earnings and accruals, both of which have been shown to be associated with

anomalous stock price movements (e.g. Bernard and Thomas, 1989; Sloan, 1996; Collins and Hribar, 2000).[1] In addition to providing results for the full sample period, we conduct our analyses over three time periods: (1) prior to the credit crisis of 2007 and 2008, (2) during the credit crisis and (3) after the credit crisis. Our analysis of these subperiods is based on evidence that the recent credit crisis represented a structural shift in how CDS markets responded to accounting information (e.g. Shivakumar, Urcan, Vasvari, and Zhang, 2011).[2] In addition, our analysis of these subperiods is informative about how the CDS market performs under different economic conditions. Specifically, analysis of the pre-crisis period provides insight on how well the CDS market performs in periods of relative economic stability. Analysis of the crisis period, which included the September 2008 bankruptcy of Lehman Brothers, the bailout of AIG, and the November 2008 organization of the CDS clearinghouse, lends insight into the degree of resilience in the CDS market during periods of economic turmoil. Analysis of the post-crisis period provides an early indication of the CDS market's performance after significant institutional changes and increased regulatory scrutiny.[3]

[1] We obtain daily CDS prices from Datastream, which has the advantage of allowing us to capture the change in CDS spreads on an individual security basis rather than the change in issue price on two different CDSs issued on the same reference asset as done in prior work (Callen, Livnat, and Segal, 2009). Hence, use of the Datastream pricing data allows us to directly capture the change in estimated financial distress in a short window around the release of accounting information.

[2] For example, Shivakumar, Urcan, Vasvari, and Zhang (2011) document that the magnitude of the CDS market reaction to management forecast news increases two to three times during the crisis period relative to the pre-crisis period.

[3]Following the bailout of AIG in September 2008, the scrutiny of the CDS market and the manner in which the contracts were written and cleared changed substantially. Specifically, the bailout of AIG led to calls for increased transparency and regulation. In November 2008, The Depository Trust & Trading Clearinghouse which accounts for the vast majority of CDS trade confirmations began releasing market data on outstanding CDS notional amounts. By the first quarter of 2009 CDSs written on Lehman Brothers had been settled under the credit event auction process and the CDS market contracted. At that same time standardization of CDS contracts occurred in an effort to prevent legal disputes and to facilitate payouts. The InterContinentalExchange (ICE) and Chicago Mercantile Exchange began operating clearinghouses to act as a central counterparty to both sides of CDS transactions which resulted in a reduction in the counterparty risk faced by buyers and sellers.

We find no evidence of a systematic relation between subsequent CDS returns and previously announced accounting information in the pre-crisis period, suggesting that the CDS market was fairly efficient during this time. During the credit crisis, however, our evidence indicates that both quarterly earnings surprises and quarterly accruals are associated with systematic patterns in subsequent CDS returns that are consistent with underreaction to both measures. The CDS market's underreaction to accruals during the crisis is particularly notable, given that the equity market has historically overreacted to accruals. Given the negative correlation between accruals and cash flows, the CDS market's underreaction to accruals is consistent with overfixation on cash flows.

The CDS market's underreaction to both quarterly earnings surprises and quarterly accruals during the crisis is consistent with the limited attention phenomenon documented in the accounting and finance literature wherein cognitive limitations undermine investors' ability to fully process information, particularly when there are multiple events vying for their attention (Hirshleifer and Teoh 2003, Hirshleifer, Lim and Teoh 2009; Hirshleifer, Lim, and Teoh 2011).[4] Although the limited attention phenomenon has been explored primarily in the context of the equity market, our evidence of underreaction by the CDS market during the crisis suggests that investors in the CDS market may also have suffered from limited attention to accounting fundamentals during this time due to the spate of negative news that arrived during this period.

In the immediate aftermath of the crisis, the CDS market appears to overreact to both quarterly earnings surprises and quarterly, suggesting a heightened sensitivity to this information post-crisis. The overreaction weakens in later quarters, however. Collectively, our results

[4] For example, Flannery, Houston, and Partnoy (2010) provide a list of 19 prominent events related to the financial crisis beginning from early 2007 until the end of 2008.

indicate that the CDS market is efficient during periods of relative economic stability but call into question its resilience during less stable periods.

Our study makes a number of contributions. First, we add to the current understanding of how the credit markets use accounting information. While prior work has focused exclusively on initial credit market responses to earnings announcements, our focus on post-announcement CDS returns provides greater insight on the appropriateness and completeness of the credit market's responses to accounting information. In addition, we add to the literature on accounting-based anomalies by showing not only that they extend beyond the equity market but that they manifest differently in the credit and equity markets based on differences in how accounting information is used in the two markets. Finally, our evidence on the informational efficiency of the CDS market is likely to be of interest to policymakers. Specifically, although the market was efficient prior to the crisis, our evidence of inefficiency during the crisis in the CDS market for corporate debt —where information is highly regulated and transparent— suggests that general concerns about how this market functions may be justified.

The remainder of this study proceeds as follows. In Section 2, we discuss prior research on the informational efficiency of the credit market and accounting-based anomalies. We also provide relevant institutional details on the structure of the CDS market. Section 3 describes our empirical methodology. We present our sample selection procedures and describe the data in Section 4. Section 5 discusses our empirical results. We conclude in Section 6.

2. Prior Research and Discussion of the Credit Default Swap Market

2.1 The Informational Efficiency of the Credit Market

A number of prior studies examine the extent of informational efficiency in the credit market and provide contrasting findings. Katz (1974) examines the responsiveness of bond

prices to credit rating changes and finds that the debt market does not appear to anticipate debt rating changes and that bond prices respond sluggishly to the announcement of debt rating changes, calling into question the efficiency of the debt market. On the other hand, Hotchkiss and Ronen (2002) examine the statistical properties of intraday bond returns and conclude that the bond market and equity market are similarly efficient. Also consistent with efficiency, other studies document timely bond market responses to negative rating changes (Hite and Warga, 1997; Steiner and Heinke, 2001).

Several studies examine the efficiency of the CDS market vis-a-vis the bond and equity markets. For example, Hull, Predescu, and White (2004) find that CDS spreads anticipate negative credit rating announcements. Daniels and Jensen (2005) find that CDS markets react more quickly and more intensely than the bond market to credit rating changes. Zhu (2006), Baba and Inada (2009) and Norden and Weber (2004) find that CDS spreads play a greater role than bond spreads in price discovery. Baba and Inda (2009) attribute CDSs' superiority to the market's greater reliance on accounting fundamental measures such as the capital ratio and non-performing loans. Flannery, Houston, and Partnoy (2010) find that the strength of Granger causality is greater in the direction of CDS spreads causing stock returns rather than vice versa. They, therefore, conclude that the CDS market is at least as efficient as the stock market even though neither market did particularly well in anticipating events associated with the financial crisis. The focus of these studies is either on how quickly the market anticipates or responds to events like credit rating changes. Therefore, they shed light primarily on the timeliness element of market efficiency but they provide little evidence on the appropriateness and completeness of the market's response to information events. Moreover, most of these studies do not focus on accounting information per se.

Using event study methodology, Hotchkiss and Ronen (2002), Easton, Monahan, and Vasvari (2009), DeFond and Zhang (2009), Callen, Livnat, and Segal (2009), Greatrex (2009) and Shivakumar, Urcan, Vasvari, and Zhang (2011) provide some insight on the efficiency of the credit market with respect to accounting information in that they show that credit markets respond immediately to earnings-related announcements, which is an essential element to establishing informational efficiency in the debt market.[5] However, given that initial reactions can be suboptimal; these studies provide limited insight on the appropriateness and completeness of the credit market's initial responses, which are also relevant factors in assessing the degree of informational efficiency. We, therefore, examine the appropriateness and completeness of credit market responses to accounting information in this study.

We invoke the classic definition of semi-strong form market efficiency wherein future returns are unpredictable based on previously released public information. Hence, we examine the relationship between subsequent movements in CDS prices and previously announced seasonally differenced quarterly earnings and quarterly accruals. We focus on seasonally differenced earnings and quarterly accruals because prior research demonstrates the relevance of earnings and accruals for pricing in the credit market.[6] In addition, both measures have been the source of anomalous stock price behavior, as discussed below. Therefore, it is important to know whether the credit market is susceptible to similar anomalies with respect to this information.

[5]Specifically, Hotchkiss and Ronen (2002), Easton, Monahan, and Vasvari (2009) and DeFond and Zhang (2009) document a significant positive association between short-window bond returns surrounding earnings announcements and earnings surprises while Callen, Livnat, and Segal (2009), Greatrex (2009), and Shivakumar, Urcan, Vasvari, and Zhang (2011) document a negative relation between changes in credit default swap spreads surrounding earnings and/or management forecasts announcements and earnings or management forecast news.

[6] For example, Callen, Livnat, and Segal (2009) document negative associations between the level of earnings and the magnitude of CDS spreads, consistent with higher earnings being associated with lower perceptions of default likelihood for the reference companies. In addition, Callen, Livnat, and Segal (1999) and Easton, Monahan, and Vasvari (2009) document long window associations between changes in CDS spreads and bond returns, respectively, and earnings changes, indicating that earnings captures information relevant to the pricing of debt and to the assessment of default likelihood. Das, Hanouna, and Sarin (2009) find that CDS spreads respond to both accounting and market-based information.

In a related study, Bhojraj and Swaminathan (2009) provide relevant evidence of overreaction to accruals in the corporate bond market from 1973 through 1997. Our examination of a similar question in the context of the CDS market is justified by: (1) the economic significance of the CDS market, (2) prior findings of differences in the degree of informational efficiency of the CDS and corporate bond markets, and (3) key institutional features of the CDS market (that we discuss below) that differ from the corporate bond market. In addition, our sample period is more recent and, therefore, provides more current insights. Given recent evidence that stock market anomalies have declined over time (e.g. Green, Hand, and Soliman 2009), inferences about market efficiency from the earlier time period examined by Bhojraj and Swaminathan (2009) may not generalize to more recent time periods.

2.2 Accounting-Based Anomalies and their Potential Existence in the Credit Market

We test the degree of informational efficiency in the credit market by focusing on two enduring accounting-based anomalies that have been documented in the equity market: (1) Post-earnings announcement drift (PEAD) and (2) the accrual anomaly. With respect to PEAD, Ball and Brown (1968) provided the first indication that the market does not fully react to earnings at the time they are announced by demonstrating that returns tend to drift for a considerable period of time subsequent to earnings announcements. Bernard and Thomas (1989) provide evidence that the drift is attributable to the market's failure to incorporate the predictable time series properties of earnings when responding to earnings. With respect to the accrual anomaly, Sloan (1996) shows that the accrual component of earnings is significantly less persistent than the cash flow component and that a profitable trading strategy can be formed based on the relative

magnitude of the accrual component, consistent with equity investors being insufficiently attentive to the differential persistence of the accrual and cash flow components of earnings.

The extent to which these two anomalies will be observed in the CDS market is not obvious. If these anomalies are the result of information processing biases to which equity and debt investors are similarly susceptible or if CDS and stock markets are cointegrated as suggested by Lok and Richardson (2011), we would expect to see these anomalies in the credit market. On the other hand, the different uses of accounting information by the two markets could result in differences in whether and how accounting-based anomalies manifest.

2.3 Structure of the CDS Market

We focus on the CDS market for several reasons. First, the CDS market is economically significant relative to the global economy.[7] Second, relative to other outputs such as bond prices or credit ratings, CDS prices are conceptually pure, frequently updated measures of default risk.[8] Finally, the now widely acknowledged underpricing of default risk in the CDO market in the lead-up to the AIG bailout, has called into question the functioning of the CDS market and led to greater regulation of this market.[9] Therefore, we believe an examination of the performance of

[7] From 2002 to 2007 the CDS market grew from $2 trillion to $62.2 trillion (ISAD 2010). As of 2009 the worldwide bond market was estimated at $82.2 trillion with the US market representing $34.7 trillion on daily trading of $822 billion. On an annual basis, the global equity market hovers around $40-50 trillion, about half of the debt market.

[8] Easton, Monahan, and Vasvari (2009) utilize bond yields in determining the credit market's reaction to accounting information; however, bond yields are influenced by many factors other than default risk such as interest rate risk and liquidity risk. Research has shown that CDS spreads are better indicators of financial distress than are bond yields, lead the bond markets, and are more liquid during times of increased risk (Das and Hanouna, 2006; Kiff, Elliott, Kazarian, Scarlata, and Spackman, 2009; Becker, 2009). The notion that CDS spreads are reliable indicators of distress in the referenced asset is widely accepted in research and the industry.

[9] By all accounts, Credit Defaults Swaps (CDS) played a significant role in the recent global financial crisis. Specifically, CDSs were written on Collateralized Debt Obligations and similar entities that held US mortgage debt including subprime mortgages. When the US financial crisis hit, sellers of CDSs found themselves in the position where they were marking down their financial assets as well as writing up their liabilities in fulfillment of their CDS collateral claims. At the same time, CDS dealers such as AIG and Lehman had their corporate credit ratings cut which led to an even larger demand for collateral from their counterparties. Both entities reached a point where the collateral calls on their CDSs exceeded their liquid assets. As a result, on September 15, 2008, Lehman defaulted

the CDS market outside the specialized CDO setting is warranted. In particular, CDSs written on the debt of publicly traded companies differ from those written on more opaque entities such as those in the CDO market due to the large amount of high quality information from which credit worthiness is more easily discerned.

The CDS market began in the 1990s as banks were developing new ways of breaking up traditional securities to off-load parts of their credit risk. Under a CDS contract, the issuer agrees to assume the financial loss if a credit event related to a specified underlying debt occurs in exchange for an annual premium referred to as the spread.[10] The spread is calculated as a fraction of the underlying debt's notional value.[11] The annual payment is fixed for the initial buyer and is generally paid quarterly until a specific pre-defined credit event occurs or the contract matures. By construction, the spread is positively correlated with the credit quality of the reference entity on which the CDS is written. There are no limits on the size of a CDS swap contract, though most contracts fall between $10 and $20 million. They are traded over the counter (OTC) at varying maturities; however, the 5-year contract is the most common and therefore, the most liquid. Because the CDS market is quite active, the stated selling price of CDSs vary based on the likelihood of the credit event occurring.[12]

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and a week later AIG received a liquidity infusion from the Federal Reserve. These institutions and others in the economy were not prepared for the induced counterparty risk that the CDS market introduced through connecting entities in the industry.

Currently, CDSs are said to have played a pivotal role in the credit crisis of Greece and other members of the European Union. In response, German financial regulators banned naked short selling of CDSs on euro zone governmental bonds in May of 2010. At the same time the US Congress passed the Dodd-Frank Act which restricts Federal assistance to certain swap dealers and major swap participants. The financial crisis around the world was precipitated by the rise in counterparty risk of CDS sellers.

[10]The credit events covered by CDS include bankruptcy, obligation acceleration, obligation default, failure to pay, repudiation or moratorium, and restructuring (in 2009, US contracts eliminated this as a potential trigger event).

[11] CDS spreads are denominated in basis points and represent a percentage of the notional amount. Thus, a CDS with a spread of 100 would cost 1% of the face amount of the underlying asset.

[12] A CDS is purchased by an initial buyer who may sell the CDS in the future at a new prevailing price which represents the credit worthiness of the referenced asset on that date. Over the life of the CDS there can be multiple players in the chain of buyers and sellers; however, it is only the counterparty at the beginning of the chain (the original seller) and at the end (the last buyer) who have the obligation and protection, respectively. The entities in

If a credit event occurs, the issuer has the obligation to settle the contract by paying the buyer the incurred loss. Under cash settlement, the buyer receives the difference between the bond value at the time of settlement and the bond's nominal value in cash. In theory, the post default recovery value at the time of settlement is the difference in value of the reference security and its stated face value. However, because the referenced asset (corporate bond) is likely not trading, this value is difficult to determine in practice.

Initially, CDSs were primarily used to hedge risk as they allow credit risk to be hedged separately from interest rate risk. Unlike securitizations, CDSs do not require prefunding on the part of the seller. Moreover, the buyer can maintain their existing credit portfolio and customer relationships while changing the portfolio's risk exposure. CDS contracts are similar to insurance policies where one party assumes the risk and the other pays a premium. However, CDSs can differ from insurance contracts in that it is not necessary for the purchaser to possess the insurable item—own the item being insured. This ability to trade "naked CDSs" allows speculative trading in CDSs, which has fueled the market's growth over time.

There are divergent views about whether the current institutional design of the CDS market leads to a well-functioning market. Critics raise concerns about the opacity of the market, which they argue makes it more difficult to assess the degree of systemic risk (e.g. Acharya, Engle, Figlewski, Lynch, and Subrahmanyam, 2009). Moreover, opacity may deprive CDS market participants of useful signals from past trading activity that might facilitate more informed trades. These concerns have led to calls for exchange trading of CDSs or, at the least, a requirement that CDS trades be disclosed with a clearinghouse (Acharya, Engle, Figlewski, Lynch, and Subrahmanyam, 2009). In addition, critics are concerned about the effect of

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between merely collect the difference in the annual premiums that they are obligated to pay and those that they contracted to receive.

speculative trading on the CDS market.

These concerns are not universal, however. Stulz (2010) argues that the CDS market performed fairly well during the recent credit crisis, citing the orderly settlement of CDS claims upon Lehman Brothers' bankruptcy. Moreover, although he does allow that clearinghouses may serve a useful role, Stulz (2010) argues that an exchange requirement for CDS trades is not appropriate given the idiosyncratic nature of CDS contracts due to the need to tailor the arrangements to fit individual risk management goals. Also, in contrast to critics of speculative trading, Stulz (2010) argues that permitting speculative trading in CDSs actually allows the market to function more effectively by allowing those with information to trade on it. Given these divergent views about how well the CDS market functions, our examination of how well it processes information relevant for assessing default risk is particularly important.

3. Empirical Methodology

3.1 *Regression Test of Contemporaneous CDS Responses to Earnings Announcements*

As a baseline test, we first verify that Callen, Livnat, and Segal's (2009) and Greatrex's (2009) findings of a contemporaneous CDS response to the release of earnings news extend to our sample by estimating the following model:

$$CDSRETANN = a_0 + a_1\, DSUE + a_2\, \Delta TREASURYANN + a_3\, RETANN + a_4\, FINANCIAL + e \quad (1)$$

where: *CDSTRETANN* is the raw CDS return for day -1 through day 1 relative to the earnings announcement date less the return on the market CDS index over the same time horizon.

SUE is operating earnings for quarter t minus operating earnings for quarter t-4 divided by average assets.

DSUE is the within-quarter decile rank of seasonally differenced earnings (*SUE*), scaled to be between 0 and 1.

Δ*TREASURYANN* is the change in the rate on one year treasury bonds from day -1 through day 1 relative to the earnings announcement period.

RETANN is the market-adjusted equity return for day -1 through day 1 relative to the earnings announcement date.

FINANCIAL is one if the firm's two-digit SIC code is between 60 and 69 and zero otherwise.

Following the recommendation of Lok and Richardson (2011), we measure CDS returns as the raw change in CDS spreads over the return interval of interest (rather than the percentage change) as this measurement best captures the economic magnitude of revisions in assessed default likelihood. We obtain the pricing data necessary to calculate CDS returns over the various intervals examined in this study from Datastream. Datastream maintains daily trading quotes on specific CDSs written on referenced assets. The quotes reported by Datastream are intraday prices that are the arithmetic mean of prices from at least 13 contributing major market makers received by the agency during a given day. Our use of high frequency CDS spread data from Datastream allows us to calculate short-window returns surrounding earnings announcements as well as post-announcement returns. To control for contemporaneous market events that may affect the CDS spreads of individual firms, we subtract the market CDS index for the announcement period, which we calculate as the average CDS return for all firms over the earnings announcement period, consistent with Greatrex (2009).

We use the rank of *SUE* to capture the strength of the linear relationship between earnings news and CDS responses. Scaling *DSUE* to be between 0 and 1 allows the a_1 coefficient to be interpreted as the difference in announcement-period CDS returns for firms with the most positive versus the most negative earnings news. Based on prior research (e.g. Callen, Livnat, and Segal, 2009; Greatrex, 2009), we expect $a_1 < 0$. That is, we expect the CDS market to revise

upward (downward) its assessment of default risk for firms reporting negative (positive) earnings news.

In addition, we include controls for previously documented determinants of short-window changes in CDS spreads. Following Zhang, Zhou, and Zhu (2009), we include changes in the treasury rate ($\Delta TREASURYANN$) to control for contemporaneous changes in macroeconomic conditions. We control for market-adjusted equity returns (*RETANN*) over the earnings announcement period based on prior findings of a negative relationship between CDS returns and stock returns (e.g. Callen, Livnat and Degal 2009; Shivakumar, Urcan, Vasvari and Zhang 2011). We also estimate a separate fixed effect for firms in the financial industry (*FINANCIAL*) based on anecdotal evidence that CDS spreads of financial firms were particularly affected by the credit crisis.

3.2 *Regression Tests of Post-Announcement CDS Responses to Previously Released Accounting Information*

To directly test the degree of semi-strong form market efficiency in the CDS market, we first examine the relation between post-announcement CDS returns and previously announced earnings surprises by estimating the following model:

$$CDSRET60 = b_0 + b_1\, DSUE + b_2 UPGRADE + b_3 DOWNGRADE + b_4\, \Delta LEVERAGE + b_5\, \Delta TREASURY + b_6\, \Delta STDRET + b_7 RET60 + b_7 FINANCIAL + e \quad (2)$$

where: *CDSRET60* is the raw CDS return for 60 trading days commencing with day +3 relative to the earnings announcement date less the return on the market CDS index over the same time horizon.

UPGRADE is one if the firm's S&P credit rating is upgraded over the 60 trading days commencing with day +3 relative to the earnings announcement date and zero otherwise.

DOWNGRADE is one if the firm's S&P credit rating is downgraded over the 60 trading days commencing with day +3 relative to the earnings announcement date and zero otherwise.

$\Delta LEVERAGE$ is the change in the firm's leverage during the quarter immediately following the earnings announcement date where leverage is calculated as the firm's total debt divided by total debt plus the market value of equity.

$\Delta TREASURY$ is the change in the rate on one year treasury bonds over the 60 trading days commencing with day +3 relative to the earnings announcement date.

$\Delta STDRET$ is the difference in standard deviation of daily market-adjusted equity returns during the 60 day post-announcement period and the standard deviation of daily market-adjusted equity returns during the previous 60 day period.

RET60 is the market-adjusted equity return for 60 trading days commencing with day +3 relative to the earnings announcement date.

We then examine the relation between post-announcement CDS returns and previously announced accruals by estimating the following model.

$$CDSRET60 = c_0 + c_1\, DACCRUALS + c_2 UPGRADE + c_3 DOWNGRADE + c_4\, \Delta LEVERAGE + c_5\, \Delta TREASURY + c_6\, \Delta STDRET + c_7 RET60 + c_8 FINANCIAL + e \quad (3)$$

where: *ACCRUALS* = operating earnings for quarter t (Compustat data item ibq) minus operating cash flow for quarter t divided by average assets for quarter t, and

DACCRUALS = the within-quarter decile rank of accruals (*ACCRUALS*), scaled to be between 0 and 1.

Equations (2) and (3) are analogous to models used to document the existence of post-earnings announcement drift and the accrual anomaly, respectively, in the equity market (e.g. Bernard and Thomas, 1990; Sloan, 1996; Collins and Hribar, 2000). Our use of a 60 day post-earnings announcement window is consistent with the literature on post-earnings announcement drift and the accrual anomaly in the equity market (e.g., Foster, Olsen, and Shevlin, 1984; Collins and Hribar, 2000). Under semi-strong market efficiency, $b_1 = 0$ and $c_1 = 0$. A finding that either b_1 or c_1 is significantly different from zero indicates a systematic relation between

subsequent returns and previously announced accounting information, consistent with suboptimal initial market reactions to this information.

Our use of decile ranks scaled to be between 0 and 1 to measure *DACCRUALS* in equation (3) is consistent with our measurement of *DSUE* as discussed in section 3.1 and has the same interpretation. In addition, our measurement of post-announcement returns relative to the earnings announcement date in equation (3) assumes that accrual information is available to the market by the earnings announcement. This assumption appears reasonable given that the practice of providing balance sheets and cash flow statements in earnings announcement press releases has become increasingly common.[13]

In both equations (2) and (3), we control for previously documented determinants of movements in CDS spreads over extended time horizons. Following Callen, Livnat and Segal (2009), we control for changes in firm-specific risk during the post-announcement period by including variables corresponding to contemporaneous upgrades or downgrades in firms' credit ratings (*UPGRADE* and *DOWNGRADE)*, changes in leverage (Δ*LEVERAGE*) and changes in the volatility of stock returns (Δ*STDRET*). Similar to Equation (1), we include contemporaneous changes in the one-year treasury rate to control for macroeconomic changes during the post-announcement period (Δ*TREASURY*) and contemporaneous market-adjusted equity returns to control for the systematic relation between CDS returns and stock returns (*RET60*).

To permit a comparison of our findings in the CDS market with those in the equity market, we estimate the following variants of equations (2) and (3) that use post-announcement stock returns as the dependent variables.

$$RET60 = b'_0 + b'_1\, DSUE + e' \qquad (2')$$

[13]Our inferences are unchanged if we instead begin our accumulation period after the filing date of the relevant 10-Q or 10-K with the Securities and Exchange Commission (SEC).

$$RET60 = c'_0 + c'_1\, DACCRUALS + e' \qquad (3')$$

where: *RET60* = abnormal stock return for the 60 days commencing with the third day after the earnings announcement.

Past research documents that $b'_1 > 0$, suggesting that the equity market consistently underreacts to earnings surprises. That is, returns for firms with positive (negative) surprises continue to drift upward (downward) after the earnings announcement period, indicating that the initial stock responses to the earnings news were insufficient. A comparison of the results of equation (2) with those of equation (2′) sheds light on the degree to which post-earnings announcement drift manifests similarly in the stock and CDS markets.

Past research documents that $c'_1 < 0$, indicating that the equity market initially overreacts to accruals. Specifically, the negative coefficient is consistent with the equity market initially punishing (rewarding) firms with income-decreasing (income-increasing) accruals excessively and then correcting for these excessive initial responses over time. A comparison of the results of equation (3) with those of equation (3′) sheds light on the degree to which the accrual anomaly documented in the stock market manifests similarly in the CDS market.

3.3 *Empirical Specifications*

To mitigate the impact of outliers, we winsorize all CDS and stock return variables at the 1st and 99th percentiles. To avoid faulty inferences due to cross-sectional dependence as a result of repeated observations by firm, we cluster standard errors by firm for all models estimated.

Prior research indicates that the recent U.S. financial crisis represented a structural shift in how CDS spreads responded to accounting information (Shivakumar, Urcan, Vasvari, and Zhang, 2011). Therefore, in addition to providing results for the full sample period, we conduct our analyses over three time periods: (1) prior to the credit crisis of 2007 and 2008, (2) during

the credit crisis and (3) after the credit crisis. We designate earnings announcements from January 2003 through December 2006 as the pre-crisis period, earnings announcements from January 2007 through December 2008 as the crisis period, and earnings announcements from January 2009 through July 2010 as the post-crisis period. For each model estimated, we assess statistical differences in coefficient estimates across the time periods based on a pooled regression that incorporates intercept and slope shifts for the different subperiods.

CDS contracts can have varying durations. Following prior work (Greatrex, 2009; Shivakumar, Urcan, Vasvari, and Zhang 2011), we restrict our analysis to the 5 year duration, which is the most common, and therefore, most liquid. In untabulated analysis we find that all inferences are unchanged by including CDS contracts of all durations.

4. Sample Selection and Descriptive Statistics

4.1 Sample Selection

Table 1 presents our sample selection process. We begin our data collection with 22,401 firm-contract-quarters from Datastream related to 736 publicly traded U.S. firms listed on COMPUSTAT starting in 2003. We eliminate 1,009 observations related to 10 firms without the necessary financial data from COMPUSTAT. Lastly we remove 7,411 observations related to 34 firms without sufficient pricing data from Datastream to calculate post announcement returns. These procedures yield a sample of 13,981 firm-quarter-contract observations related to 692 unique firms for quarterly earnings announced from January 2003 through July 2010.

4.2 Descriptive Statistics

Panel A of Table 2 reports descriptive statistics for the entire sample period as well as

each of the subperiods. The Appendix provides a detailed description of the variables. The most notable pattern is the significant deterioration during the crisis in a number of financial and accounting measures. In particular, seasonally differenced earnings (*SUE*), accruals (*ACCRUALS*), and post-announcement equity returns (*RET60*) become negative during the crisis. In addition, there is a greater incidence of downgrades (*DOWNGRADE*), an increase in leverage (*ΔLEVERAGE*) and an increase in the volatility of equity returns (Δ*STDRET*) during the crisis. Other notable changes are the decline in post-announcement CDS returns (*CDSRET60*) and the treasury rate (*ΔTREASURY*). This comparative evidence highlights the significant structural change in both the equity and CDS markets that accompanied the financial crisis and provides support for our subperiod analysis.

The differing objectives of equity investors (who are interested in infinite-horizon cash flow forecasts) and creditors (who are interested in assessing a firm's ability to service debt in the near-term) likely affects the relative degree of importance these claimants place on cash flow and accrual information. Specifically, creditors may emphasize current cash flow in their assessments of a firm's ability to meet its near-term obligations while an equity investor may emphasize the forward-looking information in accruals to make the required long-horizon forecasts. This different use of accounting information may affect how anomalies related to accounting information manifest in the two markets. To provide a basis for subsequent exploration of this issue, we report the distribution of cash flow from operations (*CFO*) across deciles formed alternatively on the basis of *SUE* and *ACCRUALS* in Panel B of Table 2. There is a generally positive but non-monotonic relation between *CFO* and *SUE*. Consistent with prior research (e.g. Sloan, 1996), there is a decidedly negative and monotonic relation between *CFO* and *ACCRUALS*.

4.3 Correlations

Table 3 reports correlations. Panel A presents correlations for the full sample while Panels B, C, and D report correlations prior to, during and subsequent to the crisis, respectively. The tenor of the results across the Pearson and Spearman correlations is varied so we focus our discussion on the ranked Spearman correlations. Across all time periods, post-earnings announcement equity returns are negatively related to accruals, consistent with the well-documented accrual anomaly. For the full sample period, post-earnings announcement equity returns are positively related to *SUE*, consistent with post-earnings announcement drift. This relation changes significantly throughout the sample period, however. It is insignificant prior to the crisis, significantly positive during the crisis, and becomes negative after the crisis. The latter finding provides a preliminary indication of overreaction by the equity market to earnings, in contrast to prior research on post-earnings announcement drift.

Announcement period CDS returns are negatively related to seasonally differenced earnings for all time-periods, consistent with prior research (e.g., Callen, Livant, and Segal, 2009; Greatrex, 2009). Also consistent with prior research, post-announcement CDS returns are negatively associated with post-announcement equity returns for all time periods. (Lok and Richardson, 2011; Callen, Livant, and Segal, 2009). There is preliminary evidence of systematic relations between subsequent CDS returns and previously announced seasonally differenced earnings and accruals, although these relations change over time. Specifically, the correlation between post-announcement CDS returns and seasonally differenced earnings is insignificant prior to the crisis but is significantly negative during and after the crisis, consistent with underreaction in the CDS market during these periods. The correlation between post-

announcement CDS returns and accruals is significantly positive prior to the crisis and after the crisis but significantly negative during the crisis, suggesting a structural shift in this relation over time.

Collectively, the results corroborate prior findings that CDS spreads respond to earnings announcements. The results also provide new evidence of systematic relations between post-announcement CDS returns and previously released accounting information that change across the time periods examined. Our ensuing multivariate analyses explore these issues in greater depth.

5. Results

5.1 Initial Market Reaction to Earnings Announcements

Panel A of Table 4 presents the results of estimating equation (1), which is our baseline analysis of the contemporaneous relation between CDS spreads and unexpected earnings. Consistent with Callen, Livnat, and Segal (2009) and Greatrex (2009), the coefficient on *DSUE* for the full sample is significantly negative (a_1=-6.030; *p*-value < 0.0001), indicating that unexpected increases (decreases) in earnings lead to lower (higher) assessments of default likelihood as reflected in CDS spreads. Consistent with expectations, equity returns are negatively associated with CDS returns (a_4 = -88.386; *p*-value < 0.0001).

Panel B of Table 4 presents the results of estimating equation (1) separately for each time period. The negative relation holds prior to the crisis (a_1 = -3.663; *p*-value = 0.001), during the crisis (a_1 = -7.627; *p*-value < 0.001) and post-crisis (a_1 = -6.322; *p*-value = 0.013). The difference in market reaction during the crisis versus prior to the crisis is significant (*p*-value = 0.077), providing some support for the possibility of a structural shift associated with the financial crisis.

The analysis in Table 4 confirms that the CDS market responds contemporaneously to earnings surprises and provides new evidence that the intensity of the response increased during credit crisis. Our ensuing analysis examines the completeness of this initial CDS market response.

5.2 Post-Announcement CDS Responses to Earnings News

Our analysis of post-announcement CDS responses to earnings news begins with Panel A of Figure 1, which depicts the coefficients on *DSUE* obtained from quarterly regressions of post-announcement CDS returns (*CDSRET60*) on *DSUE*. The coefficients on DSUE during the early quarters are minimal, consistent with the CDS market being generally efficient with respect to earnings prior to the crisis. The coefficients become increasingly negative during 2007 and 2008, consistent with an increased tendency to underreact during the crisis period. The coefficient becomes positive during the first two quarters of 2009, consistent with the CDS market overreacting to earnings information in the immediate aftermath of the crisis. This apparent overreaction dissipates by mid-2010, however.

In Figure 2, we provide some visual evidence on the drivers of the relation between subsequent CDS returns and previously announced earnings by plotting the average 60-day cumulative post-announcement CDS returns for firms in the highest and lowest *SUE* deciles. Panel A presents the graph for the full sample, which indicates that lowest *SUE* firms have larger post-announcement returns than the highest *SUE* firms, consistent with the previously noted negative correlation between *SUE* and *CDSRET60* for the full sample period. Panel B presents the graph for the pre-crisis period, which reveals no systematic difference in post-announcement CDS returns for the lowest and highest *SUE* firms, consistent with the previously noted

insignificant relation between *SUE* and *CDSRET60* prior to the crisis. Panel C depicts a notable difference in post-announcement CDS returns for the highest and lowest *SUE* firms with the lowest *SUE* firms experiencing a decided upward trend and the highest *SUE* firms experiencing a modest downward trend, consistent with the negative correlation during the crisis documented in Panel C of Table 3. The upward trend in post-announcement CDS responses for firms in the bottom *SUE* decile is consistent with the CDS market initially assigning insufficient default risk assessments for these firms that it then gradually corrects over time. Finally, Panel D of Figure 2 shows that the gap between post-announcement CDS returns for the highest and lowest *SUE* firms narrows considerably during the post-crisis period.

Taken together, Figure 2 provides visual evidence that the negative relation between post-announcement CDS returns and seasonally differenced earnings is limited to the credit crisis and is driven primarily by the CDS market's underreaction to the earnings of firms with the most negative earnings news.

We verify the intuition provided by Panels A of Figure 1 and Figure 2 by estimating equation (2). We present the results for the full sample in Panel A of Table 5 and the results for each of the subperiods in Panel B of Table 5. Consistent with expectations, post-announcement returns for the full sample are higher for firms experiencing downgrades during the post-announcement period (b_3 = 24.308, *p*-value = 0.061), firms with increases in leverage over the subsequent quarter (b_4 = 359.205, *p*-value < 0.0001) and firms with increases in stock return volatility during the post-announcement period (b_6 = 3100.500, *p*-value <0.0001). Also consistent with prior research, post-announcement CDS returns are negatively related to equity returns measured over the post-announcement period (b_7 = -186.011, *p*-value <0.0001). Post-announcement CDS returns are somewhat higher for financial firms (b_8 = 3.877; *p*-value =

0.059). Turning to the primary variable of interest, the coefficient on *DSUE* is significantly negative for the full sample period after controlling for other determinants of post-announcement CDS returns (b_1=11.499; *p*-value = 0.023), consistent with an overall underreaction to seasonally differenced earnings.

For comparative purposes, Panel A of Table 5 also presents the results of estimating equation (2′), which measures the extent of post earnings announcement drift in the equity market for the full sample period. In contrast to the CDS market, there is an insignificant relation between post-announcement returns and seasonally differenced earnings (b'_1 = -0.003; *p*-value = 0.704).

Our subperiod analysis presented in Panel B of Table 5 indicates that the overall underreaction in the CDS market is attributable to the financial crisis. Specifically, CDS returns and seasonally differenced earnings are significantly negatively related during the crisis (b_1 = -43.952, *p*-value < 0.0001) but are not significantly related either before the crisis (b_1 = 4.582, *p*-value = 0.123) or after the crisis (b_1 = 0.085, *p*-value = 0.995). The negative coefficient on *DSUE* during the crisis is significantly different from the corresponding coefficient in both the pre- and post-crisis periods at $p < 0.01$.

Recall from previous inspection of Panel A of Figure 1 that the CDS market exhibited overreaction to earnings in the immediate aftermath of the crisis although this effect was not sustained. Consistent with this visual evidence, we find that CDS returns and seasonally differenced earnings are positively related at $p < 0.01$ when we restrict the post-announcement period to the first two quarters of 2009 in untabulated analysis. The insignificant relation over the entire post-crisis period that we document in Panel B of Table 5 indicates that the CDS market's overreaction to earnings in the immediate aftermath of the crisis was not sustained.

Panel B of Table 5 also presents the results of estimating equation (2′) by subperiod. Consistent with the CDS market, there is insignificant post-announcement drift during the pre-crisis period (b'_1 = -0.003; *p*-value = 0.704) and significant drift during the crisis (b'_1 = 0.054; *p*-value = 0.001). In contrast to the CDS market, there is significant negative drift after the crisis (b'_1 = -0.063; *p*-value < 0.0001), consistent with overreaction in the equity market to earnings surprises. Therefore, the financial crisis appears to have represented a structural shift in how both the stock and CDS markets reacted to accounting information.

Taken as a whole, the results suggest that the CDS market is generally efficient during stable economic periods. Its tendency toward underreaction to earnings news during the crisis, however, calls into question the resilience of the CDS market during less stable economic periods.

5.3 Post-Announcement CDS Responses to Accruals

Our analysis of post-announcement CDS responses to earnings news begins with Panel B of Figure 1, which depicts the coefficients on *DACCRUALS* obtained from quarterly regressions of post-announcement CDS returns (*CDSRET60*) on *DACCRUALS*. The coefficients on *DACCRUALS* during the early quarters and throughout 2007 are minimal, consistent with the CDS market being generally efficient with respect to accruals prior to and during the early quarters of the crisis. The coefficients become increasingly negative during the last three quarters of 2008, consistent with an increased tendency to underreact to accruals during the crisis period. The coefficient becomes positive during the first three quarters of 2009, consistent with the CDS market overreacting to accruals in the immediate aftermath of the crisis. This apparent overreaction dissipates by mid-2010, however.

In Figure 3, we provide some visual evidence on the drivers of the relation between subsequent CDS returns and previously announced accruals by plotting the average 60-day cumulative post-announcement CDS returns for firms in the highest and lowest accrual deciles. Panel A presents the graph for the full sample, which indicates that post-announcement returns for the lowest and highest *ACCRUALS* generally track each other until the very end of the 60 day period where post-announcement returns for firms with most negative *ACCRUALS* begin to exceed those of the firms with the largest accruals. Panel B presents the graph for the pre-crisis period, which reveals no systematic difference in post-announcement CDS returns for the lowest and highest *ACCRUALS* firms. Panel C illustrates a notable difference in post-announcement CDS returns for the highest and lowest *ACCRUALS* firms with the smallest *ACCRUALS* firms experiencing a decided upward trend and the largest *ACCRUALS* firms experiencing a modest downward trend, consistent with the previously noted negative correlation during the crisis period. The upward trend in post-announcement CDS responses for firms in the bottom *ACCRUALS* decile suggests that the CDS market initially underprices the default risk of firms with the most income-decreasing accruals and gradually corrects for this underpricing. Given that these firms also have the highest cash flows (see Panel B of Table 2), it is possible that the CDS market overly fixates on cash flows and underweights the negative information in accruals during the crisis.

Finally, Panel D shows a reversal of the pattern observed during the crisis. Specifically, after the crisis, firms with the lowest accruals exhibited a decided downward trend in CDS returns while firms with the highest accruals exhibited a modest upward trend, consistent with a tendency to overreact to accruals after the crisis.

Taken together, Figure 3 provides visual evidence that the negative relation between

post-announcement CDS returns and accruals is limited to the credit crisis period and is driven primarily by the CDS market's underreaction to the earnings of firms with the most income-decreasing accruals. This pattern reverses in the post-crisis period where the CDS market appears to excessively punish firms with the most income-decreasing accruals.

We verify the intuition provided by Panels B of Figure 1 and Figure 3 by estimating equation (3). We present the results for the full sample in Panel A of Table 6 and the results for each of the subperiods in Panel B of Table 6. The behavior of the control variables is consistent with that already noted in the previous estimation of equation (2). Turning to the variable of primary interest, the coefficient on *DACCRUALS* is insignificant for the full sample period after controlling for other determinants of post-announcement CDS returns (c_1=6.211; *p*-value = 0.156), consistent with the market being generally efficient with respect to accruals.

For comparative purposes, Panel A of Table 6 also presents the results of estimating equation (2′), which measures the extent of the accrual anomaly in the equity market for the full sample period. In contrast to the equity market, there is a significantly negative relation between post-announcement equity returns and accruals (c'_1 = -0.049; *p*-value < 0.0001), consistent with prior research on the accrual anomaly.

Our subperiod analysis presented in Panel B of Table 6 indicates the insignificant coefficient on *DACCRUALS* for the full sample period is attributable to offsetting effects during and subsequent to the crisis. Specifically, while CDS returns and accruals are not significantly related prior to the crisis, they are significantly negatively related during the crisis (c_1 = -37.381, *p*-value <0.0001) and positively related after the crisis (c_1 = 38.001, *p*-value =0.001). The negative coefficient on *DACCRUALS* during the crisis is significantly different from the corresponding coefficient in both the pre- and post-crisis periods at *p*-value < 0.001.

Panel B of Table 6 also presents the results of estimating equation (3′) by subperiod. In contrast to the CDS market, the accrual anomaly is significant during all periods examined for the equity market, although it does intensify in the post-crisis period as observed for the CDS market.

In summary, the results suggest that, during the crisis, the CDS market exhibited an underreaction to accruals information, particularly for firms with the largest income-decreasing accruals. Given that these firms typically have the highest cash flow component, the CDS market's inattention to accruals for these firms may reflect the credit market's tendency to fixate on cash flows. Due to the spate of negative news during the crisis, this tendency to underreact may also reflect the limited attention phenomenon wherein investors face difficulty in fully processing relevant information when there are multiple events vying for their attention (e.g. Hirshleifer and Teoh 2003, Hirshleifter, Lim and Teoh 2009; Hirshleifer, Lim, and Teoh 2011). In the aftermath of the financial crisis, however, the CDS market appears to have excessively penalized firms with the largest income-decreasing accruals, suggesting a heightened sensitivity to accruals post-crisis.

It is interesting that, while both CDS and equity markets are characterized by anomalous responses to accruals, the nature of the anomalies differs across the two markets. In the pre-crisis period, the equity market overreacts to accruals while the CDS market does not. During the crisis, the CDS market underreacts to accruals while the equity market overreacts. Our contrasting findings indicate that the patterns we document for the CDS market are not a simple outgrowth of the stock market, a possibility raised by Lok and Richardson (2011).

6. Discussion and Conclusion

We examine the extent of semi-strong form market efficiency in the CDS market by testing the relation between post-announcement CDS returns and seasonally differenced earnings and accruals, both of which have been shown to be associated with anomalous stock price movements. Our results indicate that the CDS market responded efficiently to both earnings surprises and accruals prior to the credit crisis of 2007 and 2008. During the crisis, however, the CDS market appeared to underreact to both measures. In the immediate aftermath of the crisis, CDS market appeared to overreact to both measures, although this tendency to overreact appears to have dissipated by mid-2010. Our results suggest that the CDS market is generally efficient with respect to accounting information during periods of relative economic stability but call into question its resilience during less stable periods.

The CDS market's underreaction to both quarterly earnings surprises and quarterly accruals during the crisis is consistent with the limited attention phenomenon documented in the accounting and finance literature wherein cognitive limitations undermine investors' ability to fully process information, particularly when there are multiple events vying for their attention (Hirshleifer and Teoh 2003, Hirshleifter, Lim and Teoh 2009). Hirshleifer et al. (2010) explicitly link limited investor attention to post-earnings announcement drift and the accruals anomaly. Although the limited attention phenomenon has been explored primarily in the context of the equity market, our evidence of underreaction by the CDS market during the crisis suggests that investors in the CDS market may have also suffered from limited attention to accounting fundamentals during this time due to the spate of bad news that arrived during this period.

Our findings have several important implications. First, it appears that the market's suboptimal reaction to accounting information was a key driver of mispricing of credit risk

during and after the crisis. The underpricing of credit risk during the crisis made speculation in the CDS market particularly attractive, fueling the massive growth in the market. Specifically, the cheapness of spreads during the crisis, particularly for firms with the most negative earnings surprises and/or the largest income decreasing accruals, made it possible to profit by purchasing the CDSs of these firms in anticipation of the eventual upward drift in spreads as the market corrected. The downside of this exuberance was an increase in counterparty risk which led to the demise of Lehman Brothers, the bailout of AIG, and a fundamental change in the regulatory environment for global financial markets. The overpricing of credit risk in the immediate aftermath of the crisis likely contributed to the freezing of credit. Specifically, as default likelihoods climbed, CDS writers were required to post collateral to satisfy margin requirements on their CDS positions which tied up their liquid assets making them unavailable to potential borrowers. Moreover, the increasing cost of purchasing CDSs to hedge default risk made loan originators less willing to lend. This led to a seizing up of credit in all sectors of the market, making it more difficult in the post-crisis period for all potential borrowers to obtain financing.

Secondly, our results show that inefficient responses to accounting information extend beyond the equity market to the CDS market although there are differences in how these inefficiencies manifest in the two markets. These differences are probably a result of the different roles of accounting information in the two markets. Moreover, our results suggest that the nature of the inefficiencies appears to be evolving in response to market forces. Time will tell if the CDS market's response to accounting signals continues to evolve as a result of the institution of regulatory reform as well as through investor learning and/or the implementation of arbitrage strategies (Brav and Heaton, 2002).

Appendix
Variable Definitions

CDSRET60 = is the raw CDS return for 60 trading days commencing with day 3 relative to the earnings announcement date less the return on the market CDS index over the same time horizon.

SUE is operating earnings for quarter t minus operating earnings for quarter t-4 divided by average assets.

DSUE is the within-quarter decile rank of seasonally differenced earnings (*SUE*), scaled to be between 0 and 1.

ACCRUALS = operating earnings for quarter t minus operating cash flow for quarter t divided by average assets for quarter t, and

DACCRUALS = the within-quarter decile rank of accruals (*ACCRUALS*), scaled to be between 0 and 1.

CDSTRETANN is the raw CDS return for day -1 through day 1 relative to the earnings announcement date less the return on the market CDS index over the same time horizon.

RETANN is the market-adjusted equity return for day -1 through day 1 relative to the earnings announcement date.

RET60 is the market-adjusted equity return for 60 trading days commencing with day 3 relative to the earnings announcement date.

UPGRADE is one if the firm's S&P credit rating is upgraded over the 60 trading days commencing with day 3 relative to the earnings announcement date and zero otherwise.

DOWNGRADE is one if the firm's S&P credit rating is downgraded over the 60 trading days commencing with day 3 relative to the earnings announcement date and zero otherwise.

Δ*LEVERAGE* is the change in the firm's leverage during the quarter immediately following the earnings announcement date where leverage is calculated as the firm's total debt divided by total debt plus the market value of equity.

Δ*TREASURYANN* is the change in the rate on one year treasury bonds from day -1 through day 1 relative to the earnings announcement period.

Δ*TREASURY* is the change in the rate on one year treasury bonds over the 60 trading days commencing with day 3 relative to the earnings announcement date.

$\Delta STDRET$ is the difference in standard deviation of daily market-adjusted equity returns during the 60 day post-announcement period and the standard deviation of daily market-adjusted equity returns during the previous 60 day period.

FINANCIAL is one of the firm's two-digit SIC code is between 60 and 69 and zero otherwise.

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Figure 1 – Quarterly CDS Returns for Deciles Based on Seasonally Differenced Earnings and Accruals

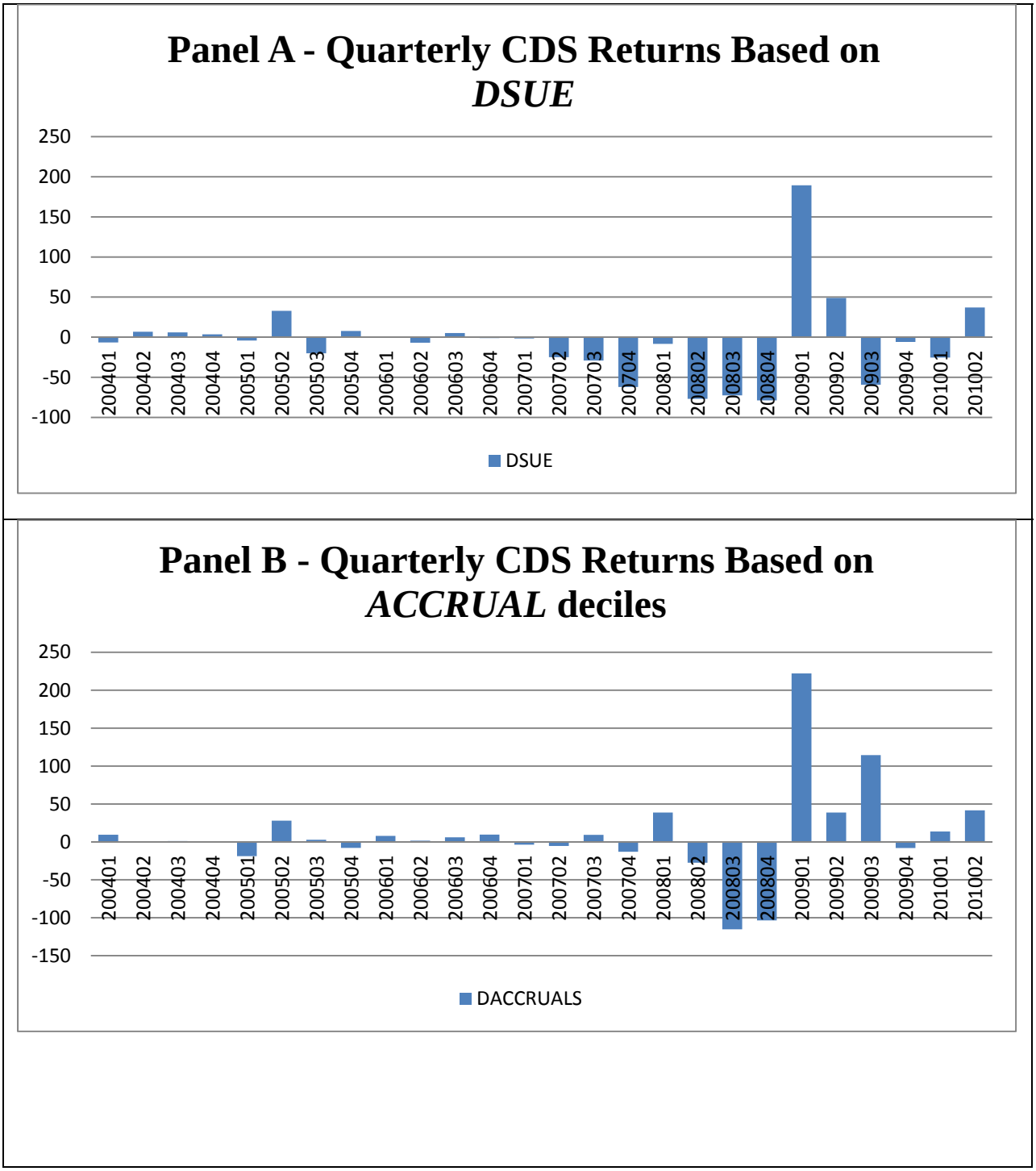

Figure 2 – Cumulative CDS Returns for Highest and Lowest Seasonally Differenced Earnings Deciles

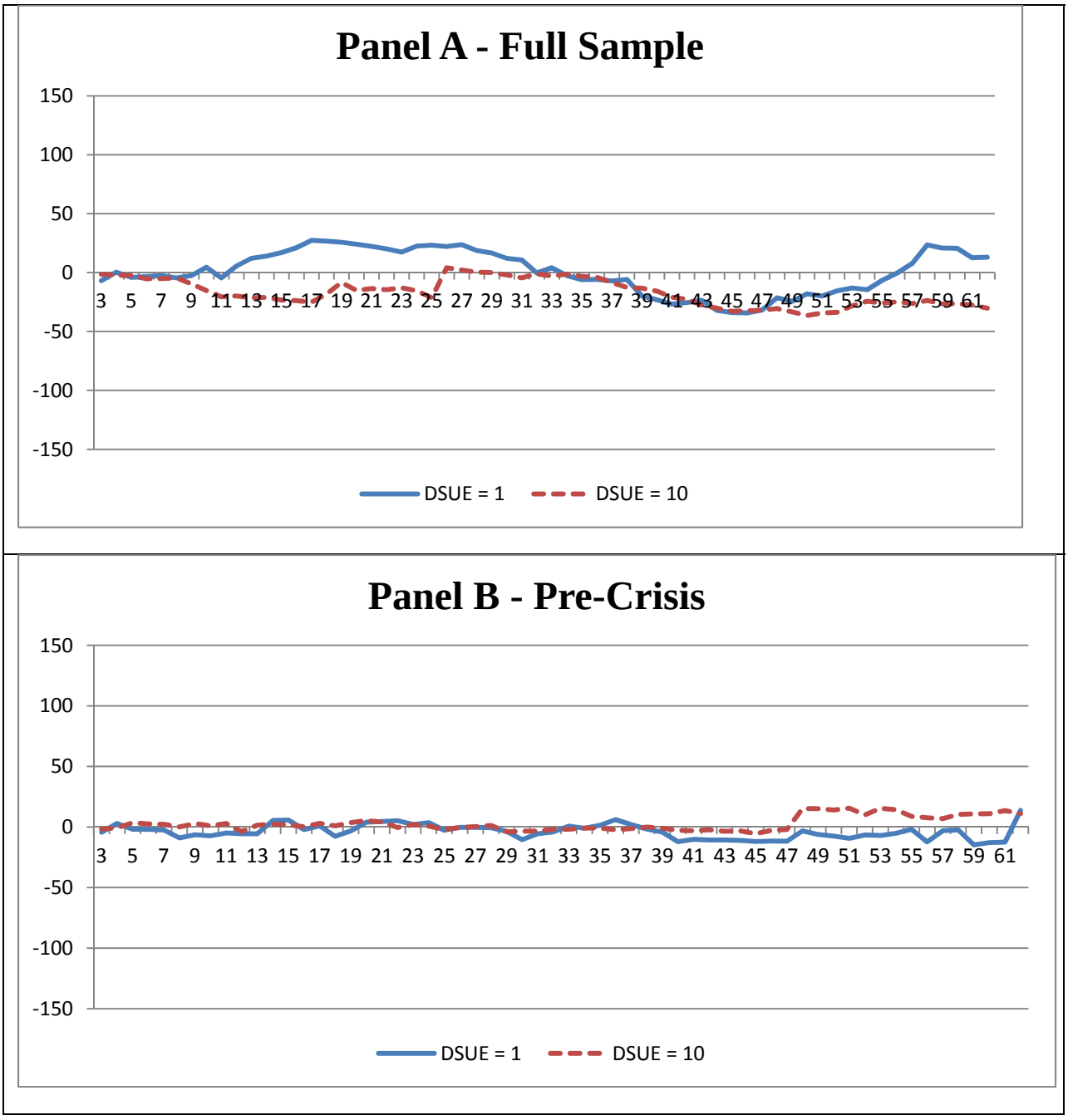

Figure 2 continued

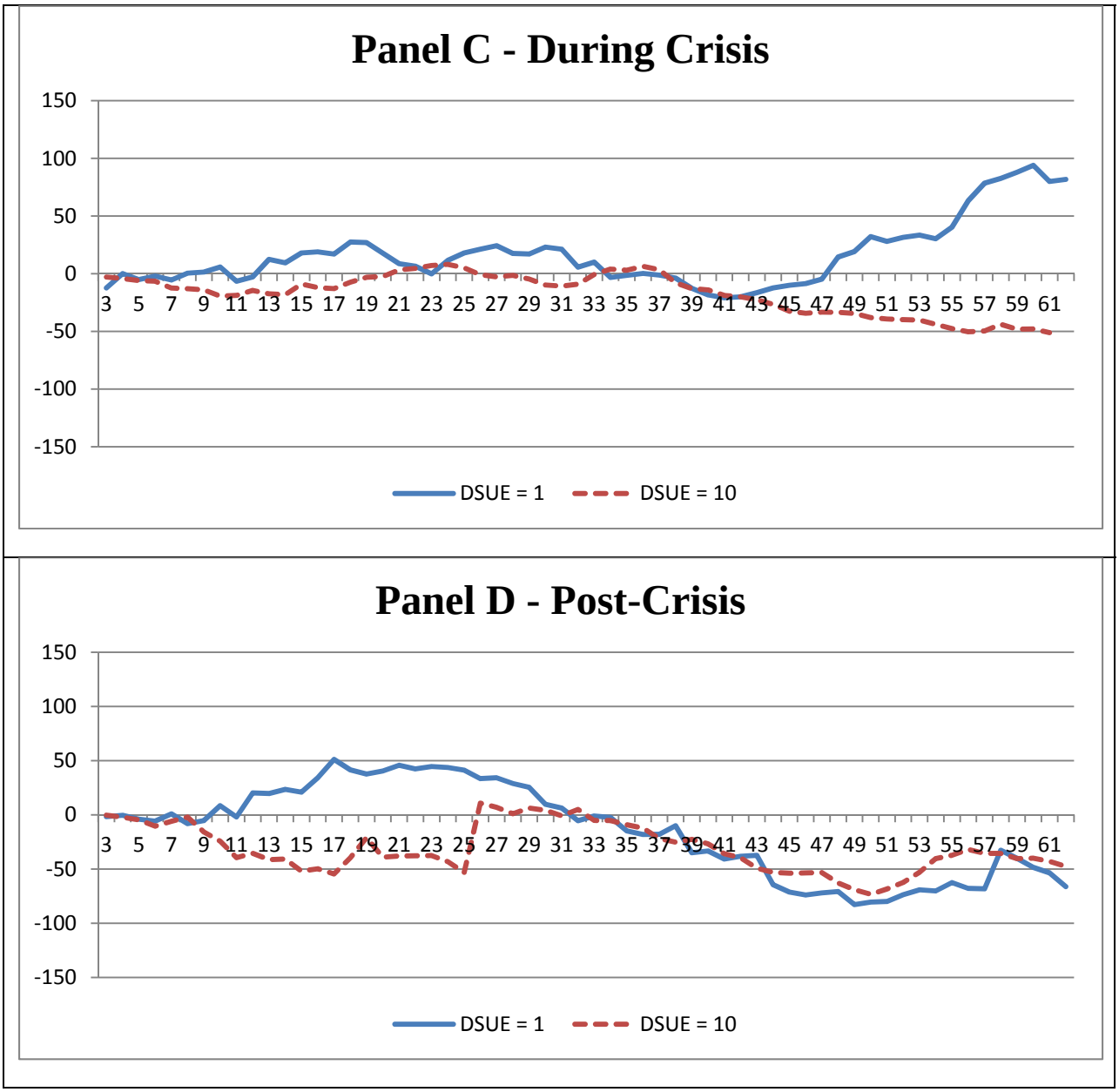

Figure 3 – Cumulative CDS Returns for Highest and Lowest Accruals Deciles

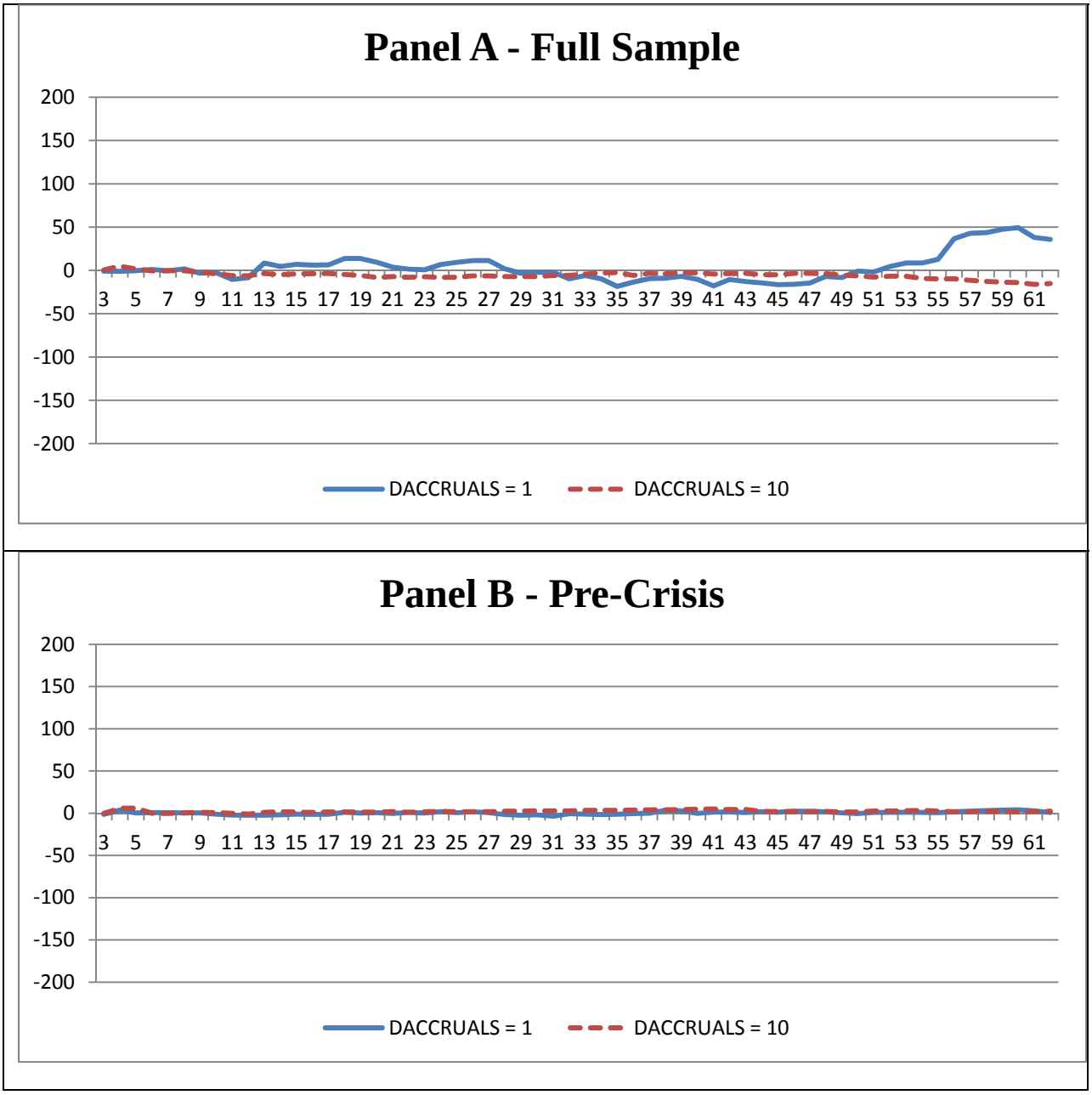

Figure 3 continued

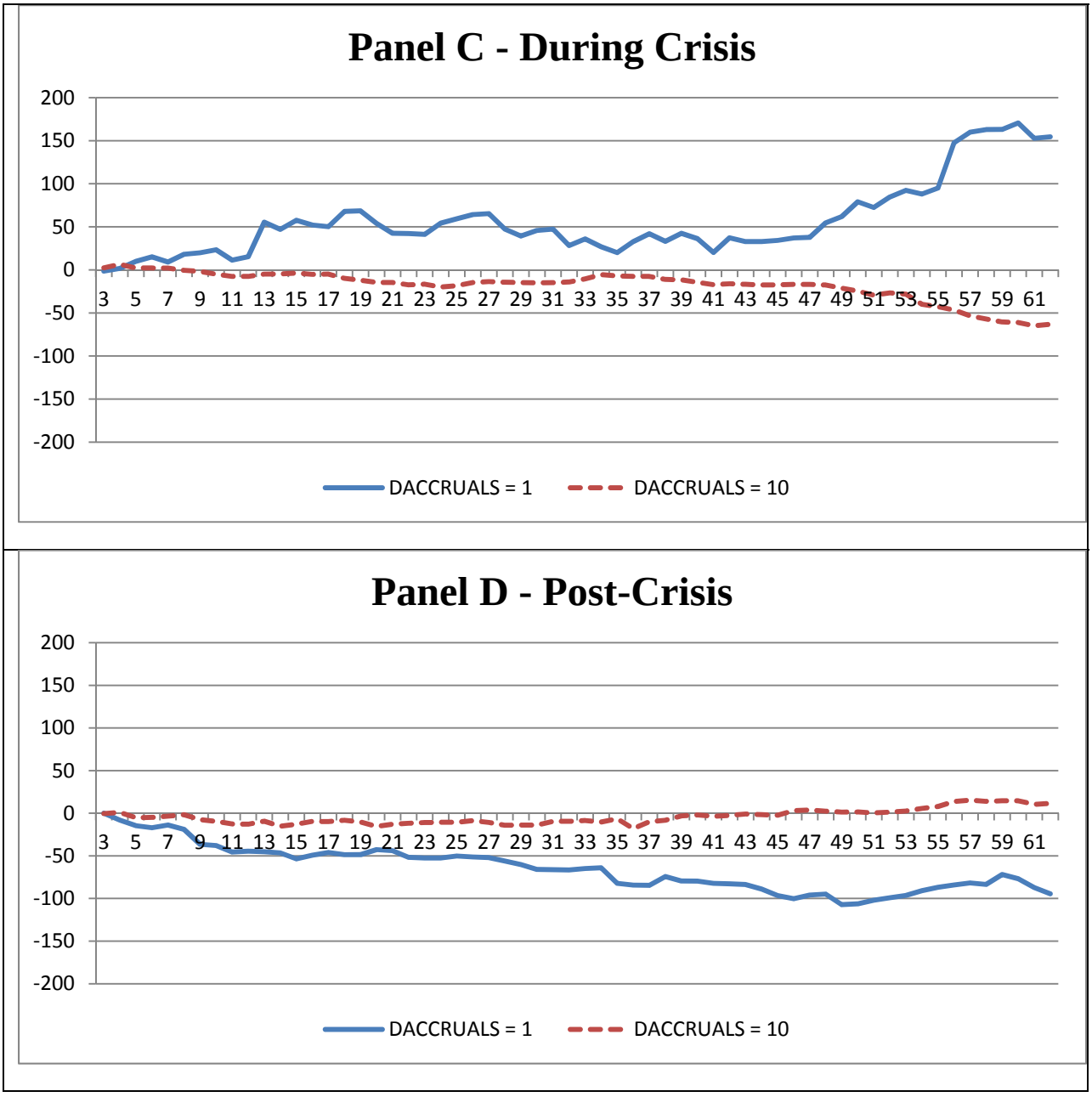

Table 1

Sample Selection Procedures

	Firm-Contract-Quarters	Number of Firms
Credit Default Swap Contracts on Datastream for firms listed on Compustat with duration of 5	22,401	736
Less: Contracts without required data to calculate accruals and seasonally differenced earnings	-1,009	-10
Less: Contracts without sufficient pricing data on Datastream to calculate post-announcement returns	-7,411	-34
Total	13,981	692

Table 2
Descriptive Statistics

Panel A: Regression Variables

Variable	periods	N	mean	std	p25	median	p75
CDSRET60 (basis points)	full sample	13,981	-6.830	118.333	-33.955	-0.439	22.806
	pre-crisis	6,084	0.321	57.104	-13.317	2.407	13.083
	during crisis	4,383	-36.223	152.833	-92.182	-35.145	9.147
	post-crisis	3,514	17.452	138.510	-23.658	31.640	73.590
SUE	full sample	13,981	0.001	0.041	-0.003	0.001	0.005
	pre-crisis	6,084	0.003	0.024	-0.001	0.002	0.006
	during crisis	4,383	-0.001	0.040	-0.003	0.001	0.004
	post-crisis	3,514	0.002	0.062	-0.008	0.000	0.005
ACCRUAL	full sample	13,981	-0.013	0.037	-0.023	-0.010	-0.001
	pre-crisis	6,084	-0.010	0.030	-0.021	-0.009	0.000
	during crisis	4,383	-0.012	0.039	-0.021	-0.009	0.000
	post-crisis	3,514	-0.020	0.043	-0.028	-0.014	-0.003
CDSTRETANN (basis points)	full sample	13,371	-0.594	26.120	-5.674	0.012	4.415
	pre-crisis	5,627	-0.273	14.951	-2.636	0.258	2.478
	during crisis	4,262	-0.199	28.688	-8.814	-0.623	7.035
	post-crisis	3,482	-1.599	35.361	-11.748	0.208	11.425
RETANN	full sample	12,891	0.002	0.064	-0.029	0.001	0.033
	pre-crisis	5,578	0.002	0.048	-0.022	0.002	0.027
	during crisis	4,043	0.002	0.070	-0.032	0.002	0.038
	post-crisis	3,270	0.002	0.077	-0.039	-0.001	0.042
RET60	full sample	12,889	-0.004	0.147	-0.080	-0.004	0.072
	pre-crisis	5,576	0.002	0.107	-0.062	-0.001	0.064
	during crisis	4,043	-0.001	0.172	-0.088	0.009	0.092
	post-crisis	3,270	-0.017	0.171	-0.112	-0.025	0.063
UPGRADE	full sample	13,018	0.013	0.114	0.000	0.000	0.000
	pre-crisis	5,837	0.013	0.111	0.000	0.000	0.000
	during crisis	4,102	0.012	0.108	0.000	0.000	0.000
	post-crisis	3,079	0.017	0.128	0.000	0.000	0.000
DOWNGRADE	full sample	13,018	0.026	0.158	0.000	0.000	0.000
	pre-crisis	5,837	0.019	0.136	0.000	0.000	0.000
	during crisis	4,102	0.033	0.178	0.000	0.000	0.000
	post-crisis	3,079	0.029	0.167	0.000	0.000	0.000

Table 2 continued

Variable	periods	N	mean	std	p25	median	p75
Δ*LEVERAGE*	full sample	11,426	0.001	0.047	-0.021	-0.002	0.017
	pre-crisis	5,217	-0.005	0.036	-0.022	-0.005	0.008
	during crisis	3,720	0.021	0.052	-0.006	0.011	0.040
	post-crisis	2,489	-0.017	0.050	-0.039	-0.014	0.005
Δ*TREASURY*	full sample	13,781	-0.055	0.483	-0.130	-0.010	0.290
	pre-crisis	6,013	0.250	0.223	0.060	0.280	0.410
	during crisis	4,285	-0.483	0.602	-0.890	-0.490	0.010
	post-crisis	3,483	-0.054	0.081	-0.110	-0.060	-0.010
Δ*STDRET*	full sample	12,836	-0.001	0.007	-0.004	-0.001	0.001
	pre-crisis	5,549	-0.001	0.004	-0.003	-0.001	0.000
	during crisis	4,025	0.002	0.008	-0.002	0.001	0.004
	post-crisis	3,262	-0.005	0.008	-0.008	-0.004	-0.001
FINANCIAL	full sample	13,981	0.191	0.393	0.000	0.000	0.000
	pre-crisis	6,084	0.198	0.399	0.000	0.000	0.000
	during crisis	4,383	0.192	0.394	0.000	0.000	0.000
	post-crisis	3,514	0.180	0.384	0.000	0.000	0.000

Panel B: Distribution of Cash Flow from Operations for *SUE* and *ACCRUAL* Deciles

Sorting variable	1 (lowest)	2	3	4	5	6	7	8	9	10 (highest)
SUE	0.021	0.020	0.021	0.019	0.017	0.021	0.025	0.031	0.031	0.027
ACCRUALS	0.082	0.062	0.045	0.035	0.026	0.019	0.014	0.010	-0.002	-0.035

See Appendix for variable definitions.

Table 3
Correlations

Panel A: Entire Period

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) CDSRET60		**-0.023**	-0.003	**0.015**	**-0.071**	**-0.273**	-0.011	**0.060**	**0.018**	**0.141**	0.005	0.000
(2) SUE	**-0.060**		**0.382**	**-0.057**	**0.067**	-0.011	**0.025**	**-0.044**	**-0.076**	**0.035**	**-0.017**	**-0.021**
(3) *ACCRUALS*	**-0.020**	**0.165**		-0.009	0.007	**-0.075**	**-0.016**	**-0.065**	-0.010	**0.024**	**0.044**	**0.087**
(4) CDSTRETANN	0.013	**-0.058**	0.013		**-0.232**	**-0.039**	-0.005	0.014	**0.128**	-0.002	**0.105**	-0.011
(5) RETANN	**-0.065**	**0.114**	-0.009	**-0.178**		0.012	**0.020**	**-0.052**	**-0.312**	0.012	**-0.111**	-0.004
(6) RET60	**-0.265**	**0.028**	**-0.069**	**-0.024**	**0.021**		**0.017**	**0.030**	**-0.272**	0.009	**-0.053**	0.013
(7) UPGRADE	-0.006	**0.045**	-0.011	-0.010	**0.019**	0.014		**-0.019**	**-0.021**	0.008	-0.015	0.008
(8) DOWNGRADE	**0.042**	**-0.080**	**-0.046**	-0.001	**-0.046**	**0.017**	**-0.019**		**0.112**	**-0.047**	**0.045**	**0.017**
(9) ΔLEVERAGE	**-0.078**	**-0.063**	**0.041**	**0.042**	**-0.289**	**-0.256**	-0.009	**0.075**		**-0.244**	**0.332**	**0.050**
(10) ΔTREASURY	**0.071**	**0.101**	**0.051**	**0.025**	0.006	**0.015**	-0.003	**-0.043**	**-0.160**		**-0.228**	0.001
(11) ΔSTDRET	**-0.173**	**0.055**	**0.062**	-0.007	**-0.052**	**0.032**	-0.006	**0.028**	**0.241**	**-0.118**		0.010
(12) FINANCIAL	-0.007	**-0.086**	**0.155**	-0.005	-0.006	0.010	0.008	**0.017**	**0.055**	-0.002	**0.024**	

Panel B: Pre-Crisis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) CDSRET60		-0.009	0.002	**-0.064**	**-0.054**	**-0.264**	-0.002	**0.075**	**0.119**	**-0.056**	0.012	-0.002
(2) SUE	-0.012		**0.240**	**-0.068**	**0.046**	-0.001	0.014	-0.021	**-0.050**	0.009	**0.022**	**-0.048**
(3) *ACCRUALS*	**0.040**	**0.118**		-0.013	0.009	**-0.078**	**-0.027**	**-0.038**	0.009	0.012	**0.055**	**0.089**
(4) CDSTRETANN	-0.021	**-0.054**	-0.005		**-0.231**	**-0.037**	0.002	**-0.038**	**0.118**	0.002	**0.064**	0.006
(5) RETANN	**-0.067**	**0.116**	0.017	**-0.194**		**0.027**	0.000	**-0.028**	**-0.282**	0.004	**-0.047**	0.000
(6) RET60	**-0.304**	0.006	**-0.087**	-0.019	**0.027**		-0.008	**0.033**	**-0.290**	**0.061**	-0.002	0.009
(7) UPGRADE	-0.002	**0.048**	-0.021	-0.008	-0.004	-0.012		-0.016	-0.012	-0.010	**-0.021**	0.013
(8) DOWNGRADE	**0.043**	**-0.060**	**-0.049**	-0.003	**-0.026**	0.019	-0.016		**0.061**	-0.017	**0.040**	**-0.038**
(9) ΔLEVERAGE	**0.089**	**-0.053**	**0.041**	**0.096**	**-0.291**	**-0.285**	0.002	**0.026**		0.007	**0.061**	**0.029**
(10) ΔTREASURY	**-0.189**	**0.035**	0.013	-0.019	0.007	**0.057**	-0.009	-0.016	0.009		**0.045**	-0.019
(11) ΔSTDRET	**-0.026**	0.022	**0.024**	0.014	-0.022	**0.031**	-0.018	**0.030**	**0.061**	**0.049**		**0.036**
(12) FINANCIAL	0.001	**-0.147**	**0.154**	-0.003	0.005	0.014	0.013	**-0.038**	**0.039**	-0.017	**0.026**	**1.000**

Table 3 continued

Panel C: During Crisis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) CDSRET60		**-0.042**	**-0.048**	0.010	**-0.061**	**-0.250**	-0.003	**0.109**	**0.085**	**0.132**	**0.118**	**0.045**
(2) SUE	**-0.058**		**0.536**	**-0.045**	**0.046**	0.008	0.010	**-0.079**	**-0.080**	-0.004	-0.018	-0.011
(3) *ACCRUALS*	**-0.030**	**0.177**		0.002	-0.003	**-0.030**	-0.003	**-0.084**	**-0.051**	0.010	-0.006	**0.068**
(4) CDSTRETANN	**-0.049**	**-0.072**	**0.030**		**-0.247**	**-0.053**	-0.006	0.018	**0.165**	-0.001	**0.075**	0.018
(5) RETANN	**-0.044**	**0.136**	**-0.029**	**-0.185**		**0.045**	**0.029**	**-0.080**	**-0.318**	0.019	**-0.103**	-0.020
(6) RET60	**-0.190**	**0.079**	**-0.071**	**-0.034**	**0.046**		0.018	**-0.032**	**-0.369**	-0.017	**-0.152**	**-0.030**
(7) UPGRADE	0.015	**0.030**	-0.007	-0.012	**0.029**	0.019		-0.020	-0.007	0.019	-0.012	0.022
(8) DOWNGRADE	**0.070**	**-0.104**	**-0.042**	0.002	**-0.077**	-0.024	-0.020		**0.180**	**-0.046**	**0.063**	**0.060**
(9) ΔLEVERAGE	0.006	**-0.136**	**0.027**	**0.099**	**-0.320**	**-0.368**	-0.002	**0.129**		**-0.193**	**0.261**	**0.073**
(10) ΔTREASURY	**0.192**	0.004	**0.052**	**0.036**	0.002	**-0.036**	0.015	**-0.047**	**-0.191**		**-0.241**	0.003
(11) ΔSTDRET	**-0.044**	**-0.043**	0.010	**0.039**	**-0.076**	**-0.090**	-0.002	**0.040**	**0.184**	**-0.283**		**0.113**
(12) FINANCIAL	**0.055**	**-0.123**	**0.124**	0.021	**-0.034**	**-0.050**	0.022	**0.060**	**0.081**	0.006	**0.093**	

Panel D: Post Crisis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) CDSRET60		**-0.028**	**0.075**	**0.051**	**-0.099**	**-0.326**	**-0.036**	0.000	**0.114**	**-0.038**	**0.075**	**-0.059**
(2) SUE	**-0.103**		**0.364**	**-0.062**	**0.095**	**-0.030**	**0.046**	**-0.030**	**-0.086**	**0.127**	0.003	-0.015
(3) *ACCRUALS*	**0.029**	**0.199**		-0.025	0.014	**-0.143**	-0.012	**-0.063**	**-0.043**	0.016	0.021	**0.105**
(4) CDSTRETANN	**0.075**	**-0.059**	0.011		**-0.225**	**-0.030**	-0.010	**0.041**	**0.100**	0.026	**0.145**	**-0.055**
(5) RETANN	**-0.100**	**0.091**	-0.024	**-0.174**		**-0.036**	**0.032**	**-0.038**	**-0.383**	0.016	**-0.179**	0.009
(6) RET60	**-0.315**	**-0.032**	**-0.085**	-0.005	-0.026		**0.046**	**0.118**	**-0.222**	-0.010	-0.018	**0.069**
(7) UPGRADE	**-0.046**	**0.063**	0.010	-0.012	**0.037**	**0.043**		-0.022	**-0.051**	0.016	0.003	-0.016
(8) DOWNGRADE	0.007	**-0.067**	**-0.045**	0.006	**-0.031**	**0.076**	-0.022		**0.075**	0.015	0.028	**0.043**
(9) ΔLEVERAGE	**0.054**	-0.027	-0.027	-0.014	**-0.332**	**-0.274**	**-0.047**	**0.065**		**0.045**	**0.338**	**0.046**
(10) ΔTREASURY	**-0.031**	**0.071**	**-0.038**	0.005	0.016	**-0.042**	0.008	**0.033**	**0.103**		0.021	-0.006
(11) ΔSTDRET	**-0.112**	**0.144**	**0.044**	-0.005	**-0.111**	**0.034**	0.015	0.000	**0.261**	**-0.026**		**-0.155**
(12) FINANCIAL	**-0.093**	0.027	**0.187**	**-0.042**	0.011	**0.079**	-0.016	**0.043**	**0.049**	-0.002	**-0.112**	

Notes:
See Appendix for variable definitions. Pearson (Spearman) correlation coefficients are presented above (below) the diagonal. The coefficients in bold are all statistically significant at the 10% level or lower.

Table 4
Test of the Contemporaneous CDS Response to Earnings Announcements

Panel A: *Full Sample*

DEPENDENT VARIABLE: *CDSRETANN*

Parameter	**Coefficient Estimate**	**t-statistic**	**p-value**
Intercept	0.544	0.160	0.874
DSUE	-6.030	-5.230	<.0001
Δ*TREASURYANN*	6.728	1.530	0.127
RETANN	-88.386	-11.050	<.0001
FINANCIAL	-0.961	-1.470	0.143
Quarterly Fixed Effects	Included		
R^2	6.32%		
N	12,253		

Table 4 continued

Panel B: *By Subperiods*

DEPENDENT VARIABLE: *CDSRETANN*

	Pre-Crisis			During Crisis			Post-Crisis			During vs. Pre			Post- vs. During		
Variable	**Coefficient Estimate**	**t-statistic**	**p-value**	**Coefficient Estimate**	**t-statistic**	**p-value**	**Coefficient Estimate**	**t-statistic**	**p-value**	**Coefficient Estimate**	**t-statistic**	**p-value**	**Coefficient Estimate**	**t-statistic**	**p-value**
Intercept	0.949	1.160	0.245	8.116	3.350	0.001	1.144	0.300	0.768	7.166	2.720	0.007	-6.972	-1.510	0.133
DSUE	-3.663	-3.290	0.001	-7.627	-3.810	0.000	-6.322	-2.500	0.013	-3.964	-1.770	0.077	1.305	0.410	0.680
Δ*TREASURYANN*	1.909	0.460	0.644	5.442	1.010	0.311	48.086	2.150	0.032	3.533	0.530	0.594	42.644	1.860	0.064
RETANN	-63.554	-6.120	<.0001	-88.825	-8.000	<.0001	-103.178	-7.630	<.0001	-25.271	-1.830	0.068	-14.352	-0.920	0.358
FINANCIAL	-0.106	-0.340	0.731	0.913	0.750	0.456	-4.775	-2.630	0.009	1.019	0.820	0.414	-5.688	-2.790	0.006
Quarterly Fixed Effects	Included			Included			Included								
R2	5.74%			6.24%			7.14%								
N	5,128			3,895			3,230								

Notes:
See Appendix for variable definitions. Pre-Crisis observations relate to earnings announcements made prior to 2007, during crisis observations relate to earnings announcements made in 2007 and 2008, and post-crisis observations relate to earnings announcements made after 2008. All p-values are two-tailed. Standard errors are clustered by firm.

Table 5
Test of the Post-Announcement CDS Response to Seasonally Differenced Earnings

Panel A: Full Sample

DEPENDENT VARIABLE: *CDSRET60*

Parameter	**Estimate**	**t-statistic**	**p-value**
Intercept	-16.350	-0.900	0.369
DSUE	-11.499	-2.280	0.023
UPGRADE	-5.368	-0.670	0.503
DOWNGRADE	24.308	1.880	0.061
Δ*LEVERAGE*	359.025	7.910	<.0001
Δ*TREASURY*	13.405	1.480	0.139
Δ*STDRET*	3100.500	7.810	<.0001
RET60	-186.011	-9.390	<.0001
FINANCIAL	3.877	1.890	0.059
Quarterly Fixed Effects	Included		
R^2	24.63%		
N	10,448		

DEPENDENT VARIABLE: *RET60*

Parameter	**Estimate**	**t-statistic**	**p-value**
Intercept	-0.015	-0.540	0.588
DSUE	-0.003	-0.380	0.704
Quarterly Fixed Effects	Included		
R^2	2.807%		
N	12,889		

Table 5 continued

Panel B: By Subperiods

DEPENDENT VARIABLE: *CDSRET60*

	Pre-Crisis			During Crisis			Post-Crisis			During vs. Pre			During vs. Post		
Parameter	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**
Intercept	5.583	2.28	0.023	-91.445	-5.75	<0.0001	-58.463	-2.93	0.004	-97.028	-5.91	<0.0001	32.982	1.35	0.176
DSUE	4.582	1.550	0.123	-43.952	-4.270	<.0001	0.085	0.010	0.995	-48.534	-4.500	<.0001	44.037	2.860	0.004
UPGRADE	-2.321	-0.520	0.606	-0.470	-0.040	0.967	-20.949	-0.830	0.407	1.851	0.150	0.881	-20.480	-0.730	0.465
DOWNGRADE	22.335	3.090	0.002	58.626	2.710	0.007	-29.917	-1.060	0.289	36.291	1.540	0.125	-88.543	-2.620	0.009
Δ*LEVERAGE*	200.254	4.970	<.0001	412.197	6.160	<.0001	407.449	4.090	<.0001	211.943	2.940	0.004	-4.748	-0.040	0.966
Δ*TREASURY*	-6.802	-1.190	0.235	36.351	3.220	0.001	-227.749	-4.450	<.0001	43.153	3.370	0.001	-264.100	-5.080	<.0001
Δ*STDRET*	343.351	1.050	0.292	5226.279	7.920	<.0001	1751.071	2.230	0.026	4882.928	6.000	<.0001	-3475.21	-3.540	0.000
RET60	-122.442	-6.110	<.0001	-164.599	-6.050	<.0001	-256.729	-7.990	<.0001	-42.157	-1.640	0.101	-92.130	-2.480	0.013
FINANCIAL	1.191	1.350	0.178	-3.712	-0.490	0.625	12.751	1.650	0.100	-4.903	-0.630	0.529	16.463	1.240	0.214
Quarterly Fixed Effects	Included			Included			Included								
R^2	10.81%			29.12%			16.24%								
N	4,810			3,366			2,272								

DEPENDENT VARIABLE: *RET60*

	Pre-Crisis			During Crisis			Post-Crisis			During vs. Pre			During vs. Post		
Parameter	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**
Intercept	0.011	1.850	0.065	-0.034	-2.720	0.007	0.023	0.880	0.379	-0.045	-3.380	0.001	0.057	2.010	0.045
DSUE	-0.004	-0.480	0.635	0.054	3.680	0.000	-0.063	-4.280	<.0001	0.058	3.470	0.001	-0.117	-5.610	<.0001
Quarterly Fixed Effects	Included			Included			Included								
R^2	5.97%			1.77%			2.70%								
N	5,576			4,043			3,270								

Table 5 continued

Notes:
See Appendix for variable definitions. Pre-Crisis observations relate to earnings announcements made prior to 2007, during crisis observations relate to earnings announcements made in 2007 and 2008, and post-crisis observations relate to earnings announcements made after 2008. All p-values are two-tailed. Standard errors are clustered by firm.

Table 6
Test of the Post-Announcement CDS Response to Accruals

Panel A: Full Sample

DEPENDENT VARIABLE: *CDSRET60*

Parameter	**Estimate**	**t-statistic**	**p-value**
Intercept	-20.847	-1.160	0.246
DACCRUALS	-6.211	-1.420	0.156
UPGRADE	-6.226	-0.770	0.439
DOWNGRADE	25.044	1.940	0.053
Δ*LEVERAGE*	363.959	7.970	<.0001
Δ*TREASURY*	14.066	1.540	0.123
Δ*STDRET*	3108.106	7.800	<.0001
RET60	-186.358	-9.400	<.0001
FINANCIAL	4.954	2.380	0.018
Quarterly Fixed Effects	Included		
R^2	24.59%		
N	10,448		

DEPENDENT VARIABLE: *RET60*

Parameter	**Estimate**	**t-statistic**	**p-value**
Intercept	0.011	0.37	0.7119
DACCRUALS	-0.049	-8.61	<.0001
Quarterly Fixed Effects	Included		
R^2	3.44%		
N	12,889		

Table 6 continued

Panel B: By Subperiods

DEPENDENT VARIABLE: *CDSRET60*

	Pre-Crisis			During Crisis			Post-Crisis			Pre- vs. During			Post vs. During		
Parameter	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**
Intercept	8.208	3.680	0.000	-94.729	-6.050	<.0001	-75.469	-3.910	0.000	-102.937	-6.460	<.0001	19.260	0.770	0.439
DACCRUALS	0.004	0.000	0.999	-37.381	-3.580	0.000	38.001	3.280	0.001	-37.385	-3.460	0.001	75.382	4.480	<.0001
UPGRADE	-2.003	-0.450	0.655	-2.236	-0.190	0.849	-21.994	-0.890	0.376	-0.233	-0.020	0.985	-19.758	-0.710	0.476
DOWNGRADE	21.924	3.040	0.003	61.041	2.840	0.005	-27.642	-0.990	0.321	39.117	1.670	0.096	-88.683	-2.650	0.008
Δ*LEVERAGE*	198.988	4.950	<.0001	438.960	6.520	<.0001	396.679	4.000	<.0001	239.972	3.310	0.001	-42.281	-0.380	0.707
Δ*TREASURY*	-7.091	-1.240	0.215	38.513	3.370	0.001	-238.754	-4.720	<.0001	45.604	3.530	0.001	-277.267	-5.380	<.0001
Δ*STDRET*	351.545	1.090	0.279	5164.248	7.870	<.0001	1766.881	2.250	0.025	4812.704	5.960	<.0001	-3397.368	-3.500	0.001
RET60	-122.542	-6.050	<.0001	-167.404	-6.150	<.0001	-249.647	-7.720	<.0001	-44.861	-1.740	0.082	-82.243	-2.180	0.030
FINANCIAL	0.921	1.010	0.312	1.944	0.260	0.797	6.646	0.840	0.402	1.023	0.130	0.895	4.702	0.360	0.722
Quarterly Fixed Effects	Included			Included			Included								
R^2	10.76%			29.02%			16.71%								
N	4,810			3,366			2,272								

DEPENDENT VARIABLE: *RET60*

	Pre-Crisis			During Crisis			Post-Crisis			Pre- vs. During			Post vs. During		
Parameter	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**	**Estimate**	**t-statistic**	**p-value**
Intercept	0.033	6.410	<.0001	0.010	0.810	0.421	0.027	0.900	0.371	-0.024	-1.910	0.057	0.017	0.540	0.589
DACCRUALS	-0.045	-6.990	<.0001	-0.030	-2.490	0.013	-0.077	-6.070	<.0001	0.015	1.070	0.284	-0.047	-2.600	0.010
R^2	6.91%			1.41%			3.12%								
N	5,576			4,043			3,270								

Table 6 continued

Notes:
See Appendix for variable definitions. Pre-Crisis observations relate to earnings announcements made prior to 2007, during crisis observations relate to earnings announcements made in 2007 and 2008, and post-crisis observations relate to earnings announcements made after 2008. All p-values are two-tailed. Standard errors are clustered by firm.