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# Essays On Earnings Quality: Evidence From Net Share Issue, Put Option Sales, And Hedging

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ESSAYS ON EARNINGS QUALITY: EVIDENCE FROM NET SHARE ISSUE,  
PUT OPTION SALES, AND HEDGING

JAGADISH DANDU

International Business

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Jagadish Dandu

2014

## **Dedication**

To my friends and family who supported me in this process.

ESSAYS ON EARNINGS QUALITY: EVIDENCE FROM NET SHARE  
ISSUE, PUT OPTION SALES, AND HEDGING

by

JAGADISH DANDU, BE, MBA

DISSERTATION

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## **Introduction**

There are three essays in this research. The main objective of the research is to extend the literature in corporate finance by investigating the quality of earnings around corporate events like net share issues, put option sales by firms on their own stock, and hedging commodities by high input cost group of firms.

The first paper is “Does Earnings Quality predicts Net Share Issuance”. This paper investigates whether quality of earnings predicts net share issuance by corporations. Pontiff and Woodgate (2008) show that annual share issuance (ISSUE) measure is a better predictor of future cross-sectional returns and we use this to measure the if a firm is net issuer of equity or net repurchasers. Market timing due to information asymmetry is one reason why manager issue equity when they perceive that their firms are overvalued. We use earnings quality as a measure of information asymmetry and found that the ISSUE (net equity issuance) has an inverse relationship with quality of the earnings reported by the firms. First, firms with poor (good) earnings quality have higher (lower) information asymmetry and tend to issue more (less) equity and this finding was true for a variety of earnings quality measures used in the literature. Second, firms with negative net issuance (net repurchasers) are more likely to have higher quality of earnings; this is true across all the earnings quality proxies except for one. On the contrary firms with positive net issuance (net issuers) were found to have lower quality of earnings.

The second paper is “Put Option Sales and Earnings Quality: Evidence of Market Timing”. This paper provides evidence that earnings quality is high for the sample of Put Option Selling (POS) firms which are actively timing the market compared to a matching sample of

firms. We hypothesize that due to information asymmetry; managers of POS firms have additional private information and estimate their stock was mispriced (undervalued) and thus expect the stock price to increase in the near future, as a result they are less likely to manage abnormal accruals and thus resulting in higher quality of earnings. We provide additional evidence of market timing (mispricing due to undervaluation) using Residual Income Model (RIM).

The third paper is “Earnings Quality: A case of Hedging Strategies by US Airlines”. This paper investigates the quality of earnings in high input cost industries like transportation, coffee which are similar to Airlines. We intend to extend this study to include more industries with similar characteristics of input costs. At this stage the paper the research presents evidence on the performance of firm and quality of earnings in a small sample of US airlines around a specific regulation change. Historically jet fuel prices have fluctuated heavily, specifically over the past few years which significantly affected the US Airlines ability to maintain consistent positive cash flows. The companies used several hedging and abnormal hedging strategies to navigate these volatile periods. We analyze these strategies employed by dichotomizing them into pure hedge positions and abnormal hedging positions and calculate the effect around implementing FASB #133 / IASB #39 on firm value among other variables in each case and identify behaviors leading to these decisions. The main hypothesis is that firms which are hedging have higher quality of earnings as compared to speculating firms.



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## **Chapter 1: Does Earnings Quality predict Net Share Issuance?**

We investigate whether quality of earnings predicts net share issuance by corporations. Pontiff and Woodgate, (2008) show that net share issuance (ISSUE) measure is a better predictor of future cross-sectional returns and we use this to measure to calculate if a firm is net issuer of equity or net repurchasers. Market timing due to information asymmetry is one of the reasons why managers issue equity when they perceive that their firms are overvalued. We use earnings quality as a measure of information asymmetry and find that the ISSUE (net equity issuance) has an inverse relationship with quality of the earnings reported by the firms. First, firms with poor (good) earnings quality have higher (lower) information asymmetry and tend to issue more (less) equity and this finding is true for a variety of earnings quality measures used in the literature. Second, firms with negative net issuance (net repurchasers) are more likely to have higher quality of earnings; this is true across all the earnings quality proxies except for one. On the contrary firms with positive net issuance (net issuers) were found to have lower quality of earnings.

### **1.1 Introduction**

Firms change their capital structure in a variety of ways. Most commonly, this is done through security issuance (either debt or equity), share repurchases, stock-based mergers and debt retirement. This research focuses on equity changes in general and leaves the debt changes for future. In the case of equity issuance and stock-based mergers, there is a vast literature

showing that the market reacts negatively to these events. On the other hand, share repurchases are usually met with a positive market reaction.

Pontiff and Woodgate (2008) show that their net share issuance (ISSUE) measure is a better predictor of the cross-sectional returns than existing measures like book-to-market, size, and momentum in predicting cross-sectional returns. They hypothesized that this relation could be driven by two factors, either in response to an asset pricing model or irrational mispricing in the market. Our paper focuses on the latter possible source of the cross-sectional variation found by Pontiff and Woodgate. If equity was mispriced, firms may attempt to ‘time’ the market, vis-à-vis their share issuance or repurchasing activities. Firms issue equity if they are overvalued and buy equity when they are undervalued. As the mispricing is eventually arbitrated away, the result is an inverse (direct) relation between issuance (repurchase) and return.

There is a growing body of literature that examines the effect of equity mispricing on capital structure and individual share issuance activities like SEO, mergers, and repurchases.<sup>1</sup> However, that work does not directly address the effect of such activity on the post issuance cross-sectional returns. Pontiff and Woodgate (2008) show that the ISSUE measure based on Stephens and Weisbach (1998) is a better predictor of future returns and at the same time overcome the issues related to long-run studies. They also leave an open question regarding the source of the relation between share issuance and subsequent cross-sectional returns, stating that “although we do not address whether the source of this predictability is mispricing or a rational response to an asset pricing model, it appears doubtful that these results can be explained solely by a risk-based asset pricing model.”

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<sup>1</sup> Baker and Wurgler (2002), Graham and Harvey (2001), Elliott et al. (2007), Huang and Ritter (2005), Leary and Roberts (2005), Hovakimian (2006)

This provides a unique opportunity to test the market timing due to information asymmetry using earnings quality as a proxy. We propose to measure the information asymmetry of a firm using its earnings quality based on several measures used in the previous literature. The most commonly used measures are based on the modified Jones model and Dechow and Dichev model, we use several variations of these models as robustness check. These models provide a direct approach to assessing the information available to outside investors than the more commonly used proxies. Our main hypothesis is that poor earnings quality results in increase of equity share issuances as the managers try to take advantage of overvaluation of the firms' stock.

The rest of the paper is organized as follows: Section 2 reviews the prior literature and develops the hypotheses, Section 3 describes the data and methodology, Section 4 describes the analysis and presents the results, and Section 5 offers conclusions.

## **1.2 Literature and Hypothesis development**

### **1.2.1 Corporate Financing activities and market timing**

Firms can raise money using financing methods either when they really need the money for the investments or at an opportunistic time by timing the market. There has been an extensive research done in finance regarding the effects of individual share issuance activities, such as SEO's, mergers based on stock, and stock repurchase announcements. One explanation based on behavioral finance theory suggests that firms issue shares when they perceive that they are overvalued and retire shares when undervalued. Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) show that long-run stock returns are negatively related to SEO's while

there is a positive abnormal return before the SEO's as shown by Ikenberry et al. (2000). Laughran and Vijh (1997) show that long-run stock returns are negatively related for the stock based acquirer in a merger. All the above research concludes that share issuance in many forms is mainly motivated by mispricing (undervalue) and result in a negative returns in the future.

The other alternative for financing is wait until the need arise for investment and then try to finance it by raising money. There are number of research studies which indicate that this might be not be the best approach. Halka (1999), Chordia, Roll, and Subrahmanyam (2001), Hasbrouck and Seppi (2001) and Acharya and Pedersen (2005) argue that the liquidity in the market is not always available and thus the firm might face a bad market to raise money. Thus market timing due to undervaluation or precautionary risk management lead to share issuance by the firms.

The previous studies test only long-run return predictability of the individual share issuance events. Firms in general make use of various financing activities at any given time. We propose to use Pontiff and Woodgate (2008) annual share issuance measure which has a better predictability of future stock returns cross-sectionally and at the same time overcome the issues with the long-run studies like specification and inference issues as discussed by Mitchell and Stafford (2000).

### **1.2.2 Aggregate share issue**

The annual issuance measure ISSUE is based on Stephens and Weisbach (1998), this measure is constructed using cross-section of the stocks. Daniel and Titman (2006) proposed a similar measure, they use 5 years to aggregate the share issues. Pontiff and Woodgate (2008) show that annual share issuance is a better predictor of stock returns than the existing measures like B2M (book-to-market), size, and momentum. They also find that these result are significant



only post 1970 as the number of firms net annual share issuance has increased in that time period. They predict that market timing by managers due to mispricing might explain the results and did not rule out that asset pricing and as a cause. McLean (2011) using net share issuance measure found that “firms increasingly issue shares for the purpose of cash savings” mainly as a precautionary move when the issuance costs are lower.

This research contributes to the area of share issuance literature by extending the existing literature that use aggregate share issue. Baker and Wurgler (2000), and Lowry (2003) studied the trend in share issuance, and Dittmar and Dittmar (2008) show that share issuance activity is high in expansion phase of business life cycle, McLean (2011) provides similar evidence that biggest cash savings is in the period of expansions for the firm using share issuances. We propose that share issuance is a result of firms having poor earnings quality and thus the aggregate issuance is a result of market timing by firm in the time of poor earnings quality.

### **1.2.3 Information Asymmetry and Earnings Quality**

Accounting earnings is used widely to measure the performance of a firm, the quality of this information is used as a proxy for information asymmetry between the managers and the outside investors. We use several measures based on discretionary accruals to measure earnings quality, specifically we use modified jones model and newer Dechow and Dichev (2002) model using operating cash flows to measure earnings quality.

There is a multitude of literature in accounting and finance in the area of earnings quality and earnings management, looking at different financing activities of the firm and their relationship to the corporate activities. Both determinants and the consequences are listed in by Dechow et al. (2010) in their summary of literature in earnings quality area, most of these studies examine if firms are interested in economic incentives and thus as a result manage their

earnings and at the same time the consequences of firms managing their earnings. All the corporate financing and investing activities were reviewed and the proxies used in all the studies were summarized.

Earnings quality has been used in the literature many times. Sloan (1996) shows that overvaluing of low earnings quality firms is corrected over time, Penman and Zhang (2002), Dechow and Schrand (2004) and Melumand and Nissim (2009) show that earnings quality predicts the future sustainable persistent earnings. The effect of earnings quality on financing and investment activities like SEO (Rangan 1998), stock repurchases (Hribar et al. 2006); IPO, Insider trading (Aboody et al. 2005), stock returns (Chan et al. 2001) and return volatility (Chen et al. 2008) were extensively studied. This line of research consistently concludes that poor earnings quality leads to increase in financing activities and thus as a result a decrease in future stock returns.

Earnings quality increases with the level of information asymmetry between the investors and managers. Trueman and Titman, (1988) conclude that the information asymmetry between management and investors is required for managing earnings, because shareholders have less information about firm's performance and future prospects if they have less information than management. In such case, management can use its accounting discretion to manage reported earnings thus managing the quality of the earnings. In addition management's discretionary ability to manage earnings increases as the information asymmetry between management and shareholders increases. Richardson (1998) provides empirical evidence consistent with Trueman and Titman. He concludes that the quality of the earnings as measured by bid-ask spread and analysts earnings forecast variance is directly related to the level of information asymmetry. Lobo and Zhou (2001) find that disclosures are negatively related to earnings quality. Firms that

disclose less tend to engage more in earnings management and vice versa. As corporate disclosure is negatively related to information asymmetry, this provides indirect evidence of the relationship between information asymmetry and earnings quality. The information asymmetry in the corporate financings activities creates an opportunity for management to engage in earnings management thus reducing the quality of earnings.

Teoh, Welch, and Wong (1998) find that earnings management is related to the underperformance of SEOs. “They find that the annual growth in issuers’ asset-scaled net income significantly exceeds that of matched non-issuers”. Using quarterly data, Rangan (1998) finds that “earnings management is most significant in the quarter in which the offering is announced and in the following quarter”. Thus showing evidence that firms actively manage earnings two quarters before.

Lee and Masulis (2009) propose to use accounting information quality measures to measure the information asymmetry between managers and outside investors. They show that poor quality of the accounting information increases the overall floatation cost of SEO issues as a result of larger underwriting costs.

Extending this line of research Biddle et al. (2006, 2009) show that higher earnings quality increases the investment efficiency by reducing the externalities like moral hazard and adverse selection which tend to reduce the investment efficiency. They also study the relationship between earnings quality and investment efficiency in a country level study and conclude that higher earnings quality reduced information asymmetry between managers and investors and this result is pronounced when creditors are supplying capital.

### 1.2.4 Hypothesis

Initially we explore if earnings quality is related to net share issue, we posit that poor earnings quality increases the asymmetric information between managers and investors. As shown by Majluf (1984) and Krasker (1986) greater information asymmetry leads to managers timing the market to exploit the overvaluation of the equity. Thus information asymmetry and resulting managers propensity to time the market shows a positive relation between lower earnings quality and net share issue. We define three main hypotheses as follows:

*H1: Lower Earnings quality leads to increase in net shares issued (ISSUE)*

Additionally we propose to divide the sample of net share issuers into “Net Issuers” who are issuing equity in general and “Net Repurchasers” who are retiring or repurchasing the equity in general. Prior literature Hribar et al., (2006) look at repurchases and conclude that firms use repurchases to manage their EPS. Firms repurchase mostly when they perceive that their stock price is undervalued. Firms issue stock when overvalued and repurchase stock when undervalued, thus we divide our sample into two and define two additional hypotheses.

*H2: Earnings quality is lower for net issuing firms where  $ISSUE > 0$*

*H3: Earnings quality is higher for net repurchasing firms where  $ISSUE < 0$*

First we predict that “Net Issuers” have lower earnings quality and “Net Repurchasers” have higher earnings quality, in both cases the manager of the firm will exploit the mispricing of the stock caused by information asymmetry.

### 1.3 Data and Sample

In this section we describe in detail about the motivation, methodology, and construction of all the variables used in this study, include earnings quality proxies, share issuance measures, and control variables. We also discuss the sample construction and descriptive statistics of the variables used in the study.

The earlier studies of earnings quality use discretionary accruals as a proxy for information asymmetry. In a summary of literature documented by Dechow, Ge, and Schrand, (2010) discretionary accruals was most used proxy in about 350 research papers. Accruals are accounting entries used to adjust the operating cash flows when calculating the accounting earnings of a firm, while discretionary accruals are the part of these accruals which are made solely on the managers own discretion. While accounting earnings are the most used measure of a firm's performance, the discretionary nature of some accruals will induce measurement errors, thus the quality of the accruals is used in the same context as earnings quality. Discretionary accruals can both increase or decrease as they can be used by manger to hide poor performance or use current earnings in future (DeFond and Park (1997). We use four measures of earnings quality (EQ) based on Francis et al. (2005), and Aboody et al. (2005).

First two (EQ1 and EQ2) are based on Dechow et al. (1995), and Dechow, Sloan, and Sweeney (1995), modified jones model. We calculate total accruals as the difference between earnings and operating cash flows. The other two (EQ3 and EQ4) are based on Dechow and Dichev, (2002) and use working capital accruals relationship with cash flows realizations. All methods use accounting information and differentiate accruals into nondiscretionary (normal) and discretionary (abnormal) parts. The absolute value of the discretionary accruals (abnormal) is the measure of the earnings quality, the lower absolute value of this indicates higher earnings

quality and vice versa. We follow Aboody et al. (2005) methodology to calculate all four of our earnings quality measures.

We use two share issuance measures, one based on Pontiff and Woodgate, (2008), which measures last year net share issue using CRSP data, we call it hence forth equity issuance (ISSUE). The second equity issuance variable is DT\_ISSUE which is based on Daniel and Titman, (2006), which measure last five years net share issue using CRSP data. Additionally we use a third measure as used by Fama and French (2008) which is similar to the two above but adds an additional time frame of three years for net share issuance. This aggregate share issue (ISSUE) captures all the new stock issues and retirement activities like secondary equity offering (SEO), stock based mergers, and repurchases over the measure time interval.

### 1.3.1 Earnings quality proxies

We calculate all earnings quality proxy measure (EQ1, EQ2, EQ3, and EQ4) using data from financial statements from Compustat starting from year 1970 to 2012.

#### 1.3.1.1 EQ1 based on modified jones model

First we calculate the difference between earnings and operating cash flows as total accruals (TA) for all firms  $j$  in time (year)  $t$  based on the following equation:

$$TA_{j,t} = (\Delta CA_{j,t} - \Delta CL_{j,t} - \Delta CASH_{j,t} + \Delta STDEBT_{j,t} - DEPN_{j,t})$$

Where:

$\Delta CA_{j,t}$	= firm $j$ 's change in current assets (Compustat #4) in year $t$ ,
$\Delta CL_{j,t}$	= firm $j$ 's change in current liabilities (Compustat #5) in year $t$ ,
$\Delta CASH_{j,t}$	= firm $j$ 's change in cash (Compustat #1) in year $t$ ,
$\Delta STDEBT_{j,t}$	= firm $j$ 's change in short-term debt (Compustat #34) in year $t$ ,
$DEPN_{j,t}$	= firm $j$ 's depreciation and amortization expense (Compustat #14) in year $t$

We estimate normal accruals (NA) for each firm  $j$  in time  $t$  by using two steps; first we perform industry level (minimum 20 firms) cross-sectional regression for 48 Fama and French's, (1997) industries using equation (1) for all firms in Compustat. Then we use the industry year specific co-efficients from the regression to calculate firm specific normal accruals (NA) for each firm scaling by lagged total assets as shown in equation (2). These normal accruals are the nondiscretionary accruals which are part of the total accruals of the firms and managers have no discretion to change. We use modified jones model and use revenues including accounts receivables while estimating the cross-section regression but delete them while calculate the firm level normal accruals.

$$\frac{TA_{j,t}}{Assets_{j,t-1}} = k_{1,t} \frac{1}{Assets_{j,t-1}} + k_{2,t} \frac{\Delta Rev_{j,t}}{Assets_{j,t-1}} + k_{3,t} \frac{PPE_{j,t}}{Assets_{j,t-1}} + \varepsilon_{j,t} \quad (1)$$

$$NA_{j,t} = k_{1,t} \frac{1}{Assets_{j,t-1}} + k_{2,t} \frac{\Delta Rev_{j,t} - \Delta AR_{j,t}}{Assets_{j,t-1}} + k_{3,t} \frac{PPE_{j,t}}{Assets_{j,t-1}} + \varepsilon_{j,t} \quad (2)$$

Where:

$\Delta REV_{j,t}$  = firm  $j$ 's change in revenues (Compustat #12) in year  $t$ ,  
 $PPE_{j,t}$  = firm  $j$ 's gross value of property, plant, and equipment (Compustat #7) in year  $t$ ,  
deflated by firm  $j$ 's total assets in year  $t-1$  ( $Assets_{j,t-1}$ , Compustat #6).  
 $AR_{j,t}$  = firm  $j$ 's change in accounts receivable (Compustat #2) in year  $t$ .

Finally we estimate abnormal accruals (AA) for firm  $j$  in time  $t$  using equation (3), where we use normal accruals from total accruals resulting in abnormal accruals which are discretionary and up to the managers to use them. The absolute value of the abnormal accruals

$|AA_{j,t}|$  is our first earnings quality proxy (EQ1), the higher value of this variable indicates lower earnings quality for the firm in that year.

$$AA_{j,t} = \frac{TA_{j,t}}{Asset_{j,t-1}} - NA_{j,t} \quad (3)$$

### 1.3.1.2 EQ2 based on modified jones model

Our second earnings quality proxy (EQ2) is calculate similarly using modified jones model by estimating abnormal current accruals instead of abnormal accruals. First, we calculate total current accruals (TCA) for firm  $j$  at time  $t$  using the following equation:

$$TCA_{j,t} = (\Delta CA_{j,t} - \Delta CL_{j,t} - \Delta CASH_{j,t} + \Delta STDEBT_{j,t})$$

Where:

$$\begin{aligned} \Delta CA_{j,t} &= \text{firm } j \text{'s change in current assets (Compustat \#4) in year } t, \\ \Delta CL_{j,t} &= \text{firm } j \text{'s change in current liabilities (Compustat \#5) in year } t, \\ \Delta CASH_{j,t} &= \text{firm } j \text{'s change in cash (Compustat \#1) in year } t, \\ \Delta STDEBT_{j,t} &= \text{firm } j \text{'s change in short-term debt (Compustat \#34) in year } t, \end{aligned}$$

We estimate normal current accruals (NCA) for each firm  $j$  in time  $t$  by using two steps; first we perform industry level (minimum 20 firms) cross-sectional regression for 48 Fama and French's, (1997) industries using equation (4) for all firms in Compustat. Then we use the industry year specific co-efficients from the regression to calculate firm specific normal accruals (NCA) for each firm scaling by lagged total assets as shown in equation (5). These normal current accruals are the nondiscretionary current accruals which are part of the total current accruals of the firms and managers have no discretion to change. As in first proxy, we use modified jones model and include changes in revenue and accounts receivables while estimating



the cross-section regression but delete them while calculate the firm level normal current accruals.

$$\frac{TCA_{j,t}}{Asset_{j,t-1}} = \gamma_{1,r} \frac{1}{Asset_{j,t-1}} + \gamma_{2,r} \frac{\Delta REV_{j,t}}{Asset_{j,t-1}} + U_{j,t} \quad (4)$$

$$NCA_{j,t} = \hat{\gamma}_{1,t} \frac{1}{Asset_{j,t-1}} + \hat{\gamma}_{2,t} \frac{(\Delta REV_{j,t} - \Delta AR_{j,t})}{Asset_{j,t-1}} \quad (5)$$

Where:

$\Delta REV_{j,t}$  = firm  $j$ 's change in revenues (Compustat #12) in year  $t$ ,  
 $PPE_{j,t}$  = firm  $j$ 's gross value of property, plant, and equipment (Compustat #7) in year  $t$ ,  
deflated by firm  $j$ 's total assets in year  $t-1$  ( $Assets_{j,t-1}$ , Compustat #6).  
 $AR_{j,t}$  = firm  $j$ 's change in accounts receivable (Compustat #2) in year  $t$ .

Finally we estimate abnormal current accruals (ACA) for firm  $j$  in time  $t$  using equation (6), where we use normal accruals from total accruals resulting in abnormal accruals which are discretionary and up to the managers to use them. The absolute value of the abnormal accruals  $|ACA_{j,t}|$  is our second earnings quality proxy (EQ2), the higher value of this variable indicates lower earnings quality for the firm in that year.

$$ACA_{j,t} = \frac{TCA_{j,t}}{Asset_{j,t-1}} - NCA_{j,t} \quad (6)$$

### 1.3.1.3 EQ3 and EQ4 based on operating cash flow

The previous two earnings quality measures were extensively used in the literature, recently measures that can capture both the earnings management and operating activities are

becoming common. We propose to use two additional models to exploit the relationship between accruals and operating cash flow.

Dechow and Dichev, (2002), proposed a measure of accrual quality) based on the relationship between accruals and cash flows in and around the observed accruals. McNichols (2002) modified it to include changes in revenues (sales) and PPE (property, plant, and equipment), because they play a significant role in current accruals calculations and effect operating cash flow. Managers of the firm have discretion over timing of the cash flow recognition and thus the actual accounting and cash flow items might be different as managers can and use accruals to time the cash flows. As a result the estimation errors in accrual can be used as a proxy for the quality of earnings, more error indicating lower earnings quality.

We estimate discretionary accruals using this concept by regressing total current accruals (working capital accruals) on lagged, current, and future cash flows using equation (7). We estimate this cross-sectionally for each industry (minimum 20 firms) for Fama and French's 48 industries. All the variables are scaled by the average assets of the firm  $j$  over current and previous years.

$$\frac{TCA_{j,t}}{A_{asset_{j,t}}} = \theta_{0,j} + \theta_{1,j} \frac{CFO_{j,t-1}}{A_{asset_{j,t}}} + \theta_{2,j} \frac{CFO_{j,t}}{A_{asset_{j,t}}} + \theta_{3,j} \frac{CFO_{j,t+1}}{A_{asset_{j,t}}} + U_{j,t} \quad (7)$$

Where:

$$\begin{aligned} CFO_{j,t} &= NIBE_{j,t} - TA_{j,t} \\ NIBE_{j,t} &= \text{firm } j\text{'s net income before extraordinary items (Compustat \#18) in year } t. \end{aligned}$$

Based on the equation (7), the absolute value of firm level error terms include changes to revenue and plant, property, and equipment, and is our third earnings quality proxy (EQ3). EQ4

is the final proxy of earnings quality calculated based on Wysocki, (2008), as the ratio of the standard deviations of the residuals from regression of current cash flows divided by the residuals from the above equation (7). All standard deviation calculations are based on  $t-1$  to  $t-5$  years of the residuals, and calculated as a ratio of STD (Residual 1) / STD (Residual 2), where standard deviation of residual 1 is based on simple regression of working capital accruals on current cash flows and the standard deviation of residual 2 is based on the regression shown in equation (7).

The measures EQ1, EQ2 and EQ3 are multiplied by (-1) to orient them in the increasing direction, higher value of the measure indicate higher earnings quality. The final measure EQ4 is not multiplied by (-1) as it's a ratio and is oriented in the appropriate direction. The lower value of EQ in all four cases indicates lower earnings quality.

### **1.3.2 Share issuance measure (ISSUE)**

Annual share issuance measure (ISSUE) is calculated for all firms by using CRSP data between 1970 and 2012. We start at 1970 due to the limitation imposed by the earnings quality calculations, for which we require Compustat data and it start in 1970. For each firm in CRSP we gather number of outstanding shares and the “Factor to Adjust Shares Outstanding” ( $f$ ). We then calculate “Adjusted Shares” at time  $t$  to reflect the various share distribution events like stock splits and rights offering. First we calculate cumulative total factor for time  $t$ , and then AdjustedShares at time  $t$ . We use the AdjustedShares to compute the annual share issuance at time  $t$  and five year share issuance based on Daniel and Titman, (2006) at time  $t$  as below:

$$Total\ Factor_t = \prod_{i=1}^t (1 + f_i)$$

$$AdjustedShares_t = SharesOutstanding_t / TotalFactor_t$$

$$ISSUE_{t, t-11} = Log(adjusted\ shares_t) - Log(adjusted\ shares_{t-11})$$

$$ISSUE_{t, t-59} = Log(adjusted\ shares_t) - Log(adjusted\ shares_{t-59})$$

From here on we will refer to annual share issue measure as ISSUE and five year measure as DT\_ISSUE. All our share issuance measures are constructed using Daniel and Titman (2006) methodology. The annual measure has some additional benefits over the five year measure. Annual time frame matches with the frequency of filing the financial reports, updates to CRSP stock prices and other databases tracking frequency related to share issuances. According to Fama and French (2008), this approach allows measuring all the share issuances and repurchases, those which were not announced publicly.

These measure can be either positive if overall the share issuance is positive in the time period used, we call these firms “Net Issuers” where ISSUE is greater than zero. If the overall share issuance is negative in the time period we call the firms “Net Repurchasers” where ISSUE is less than zero. For the firms with no share issuance or repurchase activity the ISSUE variables will be zero.

### 1.3.3 Dependent variables

Based on the prior studies of share offering we include the following ISSUE characteristics as control variables. Most of these variables are used as determinants of ISSUE by Pontiff and Woodgate (2008) as control variables in their research.

Book-to-Market (B2M) is calculated based on Fama and French (1992), last year's book value of common equity (compustat #60) is used when available, otherwise the variable is coded as zero and eliminated from the sample. The measure is calculated as the natural log of book value divided by size of the firm, where size is obtained from CRSP as firm market value. A high B2M indicates a "value firm", the choices made by firms in this stage of life cycle plays a major role the way they issue equity, high B2M firms are less likely issue equity when compared to low B2M firms which are in growth stage and more likely in need of additional equity to grow the firm.

Size is calculated based on monthly market value of equity from CRSP, we use natural log of price of shares multiplied by total number of outstanding shares. The other measure we use for size is natural log of Total Assets from Compustat. Larger companies are more likely to be tracked by analysts and other investors in the market; this has an effect on the information asymmetry between managers and investors.

Momentum is calculated from CRSP as last year's holding period return of the stock, the time is lagged by one month to avoid positive autocorrelation due to bid-ask bounce. High momentum stocks are more likely to issue equity, and these two measures are contemporaneous and correlate positively.

Leverage is debt to equity ratio for a firm. More levered firms are more likely to undertake risky non positive NPV project to maximize shareholders wealth as majority of the

risk is born by the debt holders of the firm. At the same time higher leverage is also related to higher financial distress risk. These two effects directly affect the motivation for equity issuance, leading to less issuance by higher levered firms.

Market-to-Book ratio (M2B) is calculated as the ratio of market value of total assets to the book value of the total assets as in B2M. This measure indicates the valuations of the firm, if this ratio is higher than one, it indicates overvaluation and this firm tends to take advantage of this overvaluation and issue equity before the investors realize the true value. This is positively related to the net issue of equity.

#### **1.3.4 Sample construction**

We collect accounting and cash flow data from Compustat and stock information from CRSP (Center for Research in Security Prices) databases. We estimate all our earnings quality measures and share issuance measures and control variables annually over time period from 1970 to 2012. Various filters were used, if the book value is zero or less we eliminate that firm from the sample, if marketable securities or total assets not available or zero, the firm is deleted from the sample as these variables are used as scaling variables across all calculation and thus a denominator of zero or missing value is not acceptable.

We use CCM (compustat and CRSP merge) database the firms not listed in CRSP will automatically get deleted and only the firms with listing in both CRSP and Compustat are included in the sample. Firms with industry codes related to financials (SIC code between 6000 and 6999) and utilities (SIC code between 4900 and 4999) were deleted as the firm characteristics in these industry are influenced by unique regulations and requirements from

SEC. All the accounting variables are winsorize at the 1 and 99 percentiles on both ends to eliminate the influence of extreme observations on the rest of the data.

### **1.3.5 Descriptive statistics**

Table 1.1 Panel A: shows the descriptive statistics of all the variables used in the study. The overall sample distributions of EQ1 and EQ2 are highly skewed as shown by the higher means as compared to medians. We have 142,447 firm year observation of EQ1 and EQ2, whereas 81,598 firm year observations for EQ3 and EQ4 because they are calculated as standard deviation of year's  $t-1$  to  $t-5$ , thus losing the first six years of observations for each firm in the sample. The mean values of all earnings quality proxies are negative (EQ1 -0.379; EQ2 -0.167; EQ3 -0.038; EQ4 1.123), the last one EQ4 being a ratio is not negative. These values are consistent with the prior literature Aboody et al. (2005) and Biddle et al. (2009).

The ISSUE and DT\_ISSUE variables are both positive and the mean value of 0.114 for ISSUE indicates that overall the sample firms are net issuers of equity and DT\_ISSUE (0.349) is also indicating the same but over five year time period. ISSUE is calculated using 140,797 firm years observations over 1970 to 2012. ISSUE is also strongly right skewed as shown by the mean 0.114 and median is 0.007, holding period returns (momentum) show a slight decrease in the year  $t+1$  indicating an overall slight loss for the firms who Issue shares. Pontiff and Woodgate, (2008) already show that the time-series correlations for their sample data suggest that the ISSUER's continue to ISSUE in the future, "If the firm buys (sells) shares, it continues to buy (sell) shares in the future periods". They also found share issuance increases and decreases with high and low returns as shown by positive correlation between ISSUE and HPRET (momentum) for time periods  $(-11, 0)$  and ISSUE  $(1, 12)$ .

Panel B of the Table 1.1 shows the person correlations between the variables used in the study. The preliminary results show that the two measures EQ1 and EQ2 based on modified jones model are highly correlated (0.43) with each other than compared to their correlation with EQ3 and EQ4, thus suggesting that EQ1 and EQ2 are capturing similar information about the firm and EQ3 and EQ4 are capturing different information.

All the earnings quality measures are negatively correlated with ISSUE variable thus indicating a higher level of earnings quality leads to lower ISSUE and vice versa, this is consistent with and support our main hypothesis. The correlation between both ISSUE and DT\_ISSUE is 0.324, indicating that they are capturing similar information.

Both issuance measures are negatively correlated with B2M variable and positively correlated with M2B variable, as these measures shows if the firms are over or undervalued. These observations are consistent with prior literature which concludes that firms act to exploit the mispricing caused by valuation. Managers are more likely to sell the shares of a growth firm with high M2B and buy back the share of a growth firm as indicated by low M2B (Lakonishok and Lee (2001)).

Leverage is negatively correlated with ISSUE, this is consistent with our prediction that more levered firms are more likely to undertake risk non positive NPV projects to maximize shareholders wealth as majority of the risk is born by the debt holders of the firm. At the same time higher leverage is also related to higher financial distress risk.



Table 1.1: Summary Statistics

This table presents the summary statistics for the firms in CCM (compustat - crsp merged database) during the 1970 to 2012 sample period. Panel A presents descriptive statistics for the variables used in the analysis while panel B presents Pearson correlations for these variables. ISSUE and DT\_ISSUE are calculated from CRSP database for the same time frame as the sample.  $ISSUE = [\text{Log}(\text{shares outstanding}, t) - \text{Log}(\text{shares outstanding}, t-11)]$ ;  $ISSUE-59,0 = [\text{Log}(\text{shares outstanding}, t) - \text{Log}(\text{shares outstanding}, t-59)]$  the variables are measured at the end of December for the period between 1970 and 2012. B2M is the ratio of log (book value of equity to the market value of the equity); Size is the log of market capitalization calculated based on the price and outstanding shares of the firm. Momentum is previous years return and is contemporaneous with the ISSUE variable. Total Assets and Sales are from company financial data. M2B is the ratio of the market value of total assets to book value of the total assets. Leverage is debt to equity ratio of the firm. Earnings Quality is measured four different ways, EQ1 and EQ2 are is abnormal accruals and abnormal current accruals based on modified jones model, Dechow et al. and (1995). EQ3 is earnings quality as proposed by Dechow and Dichev (2002) and modified by Francis et al. (2005). EQ4 is a modified version of the accruals quality measure proposed by Wysocki (2008). All the earnings quality measure except EQ4 are multiplied by -1 as proposed by Biddle et al. (2009) to align them in the increasing direction, thus higher value of measure indicates higher earnings quality.

<b>Panel A:</b>	<i>N</i>	Mean	Median	<i>SD</i>	Q1	Q3
ISSUE	140,797	0.114	0.007	0.349	0.000	0.072
DT_ISSUE	140,797	0.349	0.005	0.879	0.000	0.554
B2M	138,781	-0.547	-0.494	0.924	-1.076	0.055
Size	142,220	4.527	4.398	2.128	2.942	6.032
Momentum	140,797	0.155	0.047	0.651	-0.257	0.399
Total Assets	142,447	727.846	102.281	1994.330	28.326	446.722
Sales	142,447	753.002	112.410	2082.150	28.321	482.119
M2B	142,225	1.861	1.320	2.176	1.004	1.973
Leverage	142,225	0.208	0.129	0.228	0.008	0.340
EQ1	142,447	-0.379	-0.085	7.039	-0.166	-0.040
EQ2	142,447	-0.167	-0.052	1.357	-0.118	-0.021
EQ3	81,598	-0.038	-0.030	0.032	-0.046	-0.019
EQ4	81,598	1.123	1.023	0.645	0.892	1.201

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**Panel B: Correlation Matrix of Variables**

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	ISSUE	DT_ISSUE	B2M	Size	Momentum	Total Assets	M2B	Leverage	EQ1	EQ2	EQ3
DT_ISSUE	0.324***										
B2M	-0.202***	-0.149***									
Size	-0.142***	0.265***	-0.408**								
Momentum	0.164***	0.035***	-0.264***	0.153***							
Total Assets	0.013***	0.108***	-0.064***	0.560***	0.003						
M2B	0.161***	0.079***	-0.634***	0.200***	0.221***	-0.027***					
Leverage	-0.101***	-0.072***	0.426***	-0.215***	-0.131***	0.059***	-0.283***				
EQ1	-0.009***	0.011***	0.007**	-0.033***	-0.001	-0.048***	0.001***	-0.004			
EQ2	-0.004	0.026***	0.012***	0.006**	0.003	-0.021***	-0.007	-0.001	0.427***		
EQ3	-0.007*	0.044***	0.181***	0.231***	0.015***	0.153***	-0.212***	0.140***	0.194***	0.228***	
EQ4	-0.012***	-0.032***	0.007**	-0.022***	-0.016***	0.025***	0.000	0.018***	-0.038***	-0.053***	0.084***

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\*, \*\*, \*\*\* indicate significance levels of 10%, 5%, and 1%, respectively.

## 1.4 Analysis and Results

### 1.4.1 Univariate Analysis

Table 1.2 shows the results of the univariate analysis of all the earnings quality variables (EQ1, EQ2, EQ3, and EQ4). The earnings quality variables are compared between two samples of both ISSUE and DT\_ISSUE variables. Each of the issue variables are divided into two groups, if the value of ISSUE is  $> 0$ , then the firm is considered Net Issuers and if  $< 0$  the firm is considered as Net Repurchasers, the no changes in  $ISSUE=0$  are deleted from this sample thus a decrease in overall sample size to 86,401 firm year observations for Net Issuers and 24,949 firm year observations for Net Repurchasers for EQ1 and EQ2. For EQ3 and EQ4, the firm year observations are 50,221 and 16,994 respectively. DT\_ISSUE is also prepared similarly by deleting  $DT\_ISSUE=0$  and end up with 67,752 firm year observations for Net Issuers and 18,966 for Net repurchasers. For EQ3 and EQ4 the firm year observations are 57,291 and 16,291 respectively.

The results in panel A (ISSUE) presents univariate test results for the differences of mean between two groups of earnings quality variables divided into net issuers and net repurchsers. EQ1 for Net Issuers is -0.15 as compared to -0.12 for Net Repurchasers with a statistically significant mean difference of -.023. This indicates that Net Repurchasers have a higher earnings quality as compared to Net Issuers. All the other earnings quality measures show similar overall results concluding that Net Issuers and Net Repurchasers are statistically different in their measure of earnings quality. All four earnings quality measures are constantly higher in value for Net Repurchasers thus providing preliminary support for our entire hypothesis.

Panel B (DT\_ISSUE) presents univariate test results for the differences of mean between two groups of earnings quality variables divided into net issuers and net repurchsers. EQ1 for

Net Issuers is -0.11 as compared to -0.10 for Net Repurchasers with a statistically significant mean difference of -.004. This indicates that Net Repurchasers have a higher earnings quality as compared to Net Issuers. All the other earnings quality measures show similar overall results concluding that Net Issuers and Net Repurchasers are statistically different in their measure of earnings quality. All four earnings quality measures are constantly higher in value for Net Repurchasers just like ISSUE measure thus providing preliminary support for our entire hypothesis.

### 1.4.1 Multivariate Analysis

To test our hypotheses about earnings quality and share issuance for all issuers, Net Issuers, and Net Repurchasers we implement the following empirical specification using OLS regression with heteroscedasticity consistent standard errors. ISSUE variable is based on Pontiff and Woodgate (2008) is our dependent variable, and earnings quality measures and other control variables like B2M, momentum, size, total assets, M2B, and leverage as discussed in our data description section:

$$ISSUE_{it} = \beta_0 + \beta_1 EQ_{it} + \beta_2 B2M_{it} + \beta_3 ME_{it} + \beta_4 Momentum_{it} + \beta_5 TotalAssets_{it} + \beta_6 M2B_{it} + \beta_7 Leverage_{it} + \varepsilon_{it}$$

To test our main Hypothesis H1, if share issue depends on earnings quality, we run four models of the above regression each with EQ1, EQ2, EQ3, and EQ4 respectively and report all the results in table 1.3. Each column is reporting separate results for the above regression with 130,078 firm year observations for EQ1 and EQ2 while 74,327 for the other two earnings quality proxies. The regression is calculated based on data for the time period 1970 to 2012. The

control variables are calculated as described in the data sections of the paper. All the earnings quality measure except EQ4 are multiplied by -1 as proposed by Biddle et al. (2009) to align them in the increasing direction, thus higher value of measure indicates higher earnings quality. We expect each earnings quality variable to have negative and significant relationship with the ISSUE variable indicating that poor earnings quality results in net issuance of shares for all firms in our sample.

$$ISSUE_{it} \text{ (Net Issuers)} = \beta_0 + \beta_1 EQ_{it} + \beta_2 B2M_{it} + \beta_3 ME_{it} + \beta_4 Momentum_{it} + \beta_5 TotalAssets_{it} + \beta_6 M2B_{it} + \beta_7 Leverage_{it} + \varepsilon_{it}$$

To test our second hypothesis (H2) for Net Issuers we run four models of the above regression each with EQ1, EQ2, EQ3, and EQ4 respectively and report all the results in table 1.3. Each column is reporting separate results for the above regression with 84,402 firm year observations for EQ1 and EQ2 while 49,217 for the other two earnings quality proxies. The regression is calculated based on data for the time period 1970 to 2012. The control variables are calculated as described in the data sections of the paper. All the earnings quality measure except EQ4 are multiplied by -1 as proposed by Biddle et al. (2009) to align them in the increasing direction, thus higher value of measure indicates higher earnings quality. We expect each earnings quality variable to have negative and significant relationship with the ISSUE variable indicating that poor earnings quality results in net issuance of shares for “Net Issuers” (ISSUE > 0) firms in our sample.

$$ISSUE_{it} \text{ (Net Repurchasers)} = \beta_0 + \beta_1 EQ_{it} + \beta_2 B2M_{it} + \beta_3 ME_{it} + \beta_4 Momentum_{it} + \beta_5 TotalAssets_{it} + \beta_6 M2B_{it} + \beta_7 Leverage_{it} + \varepsilon_{it}$$

To test our third hypothesis (H3) for Net Repurchasers we run four models of the above regression each with EQ1, EQ2, EQ3, and EQ4 respectively and report all the results in table 1.3. Each column is reporting separate results for the above regression with 24,571 firm year observations for EQ1 and EQ2 while 16,789 for the other two earnings quality proxies. The regression is calculated based on data for the time period 1970 to 2012. The control variables are calculated as described in the data sections of the paper. All the earnings quality measure except EQ4 are multiplied by -1 as proposed by Biddle et al. (2009) to align them in the increasing direction, thus higher value of measure indicates higher earnings quality. We expect each earnings quality variable to have positive and significant relationship with the ISSUE variable indicating that poor earnings quality results in net issuance of shares for “Net Repurchasers” (ISSUE < 0) firms in our sample.

Table 1.2: Univariate Analysis

This table presents the univariate analysis of all the earnings quality variables (EQ1, EQ2, EQ3, and EQ4). The earnings quality variables are compared between two samples of both ISSUE and DT\_ISSUE variables. Each of the issue variables are divided into two groups, if the value of ISSUE is > 0 it is considered net issue and if <0 it is considered as net repurchasers, the no changes in ISSUE=0 are deleted from this sample. DT\_ISSUE is also prepared similarly. Panel A (ISSUE) presents univariate tests for the differences of mean between two group's earnings quality variables divided into net issuers and net repurchasers. Panel B (DT\_ISSUE) presents univariate tests for the differences of mean between two group's earnings quality variables divided into net issuers and net repurchasers.

<b>Panel A: Univariate Tests for ISSUE (+) vs. ISSUE (-)</b>							
	Net Issuers (+)			Net Repurchasers (-)			Mean Difference
	<i>N</i>	Mean	Std Dev	<i>N</i>	Mean	Std Dev	
EQ1	86,401	-0.15	0.21	24,949	-0.12	0.17	-0.023***
EQ2	86,401	-0.10	0.15	24,949	-0.08	0.13	-0.022***
EQ3	50,221	-0.04	0.03	16,994	-0.03	0.02	-0.004***
EQ4	50,221	1.09	1.08	16,994	1.10	1.09	-0.001***
<b>Panel B: Univariate Tests for DT_ISSUE (+) vs. DT_ISSUE (-)</b>							
	Net Issuers (+)			Net Repurchasers (-)			Mean Difference
	<i>N</i>	Mean	Std Dev	<i>N</i>	Mean	Std Dev	
EQ1	67,752	-0.11	0.11	18,966	-0.10	0.11	-0.004***
EQ2	67,752	-0.07	0.08	18,966	-0.07	0.09	-0.002***
EQ3	57,291	-0.04	0.02	16,423	-0.03	0.02	-0.001***
EQ4	57,291	1.08	0.35	16,423	1.11	0.37	-0.023***

T-tests and non-parametric tests are used to test mean differences. \*, \*\*, \*\*\* indicate significance levels of 10%, 5%, and 1%, respectively.

The main results as shown in Table 1.3 support our hypothesis H1, the earnings quality variables EQ1, EQ2, and EQ4 are negatively and statistically significantly related to the dependent variable ISSUE. In Model1 the coefficient estimate (-0.089) for EQ1 earnings quality measure is significantly negative after controlling for other factors that might affect the firms' propensity to issue shares. Similarly the earnings quality measure EQ2 (-0.112), and EQ4 (-0.009) similar and consistent result with EQ1. Thus we conclude that these measures are predicting that higher earnings quality leads to lower ISSUE and all the results are statistically significant at 1% level. As a robustness test we run all regression analysis using DT\_ISSUE as dependent variable instead of ISSUE and find overall similar results.

Table 1.4 shows the results for Net Issuers (ISSUE > 0) group of firms and support our hypothesis H2, the earnings quality variables EQ1, EQ2, and EQ4 are negatively and statistically significantly related to the dependent variable ISSUE. In Model1 the coefficient estimate (-0.126) for EQ1 earnings quality measure is significantly negative after controlling for other factors that might affect the firms' propensity to issue shares. Similarly the earnings quality measure EQ2 (-0.165), and EQ4 (-0.010) similar and consistent result with EQ1. Thus we conclude that these measures are predicting that higher earnings quality leads to lower ISSUE for Net Issuers and all the results are statistically significant at 1% level. As a robustness test we run all regression analysis using DT\_ISSUE as dependent variable instead of ISSUE and find overall similar results.



Table 1.3: Share Issue and Earnings Quality

The dependent variable is the aggregate share issuance measure *ISSUE* based on Pontiff and Woodgate (2008). It is calculated based on data from CRSP database for the time period 1970 to 2012.  $ISSUE = [\text{Log}(\text{shares outstanding}, t) - \text{Log}(\text{shares outstanding}, t-11)]$ ; *B2M* is the ratio of log (book value of equity to the market value of the equity); *Size* is the log of market capitalization calculated based on the price and outstanding shares of the firm. *Momentum* is previous years return and is contemporaneous with the *ISSUE* variable. *Total Assets* and *Sales* are from company financial data. *M2B* is the ratio of the market value of total assets to book value of the total assets. *Leverage* is debt to equity ratio of the firm. *Earnings Quality* is measured four different ways, *EQ1* and *EQ2* are is abnormal accruals and abnormal current accruals based on modified jones model, Dechow et al, and (1995). *EQ3* is earnings quality as proposed by Dechow and Dichev (2002) and modified by Francis et al. (2005). *EQ4* is a modified version of the accruals quality measure proposed by Wysocki (2008). All the earnings quality measure except *EQ4* are multiplied by -1 as proposed by Biddle et al. (2009) to align them in the increasing direction, thus higher value of measure indicates higher earnings quality. The regressions are OLS with heteroscedasticity-consistent standard errors reported in the brackets below the parameter estimates.

Dependent variable: <i>ISSUE</i>				
	(EQ1)	(EQ2)	(EQ3)	(EQ4)
Intercept	0.026*** (0.004)	0.025*** (0.004)	0.033*** (0.006)	0.035*** (0.006)
EQ	-0.089*** (0.005)	-0.112*** (0.007)	0.138** (0.056)	-0.009*** (0.004)
B2M	-0.008*** (0.002)	-0.007*** (0.002)	-0.014*** (0.003)	-0.013*** (0.003)
ME	0.072*** (0.003)	0.072*** (0.003)	0.064*** (0.004)	0.065*** (0.004)
Momentum	0.059*** (0.002)	0.059*** (0.002)	0.068*** (0.003)	0.068*** (0.003)
Total Assets	-0.062*** (0.003)	-0.062*** (0.003)	-0.057*** (0.004)	-0.057*** (0.004)
M2B	0.004*** (0.001)	0.004*** (0.001)	0.009*** (0.002)	0.009*** (0.002)
Leverage	0.118*** (0.007)	0.121*** (0.007)	0.118*** (0.009)	0.120*** (0.009)
Industry Dummies	No	No	No	No
Year Dummies	No	No	No	No
R <sup>2</sup>	0.068	0.067	0.062	0.063
No. Firms years	130,078	130,078	74,327	74,327

\*, \*\*, \*\*\* indicate significance levels of 10%, 5%, and 1%, respectively.

Table 1.5 shows the results for Net Repurchasers ( $ISSUE < 0$ ) group of firms and support our hypothesis H2, the earnings quality variables EQ1, EQ2, and EQ3 are positively and statistically significantly related to the dependent variable ISSUE. In Model1 the coefficients estimate (0.076) for EQ1 earnings quality measure is significantly positive after controlling for other factors that might affect the firms' propensity to issue shares. Similarly the earnings quality measure EQ2 (0.118), and EQ3 (1.181) similar and consistent result with EQ1. Thus we conclude that these measures are predicting that higher earnings quality leads to higher ISSUE for the Net Repurchasers and all the results are statistically significant at 1% level. As a robustness test we run all regression analysis using DT\_ISSUE as dependent variable instead of ISSUE and find overall similar results.

Table 1.4: Share Issue and Earnings Quality: Net Issuers

The dependent variable is the aggregate share issuance measure *ISSUE* based on Pontiff and Woodgate (2008). It is calculated based on data from CRSP database for the time period 1970 to 2012.  $ISSUE = [\text{Log}(\text{shares outstanding, } t) - \text{Log}(\text{shares outstanding, } t-11)]$ ; *B2M* is the ratio of log (book value of equity to the market value of the equity); *Size* is the log of market capitalization calculated based on the price and outstanding shares of the firm. *Momentum* is previous years return and is contemporaneous with the *ISSUE* variable. *Total Assets* and *Sales* are from company financial data. *M2B* is the ratio of the market value of total assets to book value of the total assets. *Leverage* is debt to equity ratio of the firm. *Earnings Quality* is measured four different ways, *EQ1* and *EQ2* are abnormal accruals and abnormal current accruals based on modified Jones model, Dechow et al, and (1995). *EQ3* is earnings quality as proposed by Dechow and Dichev (2002) and modified by Francis et al. (2005). *EQ4* is a modified version of the accruals quality measure proposed by Wysocki (2008). All the earnings quality measure except *EQ4* are multiplied by -1 as proposed by Biddle et al. (2009) to align them in the increasing direction, thus higher value of measure indicates higher earnings quality. The regressions are OLS with heteroscedasticity-consistent standard errors reported in the brackets below the parameter estimates.

Dependent variable: <i>ISSUE</i> ( $>0$ ; net issuers)				
	(EQ1)	(EQ2)	(EQ3)	(EQ4)
Intercept	0.081*** (0.005)	0.078*** (0.005)	0.079*** (0.008)	0.083*** (0.008)
EQ	-0.126*** (0.007)	-0.165*** (0.010)	0.116** (0.069)	-0.010** (0.005)
Control Variables (yes)				
Industry Dummies	No	No	No	No
Year Dummies	No	No	No	No
R <sup>2</sup>	0.064	0.063	0.064	0.063
No. Firms years	84,402	84,402	49,217	49,217

\*, \*\*, \*\*\* indicate significance levels of 10%, 5%, and 1%, respectively.

Table 1.5: Share Issue and Earnings Quality: Net Issuers

The dependent variable is the aggregate share issuance measure *ISSUE* based on Pontiff and Woodgate (2008). It is calculated based on data from CRSP database for the time period 1970 to 2012.  $ISSUE = [\text{Log}(\text{shares outstanding, } t) - \text{Log}(\text{shares outstanding, } t-11)]$ ; *B2M* is the ratio of log (book value of equity to the market value of the equity); *Size* is the log of market capitalization calculated based on the price and outstanding shares of the firm. *Momentum* is previous years return and is contemporaneous with the *ISSUE* variable. *Total Assets* and *Sales* are from company financial data. *M2B* is the ratio of the market value of total assets to book value of the total assets. *Leverage* is debt to equity ratio of the firm. *Earnings Quality* is measured four different ways, *EQ1* and *EQ2* are is abnormal accruals and abnormal current accruals based on modified jones model, Dechow et al, and (1995). *EQ3* is earnings quality as proposed by Dechow and Dichev (2002) and modified by Francis et al. (2005). *EQ4* is a modified version of the accruals quality measure proposed by Wysocki (2008). All the earnings quality measure except *EQ4* are multiplied by -1 as proposed by Biddle et al. (2009) to align them in the increasing direction, thus higher value of measure indicates higher earnings quality. The regressions are OLS with heteroscedasticity-consistent standard errors reported in the brackets below the parameter estimates.

Dependent variable: <i>ISSUE</i> ( $< 0$ ; net repurchasers)				
	(EQ1)	(EQ2)	(EQ3)	(EQ4)
Intercept	0.026*** (0.004)	-0.120*** (0.007)	-0.055*** (0.009)	-0.120*** (0.009)
EQ	0.076*** (0.011)	0.118*** (0.016)	1.181*** (0.106)	-0.004 (0.004)
Control Variables (yes)				
Industry Dummies	No	No	No	No
Year Dummies	No	No	No	No
R <sup>2</sup>	0.046	0.046	0.061	0.045
No. Firms year	24,571	24,571	16,789	16,789

\*, \*\*, \*\*\* indicate significance levels of 10%, 5%, and 1%, respectively.

## 1.5 Conclusion

The main questions we explore is if increase in information asymmetry between managers and investors are related to net share issuance. This will be the first study to use the new *ISSUE* measure to proxy the net share issuance and measure the information asymmetry as a proxy for earnings quality as compared to other proxies used like stock return volatility, bid-ask spread and analysts' forecasts.

Accounting earnings is used widely to measure the performance of a firm, the quality of this information is used as a proxy for information asymmetry between the managers and the outside investors. We use several measures based on discretionary accruals to measure earnings quality, we use modified Jones model and newer Dechow and Dichev (2002) model using operating cash flows to measure earnings quality.

We conclude that the ISSUE (net equity issuance) has an inverse relationship with quality of the earnings reported by the firms. Firms with poor (good) earnings quality have higher (lower) information asymmetry and tend to issue more (less) equity and this finding was true for a variety of earnings quality measures used in the literature.

Firms with negative net issuance (Net Repurchasers) are more likely to have higher quality of earnings; this is true across 3 of the proxies we used for the earnings quality. On the contrary, firms with positive net issuance (Net Issuers) were found to have lower quality of earnings. Additional robustness tests found that overall these findings are true for another alternate measure of net share issue (DT\_ISSUE).

We propose to conduct additional robustness tests controlling for industry and time fixed effects, we expect to find the results to be consistent with the current ones. Additionally, we propose to test the issuance efficiency, for this we intend to construct a new measure to test if the earnings quality is related to Issuance efficiency. Here we borrow the setup from Biddle et al. (2009), where they test the relationship between financial reporting quality and investment for firms in over/under investment operating conditions.

## **Chapter 2: Put Option Sales and Earnings Quality: Evidence of Market Timing**

We provide evidence that earnings quality is high for the sample of Put Option Selling (POS) and they are actively timing the market compared to a matching sample of firms. We hypothesize that due to information asymmetry; managers of POS firms have additional private information and estimate their stock was mispriced (undervalued) and expect the stock price to increase in the near future, this leads to higher earnings quality (abnormal accruals). We provide additional evidence of market timing (mispricing due to undervaluation) using Residual Income Model (RIM).

### **2.1 Introduction**

Firms selling put options on their own stock were taking on additional significant risk and gaining the premium paid for the put. These firms might be motivated by reducing transaction costs of repurchase program, reduce dilution due to employee stock option (ESO) plan, mitigate agency costs, signaling, or simply timing the market based on private information that their stock price is undervalued.

Put option sales are not generally disclosed (announced) publicly ex-ante nor at the time of the event, they are reported and filed with SEC in the subsequent quarters (ex-post), and thus they are not used as a signaling mechanism by the managers. This put selling is usually associated with open market repurchase announcements by the firm; this practice was most prevalent in the time period of 1991-2004 generally among the larger profitable firms. Jenter,

Lewellen, and Warner (2011) show that firms engage in POS mainly due to market timing, but they could not rule out the other internal firm specific explanations.

There is a growing body of literature which examines the effect of equity mispricing on various financing, investment and other corporate activities<sup>2</sup>. Put option sales provide a unique insight into decision making and processes of managers having private information under information asymmetry. According to Jenter et al. 2011, “The put option sale setting helps address the issues of both motivation and measurement, and thus provides a cleaner test” of market timing. A typical put option in this test expires in 6 months thus providing clean short term effects instead of studying problematic long term effects. Since put option sale is a levered bet by firms, we propose using earning quality measure to test the market timing explanation and predict that these firms will have higher quality of earnings as there is no need to manage earnings in this setup.

There has been a significant amount of research done regarding earnings quality in Finance and Accounting areas. A comprehensive discussion about earnings quality is provided by Dechow, Ge, Schrand (2010), where the authors summarize about 350 academic papers and identify the best measurement and test variable. Dichev, Graham, Harvey, and Rajgopal (2012), conduct an extensive survey evidence about CFO opinion’s about motivations of existing earnings quality measures and impact regulation. We add to this vast literature by studying the relationship between earnings quality and POS activity of firms.

Our main contribution is to extend the literature in earnings quality area by first providing evidence that POS firms have high earnings quality compared to sample firms and are thus timing the market (stock price) as initially shown by Jenter, Lewellen, and Warner (2011). The

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<sup>2</sup> Baker and Wurgler (2002), Graham and Harvey (2001), Elliott et al. (2007), Huang and Ritter (2005), Leary and Roberts (2005), Hovakimian (2006)

level of earnings quality is very important; we consider earning quality as either low or high relative to a matching sample. Chan, Chan, Jegadeesh, Lakonishok (2001), show that there is a positive relationship between earnings quality and stock returns. A low earnings quality firm is expected to have low future stock returns thus its stock will be currently overvalued. Whereas as a high earnings quality firm is expected to have higher future stock returns and thus its stocks will be currently undervalued.

Return volatility is not a major factor as evidenced by high quality of earnings for the sample firms. Return volatility is negatively related to earnings quality (based on accruals), high level of earnings quality indicate low level of future return volatility (Rajgopal and Venkatachalam, 2006). Our initial results show that the put selling firms have a higher earnings quality as compared to the sample firms and thus the stock price is undervalued and firms are timing the market in expectation of future raise in stock price.

Additionally we show that market timing explains put sales by firms. Here we use residual income model (RIM) as defined by Ohlson (1991, 1995) to test the mispricing (over/under valuation) as it is considered in literature as better valuation model for stocks (Dechow, Hutton, and Sloan, 1999). RIM will predicts over 20% of the variation in future stock returns (Lee, Myers, and Swaminathan, 1999). Using put option sales data (shorter term) as opposed to other larger data sets like SEO or repurchases (longer term) will eliminate potential mean reversion in valuation. Indications of undervaluation using RIM is consistent with our first findings and supports our main results that market timing is the main motive for selling put options by firms.



The rest of the paper is organized as follows: Section 2 reviews the prior literature, Section 3 describes the data and methodology, Section 4 describes the analysis and presents the results, and Section 5 offers conclusions.

## **2.2 Literature and Hypothesis**

Gibson, Povel, and Singh (2006) argued that put selling firms are signaling to market about undervaluation of their stock price, McDonald (2004) and Atanasov et al. (2007) show that signaling is not the main motive but found an abnormal stock return for the POS firms. Angle et al. (1997) and Grullon and Ikenberry (2000) argue that put option sales are executed due to undervalued stock price and managers try to profit with this private information. Jenter, Lewellen, and Warner (2011) show that market timing by managers is the main reason for put sales and did not rule out other possible explanations.

Earnings quality has been used in the literature many times. Teoh, Welch, and Wong (1998) examine accruals around SEO. Sloan (1996) show that overvaluing of low earnings quality firms is corrected over time, Penman and Zhang (2002), Dechow and Schrand (2004) and Melumand and Nissim (2009) show that earnings quality predicts the future sustainable persistent earnings. The effect of earnings quality on financing and investment activities like SEO (Rangan 1998), stock repurchases (Hribar et al. 2006); IPO, Insider trading (Aboody et al. 2005), stock returns (Chan et al. 2001) and return volatility (Chen et al. 2008) were extensively studied.

Market price of a stock is a very noisy measure of its intrinsic value. There has been much research done to determine the best possible model and Residual Income Model (RIM)

was found to be a better valuation model. In the existing finance literature market-to-book (M2B) was widely used as proxy for undervaluation/mispricing, and this measure does not clearly differentiate between the actual mispricing (due to asymmetric information) and growth opportunities of the firm. RIM decomposes M2B into two components which can be used to measure mispricing independently from the growth opportunities.

Previous researchers have used insiders trading and M2B to measure the level of mispricing and they were found to be noisy or overlapping interpretations with other measures. Residual Income Model (RIM) based on Ohlson (1991, 1995) is used lately to measure market timing. RIM is a fundamental valuation method which determines the value of a firm by calculating the present value of the future abnormal earnings (intrinsic value). Lee, Myers, and Swaminathan (1999) use RIM and show that it is a better predictor of variation in future returns. Elliott et al. (2006) and other researchers have used this model to measure the effect of equity misvaluation in various corporate financing decisions.

RIM model is more sensitive to measurement biases due to conservative accounting. That is, “book value tends to be negatively biased while future residual income can either be positively or negatively biased. Choi et al. (2006) further suggest that the negatively biased estimates from the RIM model as documented by Dechow et al. (1999) is perhaps driven by conservative accounting”. Even after adjusting for the effect of conservative accounting, the model performance improves in terms of bias but not accuracy. This still leaves an open question regarding the accuracy of RIM.

There is a multitude of literature in accounting and finance in the area of earnings quality and earnings management, looking at different financing activities of the firm and their relationship to the corporate activities. Both determinants and the consequences are listed in by

Dechow et al., (2010) in their summary of literature in earnings quality area, most of these studies examine if firms are interested in economic incentives and thus as a result manage their earnings and at the same time the consequences of firms managing their earnings. All the corporate financing and investing activities were reviewed and the proxies used in all the studies were summarized.

Earnings quality has been used in the literature many times. Teoh, Welch, and Wong, (1998) examine accruals around SEO. Sloan, (1996) show that overvaluing of low earnings quality firms is corrected over time, Penman and Zhang, (2002), Dechow and Schrand, (2004) and Melumand and Nissim, (2009) show that earnings quality predicts the future sustainable persistent earnings. The effect of earnings quality on financing and investment activities like SEO (Rangan 1998), stock repurchases (Hribar et al., 2006); IPO, Insider trading (Aboody et al., 2005), stock returns (Chan et al., 2001) and return volatility (Chen et al., 2008) were extensively studied. This line of research consistently concludes that poor earning quality leads to

Earnings quality increases with the level of information asymmetry between the investors and managers. Trueman and Titman, (1988) conclude that the information asymmetry between management and investors is a required for managing earnings, because shareholders have less information about firm's performance and future prospects if they have less information than management. In such case, management can use its accounting discretion to manage reported earnings thus managing the quality of the earnings. In addition management's discretionary ability to manage earnings increases as the information asymmetry between management and shareholders increases. Richardson, (1998) provides empirical evidence consistent with Trueman and Titman. He concludes that the quality of the earnings as measured by bid-ask spread and analysts earnings forecast variance is directly related to the level of information asymmetry.

Lobo and Zhou, (2001) find that disclosure is negatively related to earnings quality. Firms that disclose less tend to engage more in earnings management and vice versa. As corporate disclosure is negatively related to information asymmetry, this provides indirect evidence on the relationship between information asymmetry and earnings quality. The information asymmetry in the corporate financings activities creates an opportunity for management to engage in earnings management thus reducing the quality of earnings.

Teoh, Welch and Wong, (1998) find that earnings management is related to the underperformance of SEOs. “They find that the annual growth in issuers’ asset-scaled net income significantly exceeds that of matched non-issuers”. Using quarterly data, Rangan, (1998) finds that “earnings management is most significant in the quarter in which the offering is announced and in the following quarter”. Thus showing evidence that firms actively manage earnings two quarters before.

Lee and Masulis, (2009) propose to use accounting information quality measures to measure the information asymmetry between managers and outside investors. They show that poor quality of the accounting information increases the overall floatation cost of SEO issues as a result of larger underwriting costs.

Extending this line of research Biddle et al., (2006, 2009) show that higher earnings quality increases the investment efficiency by reducing the externalities like moral hazard and adverse selection which tend to reduce the investment efficiency. They also study the relationship between earnings quality and investment efficiency in a country level study and conclude that higher earnings quality reduced information asymmetry between managers and investors and this result is pronounced when creditors are supplying capital.

## 2.3 Data and Methodology

The earlier studies of earnings quality use discretionary accruals as a proxy. In a summary of literature documented by Dechow, Ge, and Schrand, (2010) discretionary accruals was the proxy most used in about 350 in the area. Accruals are accounting entries used to adjust the operating cash flows when calculating the accounting earnings of a firm, while discretionary accruals are the part of these accruals which are made solely on the managers own discretion. While accounting earnings are the most used measure of a firm's performance, the discretionary nature of some accruals will induce measurement errors, thus the quality of the accruals is used in the same context as earnings quality. Discretionary accruals can both increase or decrease as they can be used by manger to hide poor performance or use current earnings in future (DeFond and Park, 1997). We use four measures of earnings quality (EQ) based on Francis et al. (2005), and Aboody et al. (2005).

First two (EQ1 and EQ2) are based on Dechow et al. (1995), and Dechow, Sloan, and Sweeney (1995), modified jones model. We calculate total accruals as the difference between earnings and operations cash flows. All methods use accounting information and differentiate accruals into nondiscretionary (normal) and discretionary (abnormal) parts. The absolute value of the discretionary accruals (abnormal) is the measure of the earnings quality, the lower absolute value of this indicates higher earnings quality and vice, versa. We follow the Aboody et al., (2005) methodology details to calculate all four EQ measures.

We obtained put selling firms data from Dirk Jenter<sup>3</sup> and used the same filtering procedures. We obtained stock and accounting information from Compustat and CRSP merged

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<sup>3</sup> We acknowledge the data provided by Dirk Jenter from his research paper titled "Security Issue Timing: What do managers know, and when do they know it? JF 2011".

database (CCM). Due to unique requirements of calculating earnings quality measure we ended up with a finally list of 364 unique firm years of put selling issuers.

### 2.3.1 Earnings quality proxies

We calculate all earnings quality proxy measure (EQ1 and EQ2) using data from financial statements from Compustat starting from year 1970.

#### EQ1 based on modified jones model

First we calculate the difference between earnings and operating cash flows as total accruals (TA) for all firms  $j$  in time (year)  $t$  based on the following equation:

$$TA_{j,t} = (\Delta CA_{j,t} - \Delta CL_{j,t} - \Delta CASH_{j,t} + \Delta STDEBT_{j,t} - DEPN_{j,t})$$

Where:

$$\begin{aligned} \Delta CA_{j,t} &= \text{firm } j \text{'s change in current assets (Compustat \#4) in year } t, \\ \Delta CL_{j,t} &= \text{firm } j \text{'s change in current liabilities (Compustat \#5) in year } t, \\ \Delta CASH_{j,t} &= \text{firm } j \text{'s change in cash (Compustat \#1) in year } t, \\ \Delta STDEBT_{j,t} &= \text{firm } j \text{'s change in short-term debt (Compustat \#34) in year } t, \\ DEPN_{j,t} &= \text{firm } j \text{'s depreciation and amortization expense (Compustat \#14) in year } t \end{aligned}$$

We estimate normal accruals (NA) for each firm  $j$  in time  $t$  by using two steps; first we perform industry level (minimum 20 firms) cross-sectional regression for 48 Fama and French's, (1997) industries using equation (1) for all firms in Compustat. Then we use the industry year specific co-efficients from the regression to calculate firm specific normal accruals (NA) for each firm scaling by lagged total assets as shown in equation (2). These normal accruals are the nondiscretionary accruals which are part of the total accruals of the firms and managers have no discretion to change. We use modified jones model and use revenues including accounts

receivables while estimating the cross-section regression but delete them while calculate the firm level normal accruals.

$$\frac{TA_{j,t}}{Assets_{j,t-1}} = k_{1,t} \frac{1}{Assets_{j,t-1}} + k_{2,t} \frac{\Delta Rev_{j,t}}{Assets_{j,t-1}} + k_{3,t} \frac{PPE_{j,t}}{Assets_{j,t-1}} + \varepsilon_{j,t} \quad (1)$$

$$NA_{j,t} = k_{1,t} \frac{1}{Assets_{j,t-1}} + k_{2,t} \frac{\Delta Rev_{j,t} - \Delta AR_{j,t}}{Assets_{j,t-1}} + k_{3,t} \frac{PPE_{j,t}}{Assets_{j,t-1}} + \varepsilon_{j,t} \quad (2)$$

Where:

$\Delta REV_{j,t}$  = firm  $j$ 's change in revenues (Compustat #12) in year  $t$ ,  
 $PPE_{j,t}$  = firm  $j$ 's gross value of property, plant, and equipment (Compustat #7) in year  $t$ ,  
deflated by firm  $j$ 's total assets in year  $t-1$  ( $Assets_{j,t-1}$ , Compustat #6).  
 $AR_{j,t}$  = firm  $j$ 's change in accounts receivable (Compustat #2) in year  $t$ .

Finally we estimate abnormal accruals (AA) for firm  $j$  in time  $t$  using equation (3), where we normal accruals from total accruals resulting in abnormal accruals which are discretionary and up to the managers to use them. The absolute value of the abnormal accruals  $|AA_{j,t}|$  is our first earnings quality proxy (EQ1), the higher value of this variable indicates lower earnings quality for the firm in that year.

$$AA_{j,t} = \frac{TA_{j,t}}{Asset_{j,t-1}} - NA_{j,t} \quad (3)$$

## EQ2 based on modified jones model

Our second earnings quality proxy (EQ2) is calculate similar using modified jones model by estimating abnormal current accruals instead of abnormal accruals. First we calculate total current accruals (TCA) form firm  $j$  at time  $t$  using the following equation:

$$TCA_{j,t} = (\Delta CA_{j,t} - \Delta CL_{j,t} - \Delta CASH_{j,t} + \Delta STDEBT_{j,t})$$

Where:

$$\begin{aligned}\Delta CA_{j,t} &= \text{firm } j\text{'s change in current assets (Compustat \#4) in year } t, \\ \Delta CL_{j,t} &= \text{firm } j\text{'s change in current liabilities (Compustat \#5) in year } t, \\ \Delta CASH_{j,t} &= \text{firm } j\text{'s change in cash (Compustat \#1) in year } t, \\ \Delta STDEBT_{j,t} &= \text{firm } j\text{'s change in short-term debt (Compustat \#34) in year } t,\end{aligned}$$

We estimate normal current accruals (NCA) for each firm  $j$  in time  $t$  by using two steps; first we perform industry level (minimum 20 firms) cross-sectional regression for 48 Fama and French's, (1997) industries using equation (4) for all firms in Compustat. Then we use the industry year specific co-efficients from the regression to calculate firm specific normal accruals (NCA) for each firm scaling by lagged total assets as shown in equation (5). These normal current accruals are the nondiscretionary current accruals which are part of the total current accruals of the firms and managers have no discretion to change. As in first proxy, we use modified jones model and use revenues including accounts receivables while estimating the cross-section regression but delete them while calculate the firm level normal current accruals.

$$\frac{TCA_{j,t}}{Asset_{j,t-1}} = \gamma_{1,r} \frac{1}{Asset_{j,t-1}} + \gamma_{2,r} \frac{\Delta REV_{j,t}}{Asset_{j,t-1}} + U_{j,t} \quad (4)$$

$$NCA_{j,t} = \hat{\gamma}_{1,t} \frac{1}{Asset_{j,t-1}} + \hat{\gamma}_{2,t} \frac{(\Delta REV_{j,t} - \Delta AR_{j,t})}{Asset_{j,t-1}} \quad (5)$$



Where:

$\Delta REV_{j,t}$  = firm  $j$ 's change in revenues (Compustat #12) in year  $t$ ,  
 $PPE_{j,t}$  = firm  $j$ 's gross value of property, plant, and equipment (Compustat #7) in year  $t$ ,  
deflated by firm  $j$ 's total assets in year  $t-1$  ( $Assets_{j,t-1}$ , Compustat #6).  
 $AR_{j,t}$  = firm  $j$ 's change in accounts receivable (Compustat #2) in year  $t$ .

Finally we estimate abnormal current accruals (ACA) for firm  $j$  in time  $t$  using equation (6), where we normal accruals from total accruals resulting in abnormal accruals which are discretionary and up to the managers to use them. The absolute value of the abnormal accruals  $|ACA_{j,t}|$  is our first earnings quality proxy (EQ2), the higher value of this variable indicates lower earnings quality for the firm in that year.

$$ACA_{j,t} = \frac{TCA_{j,t}}{Asset_{j,t-1}} - NCA_{j,t} \quad (6)$$

### 2.3.2 Residual Income Model

The initial data for calculating RIM is obtained from CCM from 1970 – 2009 excluding utilities and financials and –ve book value firms. The RIM calculation requires that we only keep firms that survived at least 4 years. We divide firms into industry classification based on Fama and French 48 industries. The cost of capital is calculated based on Lee, Myers, and Swaminathan (1999) method using short-term T-Bill rates.

Using RIM we calculate the intrinsic value per share of the firm based on the future abnormal earnings (V0), this is scaled by the firm's market value for share (P).

$$V_0 = B_0 + \sum_{i=1}^T (1+r)^{-i} E_0 [X_i - r * B_{i-1}] + \frac{(1+r)^{-T}}{r} TV$$

$$TV = E_0 [(X_T - r * B_{T-1}) + (X_{T+1} - r * B_T)]/2$$

$$VP_0 = V_0/P_0$$

VP0 is the misvaluation at time=0,  $V_0$  is the intrinsic value of the stock at time=0, and  $P_0$  is the market price of the stock at time=0.  $VP > 1$  indicates undervaluation of the stock and  $VP < 1$  indicates overvaluation.

### 2.3.3 Sample

Table 2.1 reports sample frequencies showing the distribution of unique firms selling put options in a given year and in Panel B number of firms in the top 5 Fama, French 48 industrial groups. The result show that put selling activity is at its peak in year 2000 and the percentage of overall firms is relatively small at 0.555%. Computer and Software industry was the biggest and followed by Electronic Equipment industry; these two are high growth industries in that time frame between 1991 and 2004.

Table 2.1: Sample

This table presents the number of sample firms engaged in put selling and total CCM firms for which data is available by year (Panel A) and by Fama and French 49 industry (Panel B). We only report industries which are top 5 in selling put options.

	Sample	CCM	%
<i>A. Firm distribution by year</i>			
1991	1	3,609	0.027
1992	3	3,932	0.076
1993	6	4,838	0.124
1994	12	5,285	0.227
1995	13	5,340	0.243
1996	12	5,607	0.214
1997	16	5,515	0.290
1998	18	5,105	0.352
1999	21	4,916	0.427
2000	25	4,504	0.555
2001	22	3,786	0.581
2002	13	3,878	0.335
2003	4	4,029	0.099
2004	2	4,262	0.046
	168	64,606	
<i>B. Firm distribution by industry</i>			
Industry# - Industry Name			
36 – Computer Software	26	4,162	0.624
37 – Electronic Equipment	18	3,919	0.459
44 – Restaurants, Hotels and Motels	14	1,447	0.967
13 – Pharmaceutical Products	10	1,863	0.536
14 – Chemicals	9	1,374	0.655

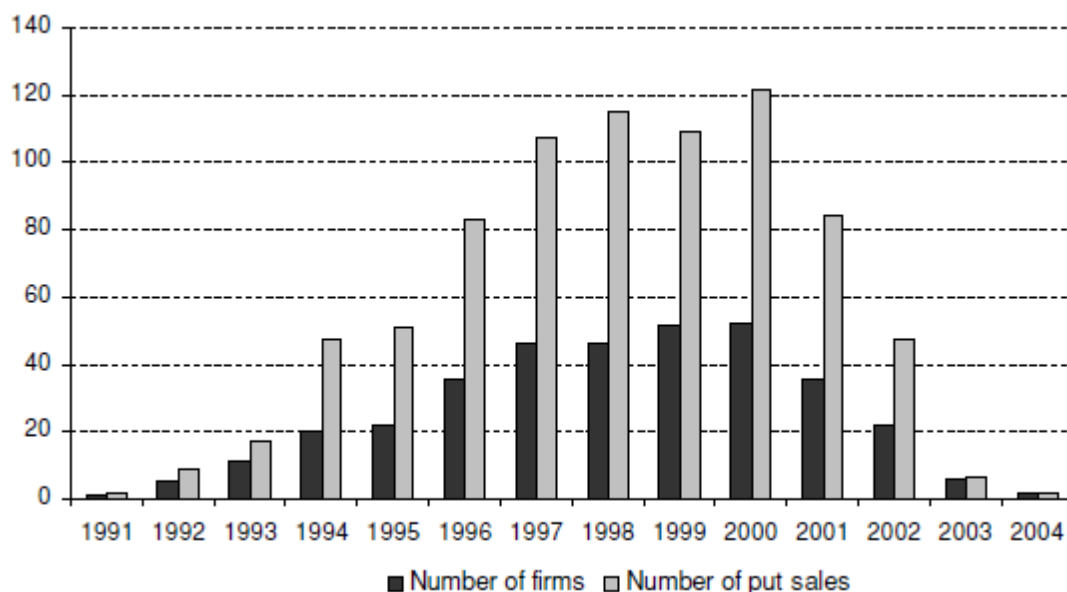


Figure 2.1: Put Option Sample firms

\*\* Put Option Sales data is provided by Dr. Jenter

## 2.4 Analysis and Results

### 2.4.1 Descriptive Statistics

Table 2.2 reports firm characteristics of firms selling put options and average of top 3 matching firms based on Wurgler and Zhuravskaya, 2002 methodology. Table 2.3 reports similar data but comparing put selling sample to all firm CCM. On average the put selling firms are much bigger than the matching firms and CCM firms. For example average size as measured by market capitalization for POS firms is \$20B, for matching firms its \$9.5B and for all CCM firms its \$3B. Put issuers have much higher book equity and market to book ratio as compared to matching firms (slightly behind) and CCM firms (far behind), indicating that these firms are growing much faster than and bigger in size at the same time.

Table 2.2: Summary Statistics of Matching firms

This table presents the Univariate characteristics for put selling firms during the 1991 to 2004 sample period compared to matching firms (top 3) in the same time period based on industry (Fama French 49 industries), then on ranking quintiles of smallest absolute difference of size (market cap), and smallest absolute difference of market to book based on Wurgler and Zhuravskaya, 2002. From CCM we get total assets (AT, in \$mln.), total common equity (CEQ, in \$mln.), cash (CHE, in \$mln.), income before extraordinary items (IB, in \$mln.), capital expenditure (CAPX, in \$mln.), common shares outstanding (CSHO, in mln.), size (PRCC\_F \* CSHO), book equity (AT-LT-PSTKL+TXDITC+DCVT), market-to-book ((AT – book equity + size)/AT), R & D (XRD, \$mln.), sales (SALE, in \$mln.), ROA (NI / lag(AT)), ROE (NI / lag(CEQ)), stock return ((PRCC\_F / lag(PRCC\_F)) -1), and book leverage ((1-(CEQ/AT)).

	Sample firms			Matching firms			Difference	
	Mean	Median	SD	Mean	Median	SD	Mean	Median
<i>Financial characteristics</i>								
Total Assets (AT)	35,108.00	2,917.00	11,7807.00	30,629.00	1,770.00	117,055.00	4.00***	2.69***
Total Equity (CEQ)	4,700.00	1,131.00	8,562.00	2,852.00	808.00	5,717.00	3.66***	3.05**
Cash (CHE)	5,476.00	308.00	21,016.00	4,370.00	138.00	23,331.00	3.68***	3.76
Income Before Ext. Items (IB)	1,004.00	226.00	1,745.00	487.00	125.00	828.00	5.52***	4.11***
Capital Expenditure (CAPX)	639.00	157.00	976.00	301.00	86.00	569.00	4.53***	2.27**
Shares Outstanding (CSHO)	385.00	153.00	567.00	226.00	90.00	412.00	4.39***	2.87***
Size	20,456.00	5,737.00	37,394.00	9,582.00	3,137.00	18,283.00	4.47***	3.40***
Book Equity	5,106.00	1,257.00	8,808.00	3,150.00	852.00	6,231.00	3.78***	2.52***
Market to Book	2.95	2.13	2.39	2.75	2.02	2.65	1.20	0.91
R & D	266.00	33.00	646.00	135.00	3.5	515.00	2.76***	1.62*
Sales	8,660.00	2,383.00	13,222.00	6,160.00	1,602.00	11,162.00	3.79***	2.34***
ROA	0.12	0.09	0.12	0.26	0.09	4.57	1.49*	0.65
ROE	0.33	0.20	0.76	0.47	0.19	6.77	1.98**	1.18
Stock Return	0.06	0.007	0.44	0.58	0.03	4.98	-1.21	-0.96
Book Leverage	0.55	0.54	0.22	0.51	0.50	0.22	1.45*	1.45**

Table 2.3: Summary Statistics of Sample firms

This table presents the Univariate characteristics for put selling firms during the 1991 to 2004 sample period compared to CCM firms in the same time period. From CCM we get total assets (AT, in \$mln.), total common equity (CEQ, in \$mln.), cash (CHE, in \$mln.), income before extraordinary items (IB, in \$mln.), capital expenditure (CAPX, in \$mln.), common shares outstanding (CSHO, in mln.), size (PRCC\_F \* CSHO), book equity (AT-LT-PSTKL+TXDITC+DCVT), market-to-book ((AT – book equity + size)/AT), R & D (XRD, \$mln.), sales (SALE, in \$mln.), ROA (NI / lag(AT)), ROE (NI / lag(CEQ)), stock return ((PRCC\_F / lag(PRCC\_F)) -1), and book leverage ((1-(CEQ/AT))).

	Sample firms			CCM firms			Difference	
	Mean	Median	SD	Mean	Median	SD	Mean	Median
<i>Financial characteristics</i>								
Total Assets (AT)	35,108.00	2,917.00	11,7807.00	6,692.00	379.00	53,527.00	13.47***	11.58***
Total Equity (CEQ)	4,700.00	1,131.00	8,562.00	1,132.00	129.00	4,753.00	14.89***	14.90***
Cash (CHE)	5,476.00	308.00	21,016.00	671.00	23.00	8,154.00	13.11***	10.19***
Income Before Ext. Items (IB)	1,004.00	226.00	1,745.00	170.00	14.00	828.00	16.56***	12.82***
Capital Expenditure (CAPX)	639.00	157.00	976.00	176.00	10.00	929.00	14.38***	14.38***
Shares Outstanding (CSHO)	385.00	153.00	567.00	86.00	16.00	335.00	16.32***	16.31***
Size	20,456.00	5,737.00	37,394.00	3,070.00	266.00	13,642.00	16.88***	16.88***
Book Equity	5,106.00	1,257.00	8,808.00	1,317.00	139.00	5,539.00	14.99***	14.99***
Market to Book	2.95	2.13	2.39	1.84	1.26	2.72	10.38***	10.37***
R & D	266.00	33.00	646.00	40.00	0.00	316.00	10.01***	10.01***
Sales	8,660.00	2,383.00	13,222.00	2,318.00	211.00	10,203.00	15.27***	15.26***
ROA	0.12	0.09	0.12	0.16	0.05	2.61	7.99***	7.99***
ROE	0.33	0.20	0.76	0.46	0.13	9.58	8.58***	8.58***
Stock Return	0.06	0.007	0.44	0.40	0.04	6.76	-1.10	-1.10
Book Leverage	0.55	0.54	0.22	0.55	0.56	0.25	-0.49	-0.50

Table 2.4: Univariate analysis: Earnings Quality

This table reports the results of summary statistics for EQ1 and EQ2 (both using modified Jones model). EQ1 is the absolute abnormal total accruals and EQ2 is the absolute abnormal current accruals. The detailed descriptions of the calculation for both measures are reported in Data and Methodology section of the paper. Panel A reports the total firms from CCM which have observations to calculate earnings quality. There are total 74898 firm year observations to both EQ1 and EQ2 are calculated. Panel B is subset of POS firms where there are 364 firm year observations. Panel C are the top 3 matching firms based on Wurgler and Zhuravskaya, 2002.

Test / Measure	Mean	Median	Standard Deviation	Q1	Q2
Panel A: All firms in CCM					
Size (74898 firm years)					
Univariate: EQ1	0.105	0.0657	0.178	0.03	0.123
Univariate: EQ2	0.075	0.039	0.118		
Panel B: POS Firms					
Size (364 firm years)					
Univariate: EQ1	0.089	0.067	0.086	0.036	0.115
Univariate: EQ2	0.049	0.029	0.066	0.012	0.061
Panel C: POS Matching Firms					
Size (1092 firm years)					
Univariate: EQ1	0.092	0.066	0.105	0.036	0.112
Univariate: EQ2	0.054	0.031	0.077	0.013	0.063

### 2.4.2 Univariate Analysis

Table 2.4 reports Univariate test results of the two main measures of earning quality (EQ1 and EQ2) for all CCM firms (Panel A), POS firms (Panel B), and average of top 3 matching firms (Panel C). Both EQ1 and EQ2 earnings quality measures for the put selling firms (EQ1 = 0.89 and EQ2 = 0.049) are lower when compared to matching firms (EQ1 = 0.92 and EQ2 = 0.054) and similarly much lower when compared to all firms in CCM. This lower value of the measure indicated High Earnings Quality of the POS firms, thus supporting our main proposition that put selling firms by exhibiting high earnings quality support market timing as the main motive for the selling of these options.

Table 2.5 shows some preliminary results indicating that quality of the earning in the quarter immediately following the quarter in which puts were sold are decreasing this observations consistent with Rangan (1998), but it need further evaluation by increasing the number of quarters the analysis is performed around the event from (-4 to +3).



Table 2.5: Earnings Quality: Quarterly

This table reports the results of summary statistics for EQ1 calculated quarterly (using modified Jones model). EQ1 is the absolute abnormal total accruals. The detailed descriptions of the calculation for both measures are reported in Data and Methodology section of the paper. Panel A reports mean and median EQ1 observations for Quarter 0 (quarter in which firm sold put options) and Quarter 1 is the immediate following quarter.

Test / Measure	Mean	Median
Panel A: POS Firms		
Size (1483 firm years)		
Univariate: EQ1 – Quarter 0	0.0417	0.268
Univariate: EQ1 – Quarter 1	0.0436	0.261

### 2.4.3 Market timing Analysis

Table 2.6 reports the final analysis and results using RIM. VP0 is calculated based on estimating the present value and dividing it by current market price of the stock as discussed in the data and methodology section. Panel A results show that POS sample mean VP0 is 0.75 as compared to 0.72 for top 3 matching firms and Wilcoxon test shows the z-value of -2.03 is significant at 5% level. This indicates that POS firms are undervalued as compared to matching firms. The median adjusted VP0 as measured by  $\log((1-\text{median})+\text{mean})$  results in 0.239 for sample firms and 0.1397 clearly indicating that POS firms are undervalued as compared to matching firm.

This is consistent with our earnings quality results, in both instances the results support our hypothesis that market timing is the main motive for the firms selling put options and it is consistent with the main findings of Jenter, Lewellen, and Warner (2011).

Table 2.6: Market Timing: Residual Income Model

This table reports the results of Mispricing (VP0) which is measured as  $(EV0 / P0)$ , where EV0 is firm's equity at time 0, and P0 is the market price at the end of the year. In calculating EV0, the cost of equity is calculated based on 3 month T-bill and the procedure used in Lee, Myers, and Swaminathan, 1999 (LMS), and based on Fama and French, 1997 using both 3 factors (FF3F) and one factor (FF1F). Sample independence of VP0 is determined by using Wilcoxon-Mann-Whitney test, additionally a t-test was also used for the sample independence. The values of the Match firms (VP0) indicate the results by averaging the VP0 for 3 matching firms for each sample firm. Statistical significance at the 10%, 5%, and 1% levels is indicated by \*, \*\*, \*\*\*, respectively.

Test / Measure	Sample (VP0)	Match (VP0) (top match)	t-test (pooled) (p-value)	Wilcoxon- Mann-Whitney test (p-value)	
Panel A: Cost of Equity based on LMS					
Univariate: Size	672	672			
Univariate: Mean	0.75	0.72 (.50)	T = 0.24 (0.8130) T = 1.51 (.1300)	Z = -2.03** (0.0213) Z=1.38* (0.0834)	(Top 3 Match Avg)  (Top Match)
Univariate: Median	0.48	0.57 (.45)			
Panel B: Cost of Equity based on FF3F					
Univariate: Size	672	672			
Univariate: Mean	0.42	0.44	T = -0.80 (0.4231)	Z = 2.07** (0.0193)	
Univariate: Median	0.36	0.36			
Panel C: Cost of Equity based on FF1F					
Univariate: Size	672	672			
Univariate: Mean	0.59	0.61	T = -0.48 (0.6322)	Z = 1.51* (0.0662)	
Univariate: Median	0.45	0.49			

Table 2.7: Market Timing: Book Value

This table reports the results of book-to-value (bv0) which is measured as (AT\_CSHO / EV0), where EV0 is firm's equity at time 0, and AT\_CSHO total assets scaled to common shares outstanding. In calculating EV0, the cost of equity is calculated based on 3 month T-bill and the procedure used in Lee, Myers, and Swaminathan, 1999 (LMS), and based on Fama and French, 1997 using both 3 factors (FF3F) and one factor (FF1F). Sample independence of VP0 is determined by using Wilcoxon-Mann-Whitney test, additionally a t-test was also used for the sample independence. The values of the Match firms (bv0) indicate the results by averaging the bv0 for 3 matching firms for each sample firm. Statistical significance at the 10%, 5%, and 1% levels is indicated by \*, \*\*, \*\*\*, respectively.

Test / Measure	Sample (bv0)	Match (bv0) (top match)	t-test (pooled) (p-value)	Wilcoxon- Mann-Whitney test (p-value)	
Panel A: Cost of Equity based on LMS					
Univariate: Size	672	672			
Univariate: Mean	3.32	2.42 (2.96)	T = 1.75* (0.080)	Z = 0.021 (0.4916)	(Top 3 Match Avg)
			T = 0.29 (0.7719)	Z=-0.31 (0.378)	(Top Match)
Univariate: Median	1.21	1.05 (1.08)			
Panel B: Cost of Equity based on FF3F					
Univariate: Size	672	672			
Univariate: Mean	2.84	5.78	T = -2.83** (0.0047)	Z = -3.72*** (0.0001)	
Univariate: Median	1.66	1.90			
Panel C: Cost of Equity based on FF1F					
Univariate: Size	672	672			
Univariate: Mean	2.29	0.77	T = -0.62 (0.5367)	Z = -3.47*** (0.0003)	
Univariate: Median	1.29	1.54			

VP0 (Mispricing) was lower for sample firms as compared to match firms in two of the methods (panel B and C: using FF3F and FF1F to calculate COE), it was higher in Panel A when the COE was calculated using Lee, Myers, and Swaminathan. This leads to the conclusion that Match firm were more mispriced as compared to sample firms who are selling put options in at least two of the three methods used to calculate COE.

The main hypothesis was that the firms selling put options are relatively more mispriced (undervalued) as compared to matching firms. This is supported in Panel A where the COE was calculated based on LMS method and more so when the matching firm was the top matching firm as compared to average of top 3 firms. An additional issue was that value of VP0 (range: .75 to .42) for different methods is very low and you were mentioning that it should be close to 1. I ran additional test to validate my coding to make sure I am calculating things correctly. These results are shown in the last page of the document in Table 7. VP0 for S&P 500 large companies is .90 indicating my code does not have major problems. In addition when ran the same code for same sample but extending the time frame to 2008, VP0 dropped to .71 thus indicating these is time varying effect.

Table 2.7 shows bv0 (Book-to-Value) representing growth opportunities. Similar panels were run as in table 3. In panel A, the sample bv0 is higher than the match firms indicating the sample firms have higher growth opportunities. Panel C was consistent with A, but Panel B reversed.

Table 2.7 shows the results of repurchase calculations for the sample and match firms. Since the POS firms are doing it along with repurchases, the sample firms should be having higher repurchase activity (higher –ve numbers). The results in the table are consistent with this except for the mean repurchased in t0 year.

## **2.5 Conclusion**

Our results show that due to information asymmetry, managers can profit by timing the market based on the knowledge of earnings quality level (low/high), thus effectively timing the market in case of firms selling put options. The market timing explanation for the put selling activity is further affirmed by using the best available valuation model RIM. This additional result show that put selling firms on average are relatively undervalued as compared to similar matching firms.

Preliminary results using quarterly earnings quality analysis (EQ1) shows that there is an increase in absolute value of EQ1 from 0.0417 to 0.0436, indicating the earnings quality decreased in the quarter immediately following quarter in which put options were sold. We need to further investigate additional quarters (-4 to +3) before and after the put sale for each firm to further understand if the managers are maintaining high earnings quality just when they decide to engage in put selling activity or if is persistent sustainable phenomena.

## **Chapter 3: Earnings Quality: A case of Hedging Strategies by US Airlines**

Historically jet fuel prices have fluctuated heavily, specifically over the past few years which significantly affected the US Airlines ability to maintain consistent positive cash flows. The companies used several hedging and abnormal hedging strategies to navigate these volatile periods. We analyze these strategies employed by dichotomizing them into pure hedge positions and abnormal hedging positions and calculate the effect around implementing FASB #133 / IASB #39 on firm value among other variables in each case and identify behaviors leading to these decisions.

### **3.1 Introduction**

Historically Crude Oil prices have been highly volatile due to the supply limitations and demand explosion as the world economies are growing. A large component of the airline industry cost structure is jet fuel. A recent article in the Wall Street Journal describes the difficulties faced by the airline industry due to a steep rise in oil prices to \$147 per barrel in mid 2008 and the subsequent steep drop due to the financial crisis to around \$40 per barrel in early 2009. For many years the fluctuation in jet fuel prices has created cash flow problems. For airlines, fuel cost is the second largest operating expense, increasing from about 13% in 2003 to about 29.4% in 2009; a 125% increase. Since over-the counter derivatives on jet fuel are very illiquid and expensive, airlines generally use the more liquid futures on crude.

FCIC (Financial Crisis Inquiry Commission) hearing considers modifying regulations related to hedging as a part of broader financial regulations. This research provides an insight into potential effects of these regulations on companies.

The main goal of this paper is to analyze the before and after effects of implementing FASB #133 and the related IASB #39 regulation regarding hedging activities on the Firm Value. Companies using derivatives as part of their day to day strategy are significantly affected by this regulation. Airlines use derivatives (options, futures and swaps) to hedge against variation caused by the fluctuation in crude oil prices as on average 15-20% of their operating expenses are due to purchase of the fuel. We propose that an increase in firm value after change in regulations will allow airlines to reduce their hedging activity which is not their core business.

FASB #1334 was made mandatory for the firms using any kind of buying and selling derivatives in 2000. Before the regulation, companies reported hedging activities on their income statement when they actually exercised them; that created higher volatility in net cash flow depending on the loss or gain from closing hedging position. The regulation requires companies to report the fair value of the derivatives on their balance sheet on an ongoing basis, thus potentially reducing volatility on the income statement.

Our research extends literature by analyzing the dichotomy of normal hedging versus abnormal hedging by the airline industry and the effect on the firms' value during the special periods when new regulations affecting the industry are implemented; the prices are volatile, as in the current financial crisis. Based on prior literature, we use Tobin's Q as a proxy for firm value.

Typical hedging strategies used by airlines range from 0% hedging to 100% hedging in static and dynamic time periods, using combination of derivatives (e.g. selling 12-month forward futures, selective 3-month forward futures, selling forward in backwardized markets, puts,

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<sup>4</sup> "FASB require companies to measure some assets and liabilities on their [balance sheet](#) at "[fair value](#)". This standard was created in response to significant [hedging](#) losses involving derivatives years ago and the attempt to control and manage corporate hedging as risk management not earnings management."

selling options, bear spread, straddle, strangle, collars and hedging by condition: backwardized and contango markets).

Froot et al. (1993) developed a theoretical explanation for hedging. They suggest that firm's investment opportunities are valuable; the firm uses derivatives to increase their ability to fund investments during peaks in input prices.

Typically, firms hedge to reduce the volatility or variance of a firm value by either increasing the expected future cash flows or reducing the risk. Some firms use hedging derivative positions for abnormal purposes beyond risk management to enhance future cash flows instead of merely smoothing their cash flows. We explore the temporal variation in the use of crude oil derivatives by airlines around new regulation implementation. In theory, hedging attempts to lower uncertainty around future price and thereby smooth earnings. Abnormal hedging involves taking a position with expectation that the price will move in a particular direction, and possibly increase the volatility of earnings. The airline industry claims to prefer hedging and not abnormal hedging. For example:

United Airlines purchased fuel caps averaging around \$111 per barrel for 2008 and \$118 for 2009; given the precipitous fall in oil prices they will be paying more for oil than the market price, due to the established contracts. Is this just bad timing or abnormal hedging? Southwest continuously hedges and considers it as their fiduciary responsibility. According to Reuter's article on March 2008, United Airlines hedged 15% of 1Q 2008 fuel needs, Continental 20%, Delta 26%, Northwest 18%, Southwest 75%, and American 24% which is only year-over-year increase for the above airlines.

There has been a significant amount of research across many industries regarding the consequences of different hedging strategies to firm value. Specifically Allayannis and Weston



(2001) show that hedging is positively related to the firm value as measured by Tobin's Q value, and that a very significant percentage of the benefits from hedging occur due to reduction in underinvestment. Carter et al. (2006) show that hedging activities add value to a firm, and also identify and quantify sources of these benefits.

The rest of the paper is organized as follows: Section 2 reviews the prior literature, Section 3 describes the data and methodology, Section 4 describes the analysis and presents the results, and Section 5 offers conclusions.

### **3.2 Literature**

In general firms manage their strategic risk, operational risk, and financial risk. Shareholder value maximization hypothesis concludes that firms engage in risk management activities like hedging to reduce costs of financial distress, to reduce taxes, and to minimize underinvestment scenarios. Whereas, Managerial risk aversion hypothesis states that managers will try to maximize their wealth using risk management strategies if their interests are not directly aligned with that of shareholders.

Allayannis and Weston (2001) show that "airlines hedge primarily to reduce costs of financial distress and underinvestment". They also show that there is a positive relationship between currency derivatives and relative market value of the firms. Froot et al. (1993) show how hedging can create consistent cash flows under financial constraints, these internal funds can enhance firm value by eliminating underinvestment problem.

Lin et al. (2008) show main theories based on investor's decisions in relation to hedging and leverage (financial distress costs), hedging and investment (underinvestment issues),

investment and leverage (agency issues related to capital structure). They conclude that all the above combinations provide mixed support for Modigliani and Miller (1958) irrelevance theory. They conclude that if all three decisions are taken together there is a positive relationship between hedging and leverage in the absence of agency issues, specifically between debt and hedging even in the absence of tax benefits. Ross (1996) has similar results but he explains them by tax benefits as the main reason.

Carter et al. (2006) show effect on firm value due to individual hedging policy in an investment and financing scenarios; they use Froot et al. (1993) results stating that “costly external financing is a market imperfection that makes hedging a value-enhancing strategy”. The airline industry is a good candidate for the underinvestment rationale for hedging. An underinvestment problem occurs when the external financing becomes relatively expensive and the internal funds availability is not enough to undertake positive NPV projects. In this scenario, firms either reduce investing in the profitable projects or undertake risk management strategies like hedging to ensure that the funds are available to engage in positive NPV projects.

### **3.2.1 Hedging in airline industry**

Pulvino (1998, 1999) show that “airlines face significant distress costs and the financially stronger airlines can buy aircraft at discounted prices”. Kim and Singal (1993) show that the above scenario leads to a higher price charged by the airlines. Airlines can hedge to avoid selling their assets at bargain prices, thus reducing expected financial distress as mentioned by Smith and Stulz (1985).

Weiss and Maher (2008) show that airlines are effectively using operational hedging strategies like fleet diversity and fuel efficient fleet along with derivatives to manage the impact

of volatility in jet fuel prices, but using financial instruments proved to be less effective when compared to operational hedging.

### **3.2.2 Disclosure and Firm Value**

Research shows that disclosure is positively related to the financial leverage, and current capital structure, specifically debt levels (Jensen and Meckling 1976). Lang and Lundholm (1993) and Miller (2002) show that higher disclosure is positively and significantly related to higher firm value and better performance.

## **3.3 Data and Methodology**

Data was collected for airline industry (SIC code 4512) with available financial data in the COMPUSTAT database as of December 2008, and Value Line reports. We also collected data on revenues, available seat miles (ASM), market share, firm size and other metrics to calculate airline hedging performance.

Hedging fuel expense related data has been collected from the airline industry firms' 10-K statements filed with SEC. Fiscal year-end is defined as calendar year in which a firm has fuel hedges in place; in addition maximum maturity of the hedge in years, and percentage of next year's fuel requirements hedged was collected as described by Carter et al. (2006). The data was collected around historical oil peaks, occurred between the sample periods 2000-2008.

First we identify determinants of hedging using regression analysis, with % of next year's fuel requirement as Dependent Variable and various financial ratios as Independent Variables as

described by Carter et al. (2006). Next we calculate effect of hedging on firm value by testing the relationship between Tobin's Q used as proxy for firm value, and fuel hedging as described by Allayannis and Weston (2001). In the second regression analysis Tobin's Q is used as Dependent Variable and other financial ratios including the % fuel hedged as Independent Variables. We use normal hedging and abnormal hedging as interaction variables. This part of the analysis provides insight into how a firm value is affected by type of hedging used by the firm.

We expect that the normal hedging firms will increase their firm value consistent with the existing literature whereas abnormal hedging firms will show a decrease in a firm value, specifically in the sample after FASB / IASB regulations came into effect. We have defined two ways to distinguish the normal vs. abnormal hedging variable in Section C (Data) of Data and Methodology.

### 3.3.1 How airlines calculating Hedge Ratios

Airlines use variety of hedging strategies using derivatives to fully hedge or to completely not hedge their fuel requirements. The airlines come up with the hedge ratio they need to use for risk management by typically selling jet fuel and buying futures contracts; one method they use is to calculate the change in value of the hedge position for the contract duration based on Hull (2000).

$$\text{Change in Value} = (\Delta \text{ Jet Fuel Spot Price}) - (H * (\Delta \text{ Futures Contract})) \quad (1)$$

$$H (\text{Hedge Ratio}) = \rho * \frac{\sigma(\text{spot})}{\sigma(\text{futures})} \quad (2)$$

$\rho$  - Correlation between spot jet fuel price and selected future contract  
 $\sigma$  - Standard deviation of contract<sup>5</sup>

The hedge ratio can also be derived by regressing jet fuel as Dependent Variable and contracts as Independent Variable.<sup>6</sup> Airlines which are not hedging will assume the risk of volatility of fuel prices. Some of them will use fuel pass-through agreements or charter agreements, where they pass the fuel costs back to the codeshare partner or share a percentage loss by reimbursing or getting back a percentage from the gains with a pre agreed cap on the proceeds.

### **3.3.2 Accounting Artifacts related to FASB #133 / IASB #39**

Hedging airlines typically have a short position in jet fuel and purchase it in the future based on real consumption, this is called “cash flow hedge of a forecasted transaction” by the FASB (Financial Accounting Standards Board) statement #133 as of fiscal year 2000. Derivative purchases must use mark-to-market accounting and be disclosed in a balance sheet. The corresponding journal entry is booked to an “Other Comprehensive Income” account thus directly booked to retained earnings; these entries are finally released in income statement as the transactions happen. The goal is to carry derivatives at market value on a balance sheet without introducing volatility to the income statement using retained earnings account.

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<sup>5</sup> Equations (1) and (2) are derived from a working paper by Richard Cobbs and Alex Wolf, 2004 article “Jet fuel hedging strategies: Options available for airlines and a survey of industry practices.

<sup>6</sup> “AMR assesses, both at the inception of each hedge and on an on-going basis, whether the derivatives that are used in its hedging transactions are highly effective in offsetting changes in cash flows of the hedged items. In doing so, the Company uses a regression model to determine the correlation of the change in prices of the commodities used to hedge jet fuel (e.g. NYMEX Heating oil) to the change in the price of jet fuel. The Company also monitors the actual dollar offset of the hedges’ market values as compared to hypothetical jet fuel hedges. The fuel hedge contracts are generally deemed to be “highly effective” if the R-squared is greater than 80 percent and the dollar offset correlation is within 80 percent to 125 percent. The Company discontinues hedge accounting prospectively if it determines that a derivative is no longer expected to be highly effective as a hedge or if it decides to discontinue the hedging relationship.”

If the forecasts fall short due to over hedging the airline can introduce volatility in the income statements in terms of cash flows falling short. To avoid this uncertainty, airlines commonly do not hedge 100% and will use hedging only up to a level they need for sure, and leave the remaining fuel consumption unhedged. The industry leader Southwest hedges about 75% of their fuel requirements based on the minimum expected use of the fuel they need for next year.

### **3.3.3 Data**

Data on the jet fuel usage and related hedging activities, fuel pass-through agreements, and charter agreements is collected for 10 airline firms, and to be expanded to the other airlines, which are listed in US and file with SEC. In total 72 firm years' data of hedging activities of the 9 airline firms was used in this research (one firm Frontier Airline has to be deleted as it filed for bankruptcy in 2008, and thus the data is not available for the recent periods). This data is collected manually from the 10-K filings from MERGENT electronic database interface to EDGARS filing website.

The information is available under “ITEM 7(A).QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK” as mandated by FASB statement #133 (“Accounting for Derivative Instruments and Hedging Activities”). All of the firms also should be represented in Compustat database between 2000-2008 calendar years and covered by Value Line during the same period, in order to augment the financial data and to collect an expected operating margin which is used in determining the abnormal hedging intent of the hedging programs of the firms.

Table 3.1: Sample

Sample hedging data for SIC codes 4512 and 4513, collected from SEC 10-K filings. Under the new accounting re FASB #133, as of 1/1/2001 all companies have to report the fair value of underlying financial instruments used for risk management. None of the firms in the sample used fuel pass through agreement or charter operations, some of the smaller airlines use these contracts which will affect their level of hedging strategies.

Airline	Jet fuel as a % of Operating Expenses	Years Jet Fuel Hedged	Average % of Next Year Hedged	Std. Dev of Next year Hedged	Fuel Pass- through Agreement	Charter Operations
AirTran	18.84%	2000-2008	29%	8	0	0
Alaska Air	13.92%	2001-2008	36%	16	0	0
American	11.97%	2000-2008	23%	12	0	0
Continental	15.14%	2000-2008	13%	13	0	0
Delta Air	12.20%	2000-2008	37%	23	0	0
Frontier Airlines	15.58%	2002-2008	17%	15	0	0
JetBlue Airlines	16.07%	2002-2008	22%	17	0	0
Southwest Airlines	14.51%	2000-2008	69%	28	0	0
United Airlines	12.30%	2000-2008	10%	12	0	0
US Airways	9.69%	2000-2008	23%	17	0	0
Average	14.02% <sup>7</sup>		28%			

The data in the Table 3.1 is based on the Carter (2006); this data is used to determine the hedge ratio by calculating and recording % of jet fuel requirement for year (t+1) (denoted as HR in the data set). The hedging data is collected over a period of time from 2000 to 2008. The fuel pass-through agreement and charter operations variables have a value of 1 if there is an agreement and 0 otherwise.

The average of “Average % of Next Year Hedged” column is 28%, this indicates that over the sample of 72 firm-years (9 firms \* 8 sample years) the identified airlines hedged 28% of their next year’s fuel requirement. This sample is further reduced to 59, due to unavailability of data in Value Line reports for some firms’ due to external factors like bankruptcy filings. Column four in Table 1 represents Standard Deviation of the previous variable for each firm over the 8 year period. Additional data will be added to this sample to increase the statistical power

<sup>7</sup> Carter et al. (2006)

of the analysis. We propose one way to identify abnormal hedging activities by identifying if a particular firm is increasing or decreasing next year's % of fuel hedged beyond the  $(\text{mean} + (1 * \text{standard deviation}))$ . This is represented by a dummy variable as  $H\_S = 1$  for abnormal hedging, and  $H\_S = 0$  for normal hedge situation in the data set

Value Line is used to collect the data for the expected Operating Margin for next year  $(t+1)$  variable. Next year expected Operating Margin (EOM) increase is compared to the % of jet fuel hedged, if the EOM increased from  $t$  to  $t+1$  years, and correspondingly the % of jet fuel hedged increases, it is considered as normal hedge, in the alternate scenario, it is considered as abnormal hedging (denoted as  $H\_S\_VL = 1$  as abnormal hedging, 0 as normal hedging in the data set).

Table 3.2 shows the summary statistics of the data we collected from 10-K filings and COMPUSTAT for the sample firms. Hedging related  $H\_S$  variable shows that firms speculate in about 27% of times (abnormal hedging), whereas  $H\_S\_VL$  indicates that firms speculate in about 32% of times. Tobin's  $Q$ , LT Debt-to-asset ratio, and  $\ln(\text{Assets})$  are used as Independent Variables to test whether these financial constraints measures are useful in explaining why firms hedge.



Table 3.2: Summary Statistics

Summary statistics for sample data for SIC code 4512, collected from SEC 10-K filings, Compustat and Value Line.

	N	Mean	Std.	Quartile1	Median	Quartile3
Tobin's Q (Firm Value Proxy)	59	0.488	0.514	0.122	0.272	0.874
LT debt- to Assets	59	0.326	0.151	0.232	0.331	0.456
Cash Flow-to-Sales	59	0.109	0.088	0.494	0.091	0.145
Cash-to-Sales	59	0.135	0.122	0.058	0.113	0.162
Tax Loss Carry Forward	59	-14.301	417.610	-0.600	6.700	167.590
Dividend Index (1=yes; 0=no)	59	0.322	0.471	0	0	1
Altman's Z Score	59	1.222	1.041	0.261	1.044	1.930
Hedge Ratio(% of t+1 years fuel hedged)	59	30.309	24.016	14	24	40
Hedge or Abnormal hedging (H_S)	59	0.288	0.457	0	0	1
Hedge or Abnormal hedging ( H_S_VL)	59	0.322	0.471	0	0	1
L T debt-to-Assets	59	8.809	1.247	7.937	9.189	9.938

### 3.4 Analysis and Results

The following hypotheses are proposed to test firm value and related performance around the adoption of FASB / IASB regulations related to derivatives hedging:

**H1:** Firm value decreases due to abnormal hedging after implementing FASB #133 / IASB #39

**H2:** Firm value increases due to normal hedging after implementing FASB #133 / IASB #39

First, we test determinants of jet fuel hedging by airlines using regression analysis:

**Model 1 (OLS):**

*% of Next year's fuel requirements hedged = the independent variables in Table 3.3*

**Model 2 (Logit):**

*H\_S (0/1) = the independent variables in Table 3.3*

**Model 3 (Logit):**

$H\_S\_VL (0/1) = \text{the independent variables in Table 3.3}$

**Model 4 (corrected Model 1 for Heteroscedasticity):**

$\% \text{ of Next year's fuel requirements hedged} = \text{the independent variables in Table 3.3}$

Table 3.3: Determinants of hedging fuel

This table reports the results of regressions explaining the hedging of t+1 year fuel requirements by sample airlines between the years 2000-2008. Model 1 shows the effect of different Independent Variables shown in the table on the Dependent Variable HR (% of t+1 year fuel requirement). Model 2 and 3 shows the effect of different Independent Variables on the Dependent Variable H\_S and H\_S\_VL respectively. Model 4 repeats the Model 1 using White matrix to correct for Heteroscedasticity in the data. Statistical significance at the 10%, 5%, and 1% levels is indicated by \*, \*\*, \*\*\*, respectively.

Variable	Model 1 (p-value)	Model 2 (p-value)	Model 3 (p-value)	Model 4 (White matrix)
Intercept	-3.344 (0.90)	5.796 (0.19)	2.756 (0.41)	
Tobin's Q	28.872*** (0.00)	0.636 (0.66)	0.683 (0.46)	28.872***
LT debt-to-assets	-48.751** (0.02)	-7.523** (0.02)	-0.643 (0.79)	
Cash Flow-to-Sales	63.057 (0.14)	-6.157 (0.34)	-4.462 (0.37)	
Cash-to-Sales	-30.937 (0.26)	-6.910 (0.13)	-0.587 (0.86)	
Tax Loss Carry Forward	-0.007 (0.28)	-0.001 (0.85)	-0.000 (0.57)	
Dividend Indicator	-4.310 (0.60)	1.340 (0.35)	-0.488 (0.60)	
Ln(Total Assets)	3.875 (0.16)	-0.139 (0.74)	-0.155 (0.64)	
Observations used	59	59	59	59
R-square	0.475*** (0.00)			
Adj. R-square	0.403			
Log likelihood		55.753	70.711	

The results from Table 3.3 show that in Model 1, Tobin's Q is positively and significantly related to hedging, which explains increase in hedging by firms with higher value. The variable LT debt-to-assets which identifies debt capacity of a firm is negatively correlated to hedging; indicating that as the debt capacity of a firm decreases the firm tends to increase their

hedging activity. A tax variable, Tax Loss Carry Forward, shows no relationship with hedging activity.

These results are all directionally consistent across Model 1 (continuously hedge variable), Model 2 (abnormal hedging variable), and Model 3 (abnormal hedging variable based on Value Line estimates) for Tobin's Q, LT debt-to-assets, Cash-to-Sales and Tax Loss Carry Forward variables indicating that none of these variables were influential in the firm's decision regarding whether to hedge normally or abnormally.

The second test shows effect of various hedging strategies and behaviors on firm value around the FASB / IASB regulation as measured by Tobin's Q:

***Model 1 (OLS):***

*Tobin's Q = the independent variables in Table 3.4, with HR*

***Model 2 (Logit):***

*Tobin's Q = the independent variables in Table 3.4, with H\_S (0/1)*

***Model 3 (Logit):***

*Tobin's Q = the independent variables in Table 3.4, with H\_S\_VL (0/1)*

***Model 4 (corrected model for Heteroscedasticity):***

*Tobin's Q = the independent variables in Table 3.4*

Table 3.4: Fuel hedging around regulation

This table reports the results of regressions explaining the value of normal hedging and abnormal hedging activities of jet fuel by sample airlines between years 2000-2008. Model 1 shows the effect of different Independent Variables shown in the table on the Dependent Variable  $\ln$  (Tobin's Q) used as proxy for Firm Value. Model 2 (H\_S) and Model 3(H\_S\_VL) shows the effect of different Independent Variables on the Dependent Variable  $\ln$  (Tobin's Q). Model 4 repeats the Model 1 using White matrix to correct for Heteroscedasticity in the data. Statistical significance at the 10%, 5%, and 1% levels is indicated by \*, \*\*, \*\*\*, respectively.

Variable	Model 1 (p-value)	Model 2 (p-value)	Model 3 (p-value)	Model 4 (White matrix)
Intercept	-0.626 (0.49)	0.284 (0.81)	0.260 (0.82)	
Hedging (HR; H_S; H_S_VL)	0.027*** (0.00)	-0.192 (0.50)	-0.328 (0.19)	0.027***
LT debt-to-assets	2.623*** (0.00)	1.579 (0.12)	1.403 (0.14)	2.623**
Cash Flow-to-Sales	6.760*** (0.00)	7.960*** (0.00)	8.082*** (0.00)	6.760***
Cash-to-Sales	1.437 (0.14)	1.523 (0.24)	1.360 (0.29)	
Tax Loss Carry Forward	0.001*** (0.00)	0.000** (0.01)	0.000** (0.02)	0.001***
Dividend Indicator	-0.414 (0.16)	0.384 (0.34)	-0.322 (0.38)	
$\ln$ (Total Assets)	-0.346*** (0.00)	0.117*** (0.00)	-0.339*** (0.00)	
Observations used	59	59	59	59
R-square	0.890*** (0.00)	0.673*** (0.00)	0.681*** (0.00)	
Adj. R-square	0.786	0.628	0.637	

Table 3.4 shows results of hedging jet fuel (both normal and abnormal hedging around regulation implementation) on a firm value as measured by Tobin's Q. The results from Table 3.4 show that in Model 1 (normal hedging), the continuous hedge ratio variable HR is positively and significantly related to Tobin's Q, which explains that firm value increases as the hedge ratio increases. In Model 2 (abnormal hedging) using binary hedge ratio variable HR\_S, and Model 3 (abnormal hedging) using binary hedge ratio variable HR\_S\_VL are negatively and not significantly related to Tobin's Q, which explains that firm value increases as the hedge ratio decreases. Model 2 and Model 3 are contradicting the results of Model 1 as related to the effect of hedging on firm value, one way to explain this is when a firm uses abnormal hedging

strategies they will result in decreased firm value; where else if a firm uses normal hedging strategies they will result in an increase in firm value<sup>8</sup>.

These results are all directionally consistent across Model 1 (normal hedging variable), Model 2 (abnormal hedging variable), and Model 3 (abnormal hedging variable based on Value Line estimates) for all variables except for Hedge Ratio, Dividend Indicator, and Ln (Total Assets) indicating that these variables were influential on firm value irrespective of their hedging strategies, whereas the other Independent Variables are not consistently related to the firm value directionally.

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<sup>8</sup> One of the definitions of normal hedging Vs abnormal hedging is derived from KPMG position paper “Fuel Hedging for the Commercial Airline Industry”, March 2008. They define Abnormal Hedging as “managing dynamic hedge positions while attempting to generate additional profits”. While dynamic hedging is defined as “a rolling-hedge strategy with an actively managed position based on market conditions and portfolio sensitivities”.

### **3.5 Conclusion**

H1: Firm value decreased by 19.2% (the 1<sup>st</sup> model) and 32.8% (the 2<sup>nd</sup> model) abnormal hedging models but not statistically significant

H2: Firm value increased by 2.7 % (significant at 1%) due to normal hedging after implementing FASB #133.

This is directionally consistent with Carter et al, (2006) who show that there is a 5%-10% increase in firm value for the companies who hedge. Observed increase in a firm value for normal hedging after implementing regulations shows that FASB / IASB regulations are effective in reducing volatility in firms Cash Flows, thus reducing the overall need for hedging in case of airlines.

One reason for our results could be that the data set is too small, towards fixing this issue we plan to expand the data set to see if the decrease (3%-13%) is valid for normal hedging activities after FASB #133 / IASB #39. The next step will be to collect 10 years of data prior to 1999, and perform our empirical testing on the full set of data for about 20 years along with 6 international airline data already collected, leading to a final set of 16 airlines. Econometric model line Chow test can be used to test if there is a structural break in explaining performance of the firm.

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## Appendix

### VARIABLES USED IN CALCULATING EARNINGS QUALITY

$$TA_{j,t} = (\Delta CA_{j,t} - \Delta CL_{j,t} - \Delta CASH_{j,t} + \Delta STDEBT_{j,t} - DEPN_{j,t})$$

(Total Accruals for firm j and year t)

$$TCA_{j,t} = (\Delta CA_{j,t} - \Delta CL_{j,t} - \Delta CASH_{j,t} + \Delta STDEBT_{j,t})$$

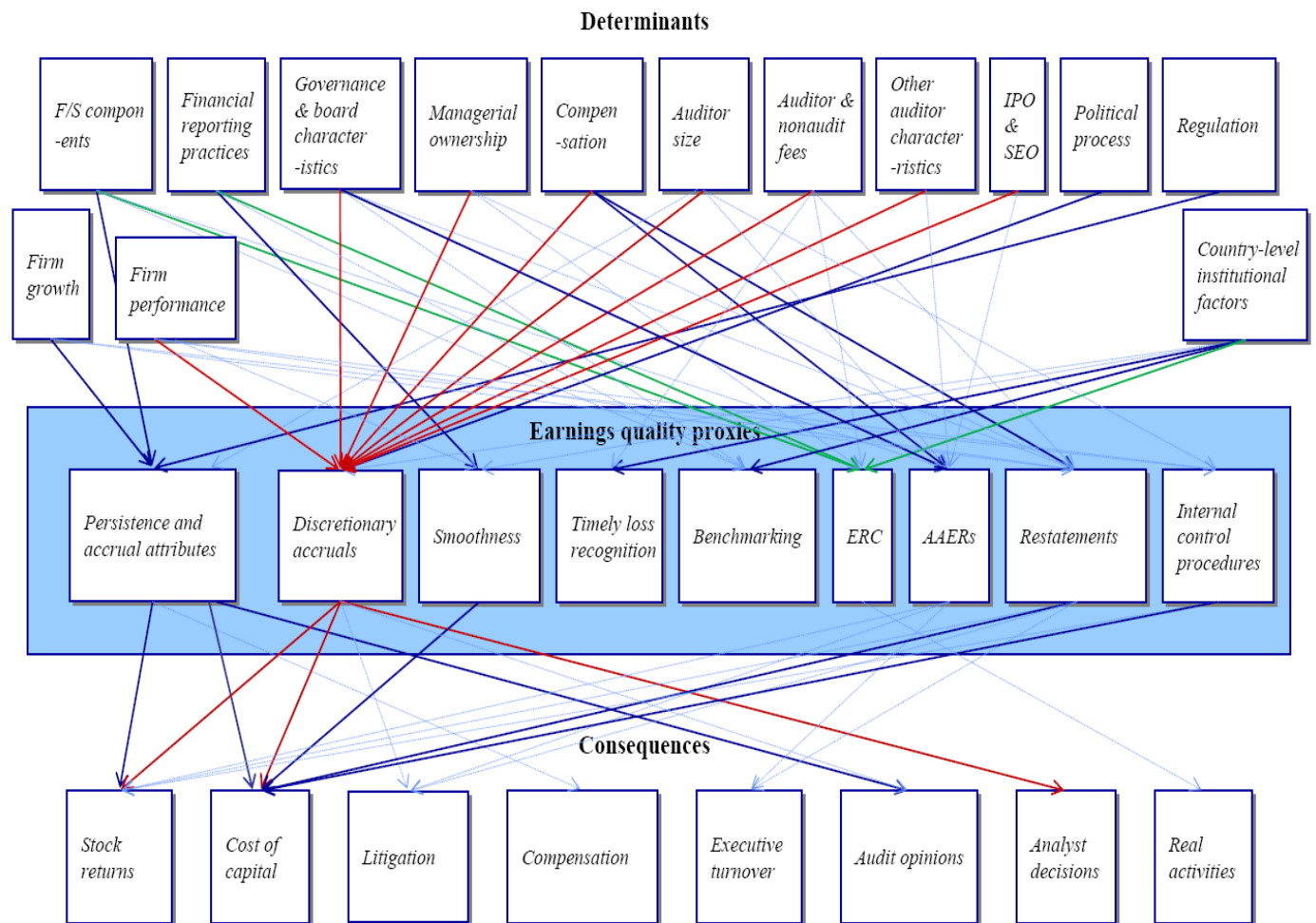
(Total Current Accruals)

$$CFO_{j,t} = NIBE_{j,t} - TA_{j,t}$$

(Cash Flow)

$\Delta CA_{j,t}$  = firm j's change in current assets (Compustat #4) in year t,  
 $\Delta CL_{j,t}$  = firm j's change in current liabilities (Compustat #5) in year t,  
 $\Delta CASH_{j,t}$  = firm j's change in cash (Compustat #1) in year t,  
 $\Delta STDEBT_{j,t}$  = firm j's change in short-term debt (Compustat #34) in year t,  
 $DEPN_{j,t}$  = firm j's depreciation and amortization expense (Compustat #14) in year t, and  
 $NIBE_{j,t}$  = firm j's net income before extraordinary items (Compustat #18) in year t.  
 $\Delta REV_{j,t}$  = firm j's change in revenues (Compustat #12) in year t,  
 $PPE_{j,t}$  = firm j's gross value of property, plant, and equipment (Compustat #7) in year t,  
deflated by firm j's total assets in year t-1 ( $Assets_{j,t-1}$ , Compustat #6).  
 $AR_{j,t}$  = firm j's change in accounts receivable (Compustat #2) in year t.

## EARNINGS QUALITY PROXIES, DECHOW, GE, AND SCHRAND (2009)



## PUT OPTION SALES DATA VARIABLES, DIRK JENTER

<b>company</b>	Company name
<b>ticker</b>	Ticker symbol
<b>filtype</b>	Type of filing: 10-k or 10-q
<b>docdate</b>	Date of the document
<b>fildate</b>	Date the document was filed with the SEC
<b>fyend</b>	Calendar year in which the fiscal year ends
<b>fq</b>	Fiscal quarter
<b>fpend</b>	End of fiscal period (quarter)
<b>permno</b>	CRSP perm number
<b>cfacpr</b>	CRSP adjustment factor
<b>cfacshr</b>	CRSP adjustment factor
<b>initiat</b>	Dummy for put option program initiation
<b>grntnum</b>	Numbers the put sales in this quarter Attempt to link (by hand) put sales to subsequent put exercises and expirations. See
<b>Link</b>	Link1 and Link2 in the exercise and expiration sections
<b>grntdatl</b>	Put sale date - lower bound
<b>grntdath</b>	Put sale date - upper bound
<b>grntd</b>	Modifier to the two put sale date variables: If missing, then the two put sale date variables refer to a month (hence 4/1/2000 means April 2000, NOT the 1st of April 2000). If 1, then the two put sale date variables refer to an exact date (i.e., 4/1/2000 actually means April 1, 2000).
<b>issnum</b>	Number of puts sold Indicator for whether the put sale described by issnum can be pinpointed to a single quarter or not. If more than one quarter has the same xiss number, then the given number of puts was sold in the these quarters combined. Such quarters are also marked by yellow shading.
<b>xiss</b>	
<b>proc</b>	Proceeds from the put sale. Indicator for whether the put sale described by proc can be pinpointed to a single quarter or not. If more than one quarter has the same xpro number, then the given proceeds were earned in the these quarters combined. Such quarters are also marked by yellow shading.
<b>xpro</b>	
<b>issface</b>	Face value of the puts sold. Indicator for whether the put face value described by issface can be pinpointed to a single quarter or not. If more than one quarter has the same xface number, then the given face value was sold in the these quarters combined. Such quarters are also marked by yellow shading.
<b>xface</b>	
<b>isstra</b>	Average strike price of puts sold
<b>isstrl</b>	Lower bound on strike price of puts sold
<b>isstrh</b>	Upper bound on strike price of puts sold
<b>isexpl</b>	Expiration date of puts sold - lower bound
<b>isexph</b>	Expiration date of puts sold - upper bound
<b>issld</b>	Indicator for how precisely we know the lower and upper bound expiration dates (isexpl and isexph): If indicator missing, we only know the month. If indicator = 1, it is a precise date. If indicator=2, we only know the quarter. If indicator=3, we only know the year.
<b>isshd</b>	Indicator for how precisely we know the lower and upper bound expiration dates (isexpl and isexph): If indicator missing, we only know the month. If indicator = 1, it is a precise date. If indicator=2, we only know the quarter. If indicator=3, we only know the year.
<b>outnum</b>	Number of puts outstanding at end of quarter. If 9999, we know that puts are outstanding, but don't know the number. If 8888, we suspect that puts are outstanding, but don't know for sure.
<b>outface</b>	Face value of the puts outstanding at end of quarter.
<b>outstra</b>	Average strike price of puts outstanding.

<b>outstrl</b>	Lower bound on strike price of puts outstanding.
<b>outstrh</b>	Upper bound on strike price of puts outstanding.
<b>outexpl</b>	Expiration date of puts outstanding - lower bound.
<b>outexph</b>	Expiration date of puts outstanding - upper bound.
<b>outld</b>	Indicator for how precisely we know the lower and upper bound expiration dates (outld and outhd). See above.
<b>outhd</b>	Indicator for how precisely we know the lower and upper bound expiration dates (outld and outhd). See above.
<b>undeter</b>	Indicator for situations in which we know that puts were either exercised or expired, but the firm does not report what happened.
<b>Link1</b>	See "Link" above.
<b>Link2</b>	See "Link" above.
<b>exenum</b>	Number of puts exercised. Indicator for whether the put exercise described by exenum can be pinpointed to a single quarter or not. If more than one quarter has the same xexe number, then the given number of puts was exercised in the these quarters combined. Such quarters are also marked by yellow shading.
<b>Xexe</b>	
<b>setnum</b>	Number of puts settled (before expiration). Indicator for whether the put settlement described by setnum can be pinpointed to a single quarter or not. If more than one quarter has the same xset number, then the given number of puts was settled in the these quarters combined. Such quarters are also marked by yellow shading.
<b>xset</b>	
<b>execost</b>	Cost to the firm from the exercise or settlement. Indicator for whether the put exercise / settlement cost described by execost can be pinpointed to a single quarter or not. If more than one quarter has the same xexecost number, then the given cost applies to these quarters combined. Such quarters are also marked by yellow shading.
<b>Xexecost</b>	
<b>exeface</b>	Face value of puts exercised or settled. Indicator for whether the face value of puts exercised / settled described by exeface can be pinpointed to a single quarter or not. If more than one quarter has the same xexeface number, then the given face value applies to these quarters combined. Such quarters are also marked by yellow shading.
<b>xexeface</b>	
<b>exestra</b>	Average strike price of puts exercised / settled.
<b>exestrl</b>	Lower bound on strike price of puts exercised / settled.
<b>exestrh</b>	Upper bound on strike price of puts exercised / settled.
<b>exedatl</b>	Lower bound on exercise / settlement date.
<b>exedath</b>	Upper bound on exercise / settlement date.
<b>exeld</b>	Indicator for how precisely we know the lower and upper bound exercise / settlement dates (exedatl and exedath). See above.
<b>exehd</b>	Indicator for how precisely we know the lower and upper bound exercise / settlement dates (exedatl and exedath). See above.
<b>expnum</b>	Number of puts expired. Indicator for whether the put expiration described by expnum can be pinpointed to a single quarter or not. If more than one quarter has the same xexp number, then the given number of puts expired in the these quarters combined. Such quarters are also marked by yellow shading.
<b>xexp</b>	
<b>extnum</b>	Number of puts that had their expiration date extended. Indicator for whether the put extensions described by extnum can be pinpointed to a single quarter or not. If more than one quarter has the same xext number, then the given number of puts was extended in the these quarters combined. Such quarters are also marked by yellow shading.
<b>Xext</b>	
<b>expface</b>	Face value of puts that expired or were extended.
<b>xexpface</b>	Indicator for whether the face value of puts expired / extended described by expface can be pinpointed to a single quarter or not. If more than one quarter has the same



	xexpface number, then the given face value applies to these quarters combined. Such quarters are also marked by yellow shading.
<b>expstra</b>	Average strike price of puts expired / extended.
<b>expstrl</b>	Lower bound on strike price of puts expired / extended.
<b>expstrh</b>	Upper bound on strike price of puts expired / extended.
<b>expdatl</b>	Lower bound on expiration / extension date.
<b>expdath</b>	Upper bound on expiration / extension date.
<b>expld</b>	Indicator for how precisely we know the lower and upper bound expiration / extension dates (expdatl and expdath). See above.
<b>exphd</b>	Indicator for how precisely we know the lower and upper bound expiration / extension dates (expdatl and expdath). See above.
<b>callsell</b>	Indicator for whether the firm sold calls in this quarter (probably incomplete).
<b>callbuy</b>	Indicator for whether the firm bought calls in this quarter (probably incomplete).

## **Vita**

Jagadish Dandu was born in Nellore, India. He graduated from Sri Venkateswara University in 1991 where he earned Bachelor of Engineering in Mechanical Engineering. He did his Masters work in Computer Science and MBA at The University of Texas at El Paso, USA. Between his bachelor and master degrees he worked in computer industry in various roles as a Software Engineer; Project Manager; and Director of Information Technology in San Jose CA, and El Paso, TX, USA

In the fall of 2008, Jagadish Dandu joined the Doctoral Program in International Business with concentration in Finance at the University of Texas at El Paso. While pursuing his Ph.D., he worked as a research assistant and assistant instructor for the department of Economics and Finance and Information and Decision Sciences. His papers were accepted and presented at FMA, SWFC, AMCIS and IFC conferences; where he was also actively involved as discussant and session chair. While at UTEP he has taught various classes in Finance, Economics and Computer Programming areas and consistently ranked as good teacher.

Currently he is a Lecturer in College of Business, Zayed University in UAE and teaching Finance classes and actively engaged in Finance research.

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