Regulation, Market-Maker Behavior, And Distributive Efficiency: A Study of Mandated Replacement Cost Disclosures

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Abstract:

Regulation in accounting, among other things, attempts to achieve allocative and distributive efficiency in capital markets. The evaluation of regulatory consequences have mostly been restricted to a study of its impact on the characteristics of stock prices. Lev (1988) suggests alternate methods to evaluate regulatory consequences. Taking his lead, this study evaluates Replacement Cost (RC) disclosures from a distributive efficiency perspective through the use of a relatively new bid-ask methodology. Parametric tests indicate that for certain firms the market-maker does experience a decrease in the level of information asymmetry subsequent to RC disclosures.

Introduction

The regulation debate in accounting continues to be a live topic for debate and analysis. Proponents of regulation harp on the notion of advancement of 'public interest' (e.g., Securities Exchange Act of 1934 Sec. 10(b); FASB 1976). Dissenters argue that financial standards are often promulgated to cater to individual interests (e.g., Watts and Zimmerman 1979). It is very difficult to operationalize the 'public interest' criterion in a clear and concise fashion. However, at the same time, the normative content of the concept is particularly appealing. As Gaa (1988, p. 31-32) succinctly notes:

The public interest, if there is one, in financial accounting standards is derived from more basic interests. The reason for this is that standards are rules governing the production and publication of financial information, for the use of interested parties who are external to the reporting entity. Therefore, financial accounting standards and (by implication) standard setting bodies have value only insofar as they have a favorable effect on the content of published financial information. Therefore, if there is a public interest in financial accounting standards, it is because there is a public interest in financial information."

A case for regulating accounting disclosures can be made, if it improves the allocative and distributive efficiency in capital markets and provides net benefits to

the society. Allocative efficiency is achieved as a result of movement towards 'Pareto-superior allocation of resources,' and distributive efficiency is achieved through 'pure welfare redistribution' resulting in reduced level of information asymmetry (Gaa 1988). Among others, the distributive efficiency aspect of justifying regulation is also emphasized by Beaver and Demski (1974), Mueller (1979), and most recently by Lev (1988).

Until recently, the evaluation of such regulatory changes have been restricted to a study of its impact on the characteristics of stock prices. Lev (1988) suggests, among other methods, a method to analyze regulatory impact through the size of the spread. In making a case for additional lines of inquiry Lev (1988, p. 16) says:

"In recent years, the evaluation of accounting policy has focused on examining the impact of regulatory changes on the characteristics of stock prices. Although such impact is of considerable interest, it does not directly address the issue of policy desirability, unless one makes strong assumptions (see Lev and Ohlson 1982). Even a regulation change that leads to a rise in the stock prices of the affected firms cannot be unambiguously labelled socially desirable. Moreover, the preoccupation of current research with average beliefs and stock price reactions to informational events precludes the consideration of important

equity issues, such as who gains and who loses from the informational change, and by how much. Additional lines of research should, therefore, be pursued in order to assess the social consequences of accounting policy." (emphasis added)

The inspiration for this paper comes primarily from Gaa (1988) and Lev (1988). Here, I attempt to empirically examine whether the SEC achieved distributive efficiency in mandating RC disclosures in 1976 (ASR 190, later retracted). RC disclosures are examined here because of: (a) its importance; (b) the fact that similar disclosures have also been extensively addressed by the FASB (SFAS No. 33, 39-41, 46, 54, 70, and 82); (c) its complexity; and (d) the justifications provided for ASR 190 draw repeatedly from qualitative characteristics contained in SFAC No. 2.

In promulgating ASR 190, SEC contended that the new rule would enable investors to obtain more relevant information about the current economics of a business enterprise in an inflationary economy, than the information provided by Historical Cost (HC) alone. The remainder of the paper is organized as follows: The next section starts with a discussion of the theoretical framework for the study. A discussion of the research question, methodology, and sample selection follows. Then, the paper concludes with an analysis of the results, and its implications for disclosure regulation.

Theoretical Framework

The spread is defined as the difference between the bid and ask price. The bid price is the price at which the securities dealer (market-maker) is willing to buy a unit of stock, and the ask price is the price at which he is willing to sell a unit of stock. Considerable theoretical and empirical work has gone in identifying the determinants of spread (for a review of recent literature see Cohen et al. 1979). The spread may be viewed as the sum of: (a) holding costs, which include the price risk and opportunity cost of holding securities; (b) order costs, which include the cost of arranging trades, recording and clearing a transaction; and (c) information costs due to the general level of information asymmetry at any given time.

In analyzing the determinants of the spread, investors are classified into liquidity-motivated traders (have less information than the market-maker) and information-motivated traders (have more information than the market-maker). Authors like Bagehot (1976), Copeland and Galai (1983), Glosten and Milgrom (1985), and Jaffe and Winkler (1976), focus on market-maker's reaction to information-motivated traders. Concluding

from these studies, one can expect the market-maker to gain from liquidity-motivated traders and continually lose to information-motivated traders. The information cost component of the spread enables the market-maker to recover losses due to the general level of information asymmetry.

If RC disclosures reveal useful information, then there will be a reduction in the general level of information asymmetry subsequent to such disclosures. This will be reflected through a reduction in the information cost component of the spread. The distributive efficiency can be ascertained by comparing the information costs before and after the disclosure enactment.

Empirical work use the following variables to explain the spread (e.g., Morse and Ushman 1983; Stoll 1976; 1978a; 1978b; Venkatesh and Chiang 1986): (a) trading characteristics, proxied by number of shareholders, trading volume, etc.; (b) competition, proxied by number of competing dealers, number of markets the security is traded in; (c) price of the security; and (d) risk, proxied by price variance, systematic risk, and unsystematic risk.

Research Question

RC accounting does not adjust for economy-wide price level changes. Instead, it incorporates only those individual price changes that affect a specific firm. In inflationary periods, HC accounting data can give a false impression of earnings and financial strength, leading to the erosion of a firm's capital base (e.g., AICPA 1963; APB 1969; Connor 1979; FASB 1979; Gynther 1970; Sterling 1975). Disclosure of RC data (or similar current cost data) in financial reports is argued to correct for this problem (e.g., FASB 1979; Mathews 1968; Revsine 1970; Revsine and Weygandt 1974). One justification for such disclosures is based on the assumption that RC income is a surrogate for economic income, and would be a lead indicator for future operating flows (Revsine 1970). Believing that RC accounting data might be useful in an inflationary economy, the SEC amended Rule 3-17 of Regulation S-X in March 1976 (ASR 190),(1) thus mandating the public disclosure of certain accounting data by its registrants. The rule required the following RC disclosures to be made for the first time, in the footnotes to the 10-K report, for fiscal years ending on or after December 25, 1976: (a) current RC's of both inventories and productive assets (property, plant and equipment) estimated at each fiscal year end; (b) depreciation expense and cost of sales at current RC; and (c) descriptions of the methods used in determining the amounts of the above items.

According to ASR 190, the RC disclosures outlined above were not required unless the firm's inventories and productive assets aggregate more than \$100 million and comprise more than 10% of total assets.

If RC data provide incremental information beyond those available in HC accounting reports and such information is not available prior to its disclosure, then one can expect a reduction in the general level of information asymmetry subsequent to such disclosures. On the contrary, if one questions the potential usefulness of such data due to measurement errors (e.g., Shriver 1987; Swanson 1990) or availability through alternate sources, there will no change in the level of information asymmetry. An examination of the average spread, before and after the RC disclosure enactment, will shed light on its distributive effectiveness.

Numerous studies have investigated the impact of first publication of RC data on security prices (e.g., Beaver et al. 1980; Gheyara and Boatsman 1980; Ro 1980). However, there has been no study to date examining the impact of RC disclosures on market-maker behavior and its role in achieving distributive efficiency.

Sample Selection and Data Sources

A sample of firms required to file RC data with the SEC and meeting the following criteria were selected: (a) reported RC data for 1976 in compliance with ASR 190; (b) listed on the NYSE for the test period; (c) had December 31 fiscal year end; and (d) had available data on the ISL Daily Stock Price Index and closing bid-ask prices.

This is a subset of the sample used by Ro (1980). (2) The sample is reported in Table 1. The closing bid and ask quotes were collected from the Francis Emory Fitch Publications. (3) The average of the bid-ask quotes were checked against the closing price for the same day from the CRSP Daily Stock Master files. The daily trading volume and the high and low prices on the stocks were collected from the ISL Daily Stock Price Index. Timing of RC disclosures through 10-K reports were obtained from filings with the SEC (the SEC mail room opens and 'stamps' the 10-K reports as being received, and this 'stamp date' indicates the timing of RC disclosures to the public). (4) The data was further screened for other significant announcements like merger announcements, lawsuits etc., and also other non routine announcements that might confound the results.

Empirical Formulation and Analysis

The methodology used for analysis is similar to

Table 1
List of Sample Firms

No.	Sample Firms
1.	Abbot Labs
2.	Allis Chalmers
3.	American Can
4.	A T & T
5.	Anchor Hocking
6.	Armco Steel
7.	Baxter Travenol Labs
8.	Cincinnati Milacron
9.	Dart Industries
10.	Diamond International
11.	FMC Corp
12.	Federal Mogul
13.	Fieldcrest Mills
14.	General Host
15.	Grumman
16.	Harsco
17.	Insilco
18.	International Paper
19.	Kaiser Aluminium & Chemical
20.	Libby-Owens Ford
21.	Marathon Oil
22.	Midland Ross
23.	Nabisco
24.	National Distillers
25.	Norton
26.	Owens-Corning
27.	PPG Industries
28.	RCA
29.	Scovill Mfg
30.	Stauffer Chemical
31.	Warnaco
32.	Wrigley Wm. Jr.
33.	Zenith Radio

Venkatesh and Chiang's (1986) adaptation of Stoll's (1978a) model. The dollar spreads are standardized to percentage spreads for testing purposes. (5) The transaction costs are assumed to remain constant on account of the short time span used for analysis (Venkatesh and Chiang 1986). The spreads are analyzed with and without adjustment for holding costs. (6) The spreads are compartmentalized into three time windows. They are: the estimation window, the pre-announcement win-

dow, and the post-announcement window.

The estimation window comprises 60 days for each firm prior to the pre-announcement period. The pre-announcement window comprises 5 days ($k-3, k-2, k-1, k$, and $k+1$) surrounding the SEC 'stamp date' on 10-K reports (k =SEC 'stamp date' on 10-K reports). The post-announcement window comprises 60 days subsequent to the pre-announcement window.(7) The pre-announcement window is excluded from analysis to eliminate noise on the eve of 10-K report filings.(8) An overview of the data is in Table 2.

Table 2
Overview of Data
(Estimation window + Pre-announcement window +
Post-announcement window = 125 Days)

Sample Firms (N=33)	
SPREAD(%)^a	
Median	0.6632
Range	0.5579
PRICE(\$)	
Median	32.25
Range	20.813
VOLUME^b	
Median	91
Range	202
PRICE VARIABILITY^c	
Median	1.2632
Range	0.9873

^a - For each firm, an average(median) over time is computed for each variable.

^b - Based on daily trading volume, in 100s of shares.

^c - Based on variable

$$HL(t) = 100 * (High Price(t) - Low Price(t))$$

$$\frac{(High Price(t) + Low Price(t))}{2}$$

$$Range = Q3 - Q1.$$

Behavior of Spreads Before and After RC Disclosure Enactment

A. Spreads without Adjustment for Holding Costs

For each sample firm, the distribution of percentage spreads over the estimation window is used as the benchmark, and the mean of such percentage spreads (hereafter 'mean percentage spreads') is employed as the representative statistic. The distribution of mean percentage spreads for the sample firms, before and after the disclosure enactment, are in Table 3.

Normal-probability plots indicate that the mean percentage spreads are approximately normally distributed for the sample firms, allowing the use of parametric tests.(9) The mean percentage spreads, before and after the RC enactment, are then examined to test for distributive efficiency.(10) The null hypothesis of no decrease in equilibrium mean percentage spreads cannot be rejected at 95 percent confidence level using t-test. The results are in Table 4.

B. Spreads Adjusted for Holding Costs

A multiple regression model is used to analyze the behavior of spreads, adjusted for holding costs, before and after the RC disclosure enactment. The model includes an indicator variable to capture the decrease in the information cost component of the spread subsequent to RC disclosures. The model used for testing purposes is similar to Venkatesh and Chiang (1986) and given in Table 5.

The time series regression is run individually for all sample firms. The sign and magnitude of β_4 indicates the reaction of the market-maker only to an individual stock. The proportions of positive and negative t-values are roughly equal for the indicator variable. Individual t-values are significant at 90 percent confidence level for 7 sample firms. Summary results are in Table 6.

To test the hypothesis of whether there is a decrease in information cost across all firms, the Fisher overall probability test is used to consider all individual t-values.(11) The results are in Table 7.

The null hypothesis of no decrease in information costs cannot be rejected at 95 percent confidence level using Fisher overall probability test. Thus, RC disclosures may not be justifiable from a distributive efficiency perspective.

Interpretation of Results

Parametric tests indicate that for certain firms the market-maker does experience a decrease in the level of information asymmetry. However, the results cannot be generalized using the Fisher overall probability test. This implies that for certain firms the market already

has access to such information, or such information is not useful due to measurement errors in RC disclosures (e.g., Shriver 1987; Swanson 1990). Further analysis to identify and correct for measurement errors in RC disclosures could not be done due to the difficulty involved in their estimation and concern about their precision (e.g., Shriver 1987; Swanson 1990).

Table 3

Distribution of Mean Percentage Spreads

Sample Firms	Mean Spreads Before RC Disclosures (Estimation Window)	Mean Spreads After RC Disclosures (Post-announcement Window)
1	0.61082	0.59070
2	0.71190	0.72320
3	0.50736	0.50110
4	0.23762	0.23360
5	0.92239	0.90930
6	0.80543	0.81000
7	0.60293	0.61750
8	0.68658	0.65850
9	0.78698	0.77720
10	0.83802	0.84201
11	0.67280	0.66980
12	1.26570	1.29730
13	1.28850	1.27750
14	1.16730	1.15470
15	1.49350	1.35350
16	1.25150	1.26240
17	0.29063	0.30000
18	0.37026	0.35213
19	0.65446	0.69912
20	0.80711	0.75731
21	0.46803	0.47475
22	0.85525	0.89901
23	0.26265	0.25430
24	0.58288	0.59773
25	0.80196	0.81620
26	0.39028	0.42682
27	0.52515	0.55560
28	0.53077	0.53110
29	0.91419	1.12460
30	0.30571	0.27990
31	1.56700	1.60610
32	0.78787	0.79650
33	0.49826	0.50010

Table 4

Test For Distributive Efficiency
Test of Mean ≥ 0 Versus Mean < 0

Firms	N	T-Value	Estimated P-Value	Mean
Sample	33	0.66	0.74	0.00569

Suggestions For Future Research

This is the first study of its kind to analyze regulatory impact from a distributive efficiency perspective through the use of a relatively new bid-ask methodology. Future research should continue to focus on this important aspect of justifying disclosure regulation. ■

Endnotes

- Securities Act of 1933, Release No. 5695.
- * Ro's (1980) sample disclosing
RC data = 83 firms
* Less Missing 10-K reports = 8 firms
* Less Missing and illegible
SEC 'stamp dates' = 6 firms
* Less Missing bid-ask quotes = 19 firms
* Less Missing volume and
high-low information = 17 firms
* Equals Useable sample = 33 firms
- The bid and ask quotes were collected at a cost of \$25 per daily list.
- Studies have found market reaction to SEC filings around and including the day following the SEC 'stamp date' (e.g., Brickley 1986).
- The percentage spread, S_t is defined in Table 8.
- Venkatesh and Chiang (1986) allude to certain aspects of holding cost that may also be associated with the information cost. Higher price variability around announcements will increase the holding cost to the market-maker and may also be suggestive of informed trading. The tests will be conservative to the extent that a higher information trading cost is subsumed in the holding cost as measured in the model.
- Estimation window (60 days) --> Pre-announcement window (5 days)-->Post-announcement window (60 days). A longer time window is not used for cost reasons, and the possible impact of other confound-

ing information on the spread.

- As enumerated earlier, studies have found market reaction to SEC filings around and including the day following the SEC 'stamp date' (e.g., Brickley 1986). Information-motivated traders, who have prior access to RC data, may be motivated to trade before such data is made public through 10-K filings. If this is the case, on the eve of such disclosures (pre-announcement window), the market-maker can be expected to temporarily widen the spread to recoup losses to such information motivated traders (Glosten and Milgrom 1985). Parametric and non-parametric tests confirm that there is no temporary increase in spreads on the eve of 10-K filings (Venkateswar 1992).
- Non-parametric tests using median percentage spreads yield results similar to those reported in this study.
- As enumerated earlier, the time window for testing distributive efficiency comprises two time periods: the estimation window, and the post-announcement window.
- The Fisher Overall probability test (Maddalla attributes the test to Pearson) combines the different tests by calculating the probabilities p_i for each case of obtaining a coefficient as high as the one obtained assuming the null hypothesis to be true. Then if there are k tests, then the test statistic is given in Table 9.

This statistic can be used for an overall rejection or acceptance of the null hypothesis on the basis of the k independent tests. It enables one to obtain a single test of significance of the overall results, based on the products of the individual significance levels (Maddalla, 1977). In our study, the Overall Probability test is used to combine the results from 33 individual regressions run on sample firms. In essence, it tests for overall β_4 for the sample firms.

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Table 5

Multiple Regression Model

$$S_{t+} = \beta_0 + \beta_1 P_t + \beta_2 VA_t + \beta_3 HL_t + \beta_4 D_t + e_t,$$

where:

- a. S_{t+} , the percentage spread, is the dependent variable and is defined as:

$$S_{t+} = \frac{(A_{t+} - B_{t+})}{(A_{t+} + B_{t+})/2} \times 100,$$

where, A_{t+} and B_{t+} are the closing ask and bid prices on day t , respectively, and the time subscript $t+$ indicates that the dealer sets these prices after observing all the independent variables through day t .

- b. The variable P_t is the closing price of the stock on day t . It is included to remove the suggestion of any apparent trends in the spread due to trends in the stock price (for example, a steadily declining price and a fixed dollar spread would give the appearance of an increasing percentage spread).

- c. The variable $VA_t = (V_t + V_{t-1} + V_{t-2})/3$ is a measure of the anticipated dealer holding period, where V_t stands for volume observed on day t ; this moving average can be regarded as an anticipated volume figure. The higher the volume of trading, the easier it is for the dealer to revise his position and thus shorter the holding period. Since closing bid-ask quotes are used in the analysis, V_t is known when the dealer sets the spread.

- d. The variable, $HL_t = \frac{(\text{High Price}_t - \text{Low Price}_t)}{(\text{High Price}_t + \text{Low Price}_t)/2}$

is a measure of the anticipated price variability. The price risk, a part of the holding cost, is greater when it is anticipated that the price will fluctuate more.

- e. D_t is the indicator variable, and

$$D_t = 1 \text{ (60 days in the post-announcement window) for}$$

$t = T_{k+2}, T_{k+3}, T_{k+4}, T_{k+5}, \dots, T_{k+61}$ (K = SEC stamp date on 10-K reports), else $D_t = 0$ (60 days in the estimation window).

- f. The error term is assumed to be independent and normally distributed.

- g. The intercept term β_0 captures the portion of the spread that accounts for the information cost component of the spread.

Table 6**Spreads, Adjusted For Holding Cost
Summary Statistics on t-values for B4**

Firms	Number	Median	Mean	Pos	Neg
Sample	33	-0.472	-0.4430	15	18

Table 7**Spreads, Adjusted For Holding Cost
Overall Probability (Fisher) Test
for Decrease in Information Costs.****Sample Firms**

Chi-squared value Degrees of Freedom 74.013/66

Test statistic using normal approx^a 0.7210Significance level at which Ho
can be rejected 0.2355^a((2Chi-squared value)^{0.5}) - ((2(d.o.f)-1)^{0.5}). Details of
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Table 8**Percentage Spreads**

$$S_t = \frac{(A_t - B_t)}{(A_t + B_t)/2} \times 100,$$

where, A_t and B_t are the closing ask and bid prices on day t .

Table 9**Overall Probability Statistic**

$\sum_{i=1}^k (-2 \log_e p_i)$, that is chi-square distributed with $2k$ degrees of freedom.

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