ACCOUNTING FOR FINANCIAL DERIVATIVES AND ITS EFFECTS ON EARNINGS VOLATILITY

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ABSTRACT

Upon the request of many constituents, the Financial Accounting Standards Board in the US has been engaged to draft and enact some regulations for derivatives and hedging activities since January 1992. FASB published an Exposure Draft in June 1996, after about two years of discussions and analysis, FASB issued Accounting for Derivative Instruments and Hedging Activities. The new regulation is effective for all fiscal quarters and years after June 15, 1999 and it applies to all industries and enterprises.

The purpose of this paper is to discuss problems of previous accounting guidance for derivatives and hedging activities, to illustrate the requirements of the new accounting regulations in this respect, and to discuss some of the potential concerns of this new approach.

We also extend the empirical research in Jan (2001), which provides evidence showing that the uses of derivative securities and discretional accounting accruals are negatively correlated.

Keywords: Accounting Standards; Financial Derivatives; Earning's Volatility

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CONTRIBUTION

Zhen Hua Hu analyzed and summarized the SFAS No.133 and prepared Section 1 to Section 7; Ying Zhou made research and analysis on improvement and drawbacks of the SFAS No.133 and provided some complements in the relevant sections.

Ying Zhou did research and generated the ideas on the empirical research, engaged in data collection and analysis and prepared Section 8 to Section 10; Zhen Hua Hu designed and implemented some necessary processes and programs to analyze these data.

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1 INTRODUCTION

The creation of financial derivatives during the past 20 years has inspired great interest in all aspects of those intricate instruments. The innovations, diversity, and complexity of derivatives have besieged traditional accounting implementation for financial instruments, which had evolved in earlier years when non-derivative type instruments prevailed. Derivative securities, from now on to be referred to as derivatives, have long been a concern in the accounting domain because of their various types and complex nature. The development of the accounting standard of derivatives has lagged and, as a result, the previous accounting practices for derivatives are often contradictory and underdeveloped. In order to provide accurate, reliable, and comparable financial information to financial statement users, accounting standard boards from all over the world have been engaged to develop standards to account for derivatives.

In the United States, the authoritative accounting standard for derivatives is promulgated by the Financial Accounting Standards Board (FASB). Since 1973, FASB has been the designated organization in the private sector for establishing standards of financial accounting and reporting. Those standards govern the preparation of financial reports. They are officially recognized as authoritative by the Securities and Exchange Commission and the American Institute of Certified Public Accountants. All the publicly traded companies in the US must follow the standards issued by the FASB for preparing financial reports and disclosing financial information. Such standards are essential to the efficient functioning of the economy because investors, creditors, auditors and others rely on credible, transparent and comparable financial information. Among the publications issued by the FASB, Statements of Financial Accounting

Standards, generally abbreviated and used as "SFAS", are the most authoritative publications for setting the accounting rules on public companies.

However, the FASB has offered incomplete and inconsistent accounting standards prior to 1996 as accounting guidance on derivatives (Raymond, 1997). Some major losses of several public companies on derivatives activities in 1997[1] also added to the pressures for the FASB to improve its existing accounting standard for derivatives. Finally, in June 1998 a breakthrough accounting statement-- Statement of Financial Accounting Standards (SFAS) No. 133 was published.

[1] For example, Procter & Gamble Co., Gibson Greetings Inc., Orange County and Long-Term Capital Management.

2 WHAT IS A DERIVATIVE SECURITY?

A derivative security or derivative is a contract that specifies the right or obligation between two parties to receive or deliver future cash flows (or exchange of other securities or assets) based on some future event. According the definition of FASB, a derivative security is defined as a swap, future, forward, option or other financial instruments with similar characteristics (Woodward et al. 1996). Due to the underdeveloped accounting standard system and difficulties in recording non-cash transactions, FASB's definition of a derivative prior to 1996 excludes contracts that allow delivery of the actual item or commodity.

For financial derivatives, the dates or amounts or both are variables for calculation of the cash payments or deliveries of other financial instrument, the values of which vary over time. "Interest rate swaps, exchange traded futures contracts, and financial options are common examples of financial derivatives" (Beier, 1995). Interest rate swaps are contracts where the involved parties agree to exchange cash flows on settled future date. Party A is required to pay a fixed amount of cash, and party B is obligated to pay a variable amount of cash determined by some price index such as the London Inter-Bank offer Rate (LIBOR). Exchange traded futures contracts are contracts where the involved parties agree to exchange a predetermined amount of cash for a specified financial instrument on a specified date. The amount and the date of exchange are fixed, but the value of the financial instrument is changeable; its value will be calculated based on the prevailing market prices at the date of exchange. Financial optional contracts, including put options and call options, are common derivatives. The writer of a put agrees to obtain a defined financial instrument from the holder of the put for a fixed price on a future date. The writer of a call agrees to sell a defined financial instrument to the holder of the call for a fixed price on a future date. "The market price of the underlying financial instrument at the

exercise date determines whether the holder chooses to exercise the option and which party gains or loss." (FASB, 1996)

However, the accounting standards for employee stock options, one of the most commonly used employee compensation components, are not covered by SFAS 133. Due to the significance and popularity of employee stock options, FASB issued separate statements governing the recording and disclosure of employee stock options, namely APB No. 25 (which has been superseded by SFAS123 (R) issued in December 2004), SFAS 123 and SFAS 123 (R).

3 DIFFICULTIES IN ACCOUNTING FOR DERIVATIVES BEFORE 1996

Financial instrument innovations have challenged the financial system's use of previous authoritative guidance for new financial instruments. The creation of new financial products has outpaced the establishment of relevant accounting standards, and accounting standard-setters have not kept up with the innovations of the financial community. Reporting and disclosing derivatives activity has bothered accountants, companies and accounting standard boards. Difficulties associated with derivatives accounting exist in two areas: the gains and losses recognition from these financial instruments and the disclosure of derivatives positions.

According to Carpenter (1996), difficulties in the reporting of derivatives in financial statements seem to lie in the fact that some items on the balance sheet have been measured at cost while others are marked to market. For example, free-standing derivatives are recorded at their fair value, and gains and losses on the derivatives have been recognized until they occur. However, the offsetting changes in the value of the hedged items, such as inventory, are not recognized until disposition. This may cause the recognition of offsetting gains and losses in hedging in different reporting periods. Therefore, a hedge that lowers economic risk may increase the volatility of accounting earnings. In order to resolve this problem, firms are allowed to defer derivatives gains and losses until offsetting gains and losses are realized. Nevertheless, the problem with reporting derivatives still exists because the effectiveness of the approach relies on the flexibility of the firm in deciding which gains and losses to defer. Such flexibility makes financial statements hard to explain. One alternative solution is to recognize all gains and losses when they occur. However, this solution is highly controversial since it violates the traditional accounting convention.

Prior to 1996, the FASB issued five statements related to this area. Accordingly, it adopted different approaches to account for derivatives. (FASB, 1998)

SFAS No.52 "Foreign Currency Translation" and SFAS No. 80 "Accounting for Futures Contracts" allow hedge accounting which enables gains and losses in derivatives positions to be deferred until the associated offsetting gains and losses are recognized. Recognizing gains and losses on related items in the same period satisfies the "matching principle".

The Board adopted SFAS No.199 to hedge accounting in 1995. Although firms are required by the new approach to classify derivatives as either for "trading" or "other" purposes, the new approach additionally requires all derivatives to be marked to market and all realized gains or losses to be reported under income. Unrealized gains and losses on "trading" derivatives will be reported under income while those for "other" purpose will be reported in a separate component of equity until realized. (Smith and Wilson, 1999)

4 SHORTCOMINGS OF ACCOUNTING STANDARDS FOR DERIVATIVES BEFORE 1996

The use and creation of various financial derivatives by companies has increased significantly during the past twenty years. However, the relevant accounting standards and guidelines offered by the FASB have lagged far behind such development. The existing rules and regulations also have problems that hinder their implementations and forces. In particular, the regulations issued by the FASB before 1996 had been criticized for some major shortcomings as discussed below.

4.1 Subjective Criteria of Hedge Accounting

The criteria for hedge accounting treatment mentioned in SFAS No.52 and SFAS No. 80 are subjective for several reasons.

First, management relies on subjective judgement to determine risk exposure. Management cannot consider risk exposure on just an individual item or transaction. Instead, it must take into account all of the existing offsetting exposures. However, it is often difficult for management to objectively measure an enterprise risk. Thus, this subject management judgement can compare financial statements across different forms. More importantly, this may enable firms to manipulate their earnings.

Second, SFAS No. 80 requires that management must illustrate a high correlation between gains and losses on the hedging instrument and changes within the market value of the hedged item. However, the statement does not provide a definition of "high correlation" or provide a definite guideline on how to measure and analyze such correlations. As such, management's understanding and estimate on the correlations will be subjective. These various

understandings and estimates by the management of different companies will inevitably lead to the inconsistency and lack of comparability of the financial statements of the companies.

4.2 Internal Inconsistency

Smith and Wilson (1999) mention that it is difficult to use an analogy to account for any financial instrument not mentioned in these two statements because SFAS No.52 and SFAS No. 80 are inconsistent.

First, SFAS No.52, which addresses forwards, assesses risk on a transaction basis while SFAS No.80, which addresses futures, assesses risk on an enterprise perspective.

Second, SFAS No.52 allows only firm commitments to be hedged while SFAS No.80 permits hedge accounting for both firm commitments and forecasted transactions.

Third, the correlation between the hedged position and the hedged item is a more significant criterion to be reached in order to apply hedge accounting according to AFAS No.80 than SFAS No.52. The rationale is that SFAS No. 80 permits cross-hedging. On the other hand, SFAS No. 52 does not allow cross-hedging even though a high correlation condition is met, it only permits cross-hedging if it is not practical or feasible to hedge in an identical currency.

Finally, SFAS No.80 requires futures contracts to be reported at fair value while SFAS No.52 requires foreign currency forwards to be reported at amounts based on changes in foreign exchange rates only. As a result, derivatives are unrecognized or recorded at nominal amounts that signify a small fraction of the value of their potential cash flows.

4.3 Difficulties in Justifying Deferred Gains and Losses as Liabilities or Assets

The problem mentioned by Wilson and Smith arises from recording a deferred loss as an asset and a deferred gain as liability because they do not match the conventional accounting

definition of assets and liabilities. However, it is complicated to justify unrealized gains as future sacrifices of economic benefits and unrealized losses as future economic benefits.

4.4 Other Limitations

4.4.1 Lack of Visibility

Many off-balance-sheet instruments are not reported in the financial statement since these off-balance-sheet derivative instruments do not require an initial cash outlay. As a result, unrealized gains or losses of these instruments are not recognized. The lack of visibility of derivative instruments and the changes of their market values may hide potential risks to a company.

4.4.2 Incompleteness

It is difficult for the accounting standard setting community to develop appropriate guidelines. Due to the lack of complete guidance, accountants have to refer to numerous Emerging Issues Task Force (EITF) consensus documents and non-authoritative literature to decide how to account for specific derivatives instruments. Usually, they have to analogize an accounting method since even EITF is unable to provide timely guidance on rapidly evolving derivative instruments. As different combinations are possible, various methods can be applied. This makes financial statements hard to compare across companies.

5 CHANGES IN ACCOUNTING FOR DERIVATIVES IN THE UNITED STATES

5.1 SFAS No.133

Due to the incompleteness and inconsistency of accounting standards in derivatives and the large derivative losses of some companies in the 1990s, under the stress from Congress, the Securities and Exchange Committee (SEC), bank regulators and other groups, FASB has to improve its accounting standards for derivatives and hedging activities. After the analysis of possible alternatives and the consideration of all comments at the public hearings, the FASB published an Exposure Draft in June 1996. After two years of trial and adjustment, the final Accounting Standard for Derivatives instruments and Hedging Activities was issued in the summer of 1998 (Ashley and Bliss, 1999). SFAS No.133 establishes accounting and reporting standards for derivative instruments, including certain derivative instruments embedded in other contracts, (collectively referred to as derivatives) and for hedging activities. It requires that an entity recognizes all derivatives as either assets or liabilities in the statement of financial position and measure those instruments at fair value. If certain conditions are met, a derivative may be specifically designated as a hedge of the exposure to changes in the fair value of a recognized asset or liability or an unrecognized firm commitment, (b) a hedge of the exposure to variable cash flows of a forecasted transaction, or (c) a hedge of the foreign currency exposure of a net investment in a foreign operation, an unrecognized firm commitment, an available-for-sale security, or a foreign-currency-denominated forecasted transaction.

The purpose of SFAS 133 is to provide a comprehensive and consistent guide for all derivatives and hedging activities, and to eliminate non-authoritative practices. SFAS No.133 was supposed to be effective for all fiscal quarters of all fiscal years after June 15, 1999. However,

there was some strong opposition from corporate end users, banks, exchanges and several regulatory agencies. Consequently, the FASB has decided to defer the effective date for one more year.

5.2 New Definition of Derivatives

To accommodate innovative new derivatives instruments' emerging in the market, SFAS No.133 defines a derivative as having three "distinguishing" characteristics. It should have: first, one or more underlying assets such as index, price or rates, a specified interest rate and foreign exchange rate, and one or more notional amounts or payment provisions; second, there is little or no initial net investment required; third, its term requires or permits net settlement. The Board believes that this new definition will accommodate most existing or emerging free-standing derivatives.

5.3 Basic Accounting Requirement

As an absolute breakthrough in the accounting treatments for derivatives, SFAS No.133 substantially changes the current hedge accounting and requires all derivatives to be recorded at fair or current market value and recognized as assets or liabilities in the balance sheet. Derivatives may be specifically designed as (i) hedging the exposure to changes in the fair value of an existing asset or liability or a firm's fair value hedge, (ii) hedging the exposures to changes in cash flows associated with an existing asset or liability or with a forecasted cash flow hedge, and (iii) hedging the foreign currency exposure of a firm commitment, a net investment in foreign operation, an available-for-sale security, or a forecasted transaction denominated in foreign currency (foreign currency hedge). Changes in fair value of derivatives are not designated as any one of the three hedges mentioned above will be included in earnings as they occur. (Demarzo and Duffie, 1998)

5.3.1 Fair Value Hedge

The accounting for changes in the fair value of a derivative (that is, gains and losses) depends on the intended use of the derivative and the resulting designation. For a derivative designated as hedging the exposure to changes in the fair value of a recognized asset or liability or a firm commitment (referred to as a fair value hedge), the gain or loss is recognized in earnings in the period of change together with the offsetting loss or gain on the hedged item attributable to the risk being hedged. The effect of that accounting is to reflect in earnings the extent to which the hedge is not effective in achieving offsetting changes in fair value.

The gain or loss on a derivative will be recognized in earnings accounts or income statements as it occurs, along with the offsetting gain or loss on the hedged item attributed to the risk being hedged. The offsetting gain or loss on the hedged item and the entire gain or loss on the derivative will be reported to the extent the hedge is effective. In general, fixed-rate financial assets and liabilities are subject to fair value exposure due to changes in the market interest rate. (Rasch and Wilson, 1998)

5.3.2 Cash Flow Hedge

For a derivative designated as hedging the exposure to variable cash flows of a forecasted transaction (referred to as a cash flow hedge), the effective portion of the derivative's gain or loss is initially reported as a component of other comprehensive income (outside earnings) and subsequently reclassified into earnings when the forecasted transaction affects earnings. The ineffective portion of the gain or loss is reported in earnings immediately.

A derivative's gain or loss will be reported in other comprehensive income or current earning, as necessary, in order to adjust the balance in other comprehensive income with the amount equalling the lesser of 1) the cumulative gain or loss on the derivative, 2) the cumulative change in expected cash flows on the hedged transaction. The excess cumulative gain or loss on the derivative will be referred to as ineffective and included in current earnings. The accumulated

gains and losses will be deferred and reported in equity when the forecasted transaction influences earning. (Rasch and Wilson, 1998)

5.3.3 Foreign Currency Hedge

For a derivative designated as hedging the foreign currency exposure of a net investment in a foreign operation, the gain or loss is reported in other comprehensive income (outside earnings) as part of the cumulative translation adjustment. The accounting for a fair value hedge described above applies to a derivative designated as a hedge of the foreign currency exposure of an unrecognized firm commitment or an available-for-sale security. Similarly, the accounting for a cash flow hedge described above applies to a derivative designated as a hedge of the foreign currency exposure of a foreign-currency-denominated forecasted transaction.

To account for derivatives that hedge the foreign currency exposure of a future firm commitment or available-for-sale security, the fair value hedge accounting is used to provide that all fair value hedge criteria are met. For derivatives that hedge the foreign currency exposure of a forecasted transaction, cash flow hedge accounting is used provided that all cash flow hedge criteria are met. (FASB, 1998)

6 IMPROVEMENTS OVER THE PREVIOUS ACCOUNTING FOR DERIVATIVES

It is understandable that SFAS No.133 cannot resolve all previous accounting problems related to financial derivatives. Alex (2004) points out that SFAS No.133 represents great improvements. SFAS No.133 resolves many of the major problems with previous accounting standard of derivative; it also increases the visibility, completeness and internal consistency of the accounting of derivatives (Alex, 2004). However, these studies do not seem to be comprehensive enough. More improvements over the previous accounting for derivatives are discussed below.

6.1 Consistency

First, inconsistencies caused by entities holding different view of risk are eliminated by requiring an entity to identify the risk being hedged by the exposure of changes in the cash flow, fair value or exchange rate.

Second, inconsistencies are reduced because SFAS No.133 permits hedge accounting for most derivatives instruments. Inconsistencies that arose from derivatives being measured differently under previous accounting standard are overcome by SFAS No.133.

6.2 Treatment on Deferred Gains or Losses as Liabilities or Assets

Reporting deferred gains or losses as liabilities or assets need not be justified since SFAS No.133 does not require the reporting of unrealized gains or losses as liabilities or assets. They will be included in current earning if they are not deferred. Otherwise, they will be included in comprehensive income and reported in stockholder' equity.

6.3 Easier to Determine a Hedge

Under SFAS No.133, only three kinds of hedges, fair value hedge, cash flow hedge and foreign currency hedge, are permitted. Therefore, it is easier to determine what designates as a hedge. The derivatives can be qualified as one of these hedges only if the criteria for the corresponding hedge are met.

6.4 Visibility

Lack of visibility is no longer a problem under SFAS No.133 since all derivative financial instruments are to be measured at fair value instead of historical cost and reported as assets or liabilities on the balance sheet. Since fair value provides financial instruments users a better reference to of whether the value of the hedged item is experiencing favourable or unfavourable market changes, the FASB decided that fair value is more useful measure for derivative financial instruments than historical cost. As a result of this new regulation, it can help financial statement users make better assessment on the company's investment strategies.

6.5 Competences

There will be no need to analogize to current guidance and generate new accounting standards since SFAS No.133 offers a comprehensive approach in accounting for derivatives. It will apply to all derivatives instruments. Comparability also improves since the purpose and the way all companies use to account for derivatives are similar. SFAS No.133 also promotes the matching principle since gains and losses on a hedging instrument are the same time with the gains and losses of the hedging item.

6.6 Fewer Subjective Criteria of Hedge Accounting

SFAS No.133 overcomes the subjective judgment of net risk exposure. SFAS No.80 requires that to justify hedge accounting, an entity must show that there is risk reduction on an

enterprise basis. Since it is hard to assess an enterprise risk objectively, this requirement has led to earning manipulation. However, such as requirement is eliminated in SFAS No.133. Therefore, the new accounting statement serves to reduce the subjective criteria of hedge accounting.

7 NEW PROBLEMS CREATED BY SFAS NO.133

7.1 Volatility of Earning and Equity

One of the major concerns on SFAS No.133 is that it will increase companies' earning volatility. As previously mentioned, this regulation requires all the U.S. corporations and foreign corporations with a stock listing in the US to include their derivatives on balance sheets and adjust earnings to reflect changes in their market value. As a result, it will be a lot more difficult for companies to smooth out their earnings. Risk managers, CFOs and CEOs are worried a lot on how the market and investors will react to this increased volatility. As argued by Jonathan Boyles, director of financial standards at Washington, D.C.-based Fannie Mae, which held $240 billion worth of interest-rate swaps at the end of 1999, "*Derivative* is still a four-letter word", "People may see our use of derivatives and think we're taking on a lot of risk, when that's not the case." (Andrew, 2000)

7.2 Compliance Costs

There are short term and long term compliance costs associated with the SFAS No.133. Over the short run, companies have to incur a considerable amount of implementation costs. For example, there are costs of revising a company's accounting, tax, risk management and valuation system, as well as the cost of required computer system changes. Over the long run, there are ongoing costs associated with the extensive disclosure requirement of the new accounting standard. Documentation of the hedge relationship, the risk-management objective and the risk-management strategy is required.

7.3 Reporting of Hedged Item between Historical Cost and Fair Value

Under SFAS No.133 the magnitude of overhedging will be reflected in current earnings, but underhedging will not. Overhedging means that the change in fair value of the derivative is greater than the change in fair value of the hedged item. Underhedging means that the change in fair value of the derivative is less than the change in fair value of the hedged item. If there is overhedging, both the derivative and the hedged item will be reported at fair value while the changes in their fair value will be included in current earnings. The excess of the gain or loss on the derivatives over the gain or loss on the hedged item will be included in earning. If there is under-hedging, the full amount of gain or loss on the derivative will be reported in earning, but the amount of gain or loss on the hedged item being reported will only be up to the amount that provides asset. The hedged item, reported at an amount between historical cost and fair value, may create inconsistency in reporting the value of a hedge item.

7.4 Different Accounting for the same Financial Instrument or Transaction

SFAS No.133 creates inconsistency in new areas since the same financial instrument or transaction will be accounted for differently. For instance, the accounting for hedges of firm commitments versus forecasted transactions. There is belief that there is no substantive difference in qualifying forecasted transactions and firm commitments and hence both of them should be treated the same way. However, FASB believes that firm commitments are distinct from forecasted transactions. Therefore, its new requirements account for hedging of forecasted transactions as cash flow hedges and hedging of firm commitments as fair value hedges. For a forecasted transaction that later becomes a qualified firm commitment, the hedge accounting for a forecasted transaction must be discontinued. The firm commitment can then be hedged prospectively. (Arlette and Rasch, 1998)

8 THE EMPIRICAL RESEARCH BY JAN (2001)

8.1 Introduction to Jan's Study

Contrary to the general argument that the implementation of SFAS No. 133 may increase the earning's volatility, Jan (2001) presents evidence showing that managers actually can use derivatives and accounting accruals as partial substitutes to smooth their earnings volatility. In his study, Jan examines the relation between managers' use of derivative financial instruments and their earnings management decisions. He points out that in addition to discretionary accounting accruals which are used as the primary means by managers to smooth their firms' earnings, "managers also can smooth earnings by using other tools, such as financial derivatives, that smooth their firms' cash flows. That is, earning is the sum of cash flows and accruals; all else equal, reducing cash flow volatility should reduce earnings volatility." Through his empirical study on the 1994-1996 data on a sample of 304 non-financial, non-regulated Fortune 500 companies, he finds a significant negative association between derivatives' notional amounts and proxies for the magnitude of discretionary accruals.

8.2 Jan's Sample and Measurement of Derivative Use and Accrual Management

8.2.1 The Sample

The sample used by Jan includes non-financial, non-regulated *Fortune 500* firms for 1994-1996. From the 489 firms that were consistently included in the Fortune 500 firms for 1994-1996, Jan discards 82 firms that were privately owned or owned by foreign corporations or had missing information. 103 firms in the financial industry and regulated industry were also excluded from the sample. Accordingly, there were 304 firms remaining in the sample, among

which 218 were derivative users and 86 were non-users. Jan uses three annual observations for these 304 firms in his study. The firms in the sample that use derivatives do so consistently throughout the sample period.

8.2.2 Measurement of Derivative Use

In his study, Jan measures derivative use (DERIVATIVES) as the "disclosed notional amount of interest rate and foreign currency derivatives, scaled by lagged total assets." The derivative information can be found from the 1994-1996 Form 10-K filings retrieved from EDGAR through SEC's website. The other financial data of the sample firms are obtained from the Standard and Poor's CompuStat Database.

8.2.3 Measurement of Accrual Management

For the measurement of accrual management of the sample firms, Jan uses the Jones (1991) accruals expectation model as modified by Dechow et al. (1995) to develop a proxy:

$$TAC_{it} / TA_{it-1} = \varphi_1(1/ TA_{it-1}) + \varphi_2 [(\Delta REV_{it} - \Delta REC_{it})/ TA_{it-1}] + \varphi_3(PPE_{it}/ TA_{it-1}) + \varepsilon_{it} \quad (1)$$

where TAC is total accruals, which is measured by Jan as earnings before extraordinary items and discontinued operations less operating cash flows; TA is total assets; ΔREV is change in revenue; ΔREC is change in accounts receivable; and PPE is gross property, plant, and equipment. "The (ΔREV - ΔREC) term controls for normal levels of working capital accruals related to sales, the PPE term controls for normal levels of depreciation expense and related deferred tax accruals, and the TA deflator controls for potential scale bias (Jones, 1991; Dechow et al. 1995)". "The above model implicitly assumes that an changes in credit sales result from the earnings management. This is based on the reasoning that it is easier to manage earnings by exercising discretion over the recognition of revenue on credit sales than it is to manage earnings by exercising discretion over the recognition of revenue on cash sales." (Dechow et al. 1995)

In his study, Jan uses the regression residuals from the above model as a proxy of the discretionary accruals. Since Jan's arguments and tests are "based on theories of income smoothing rather than on theories of directional earnings Management" (Jan, 2001), the magnitude rather than the direction of discretionary accruals makes more sense to him. As such, his analysis is based on the absolute value of the proxy for discretionary accruals, i.e. |DAC|.

8.3 Jan's Hypothesis and Empirical Design

8.3.1 The Hypothesis

According to Jan, "earnings is the sum of cash flows and accruals; hence, the variance of earnings (σ_E^2) is a function of the variance of cash flows (σ_C^2), the variance of accruals (σ_A^2), and the correlation between cash flows and accruals ρ_{CA}:

$$\sigma_E^2 = \sigma_C^2 + \sigma_A^2 + 2\,\rho_{CA}\,\sigma_C\,\sigma_A \qquad (2)$$

Therefore, managers can change earnings volatility by adjusting cash flow volatility, accrual volatility, and/or the correlation between cash flows and accruals." (Jan, 2001) Managers presumably consider using derivatives and discretionary accruals jointly if the costs or effectiveness of these tools differ. As such, Jan predicts and tests the following alternative hypothesis: "DERIVATIVES and |DAC| will be negatively associated, conditional on managers' maintaining a desired level of earnings volatility." (Jan, 2001).

8.3.2 The Empirical Design

To test this hypothesis, Jan designed the following simultaneous equations:

$$\text{DERIVATIVES}_{it} = a_0 + a_1|\text{DAC}|_{it} + a'\text{CONTROLS}_{it} + \zeta_{it} \qquad (3)$$

and

$$|\text{DAC}|_{it,} = \beta_0 + \beta_1\text{DERIVATIVES}_{it,} + \beta'\text{CONTROLS}_{it} + \xi_{it} \qquad (4)$$

CONTROLS is a vector of control variables. It accounts for managers' incentives to use derivatives and manage accruals to maintain a desired level of earnings volatility. It includes two sets of variables, one common to both equations and the other intended to identify the simultaneous equations. The data used to construct these variables mostly come from CompuStat, if not otherwise indicated.

Variables Common to All Equations

According to Jan, "managers use derivatives and discretionary accruals to increase managerial compensation and wealth, to reduce income taxes and debt financing costs, to avoid underinvestment and earnings surprises, and to mitigate any volatility caused by low diversification." Equations (3)-(4) above include variables to control for these incentives.

The cash compensation and value of the shares and stock options held by managers create the most important incentive on them to manage earnings volatility of their companies. According to the literature review conducted by Jan, "because cash compensation and firm value tend to increase with earnings persistence (Baber et al. 1998; Barth et al. 1999; Myers and Skinner, 1999), managers are likely to smooth earnings through derivatives and discretionary accruals to increase their compensation and the value of their stock (e.g.. Smith and Stulz, 1985; Gaver et al. 1995; Balsam, 1998). The incentives to manage earnings volatility to increase the value of stock options are less clear."

The variables used in the equations (3) and (4) for the manager's compensations are cash compensation (CASH_COMP), stock holdings (STOCK) and option holdings (OPTIONS). These variables are all scaled by the respective company's lagged total assets. The data is obtained from the database ExecuComp. Jan uses the CEO's salary and bonus for CASH_COMP, fair value of stock the manager owns for STOCK, and the number of outstanding options the manager has for OPTIONS.

Income tax is also an incentive to managers to smooth earnings and cash flows in Jan's equations. He uses the variable "CONVEXITY" for the "tax convexity" of the company and expects that it is positively associated with derivative use and accrual management. This variable is computed as the excess of the marginal tax rate according to Graham (1996) over the average tax rate which is calculated as tax expense divided by pre-tax earnings.

Leverage and financial distress also create the necessity to smooth earnings and cash flows so that the firm's credit risk can be under control or reduced. Therefore, Jan uses the debt-to-asset ratio for proxy of leverage (LEVERAGE). For financial distress (DISTRESS), he uses Ohlson's (1980) bankruptcy prediction model for the proxy.

Jan also takes into considerations firms with growth options such as research and development, which "are more likely to smooth earnings and cash flows to avoid underinvestment". He uses the variable RD in his equation which is the ratio of research and development expense to total sales.

Since firms with heavy analyst following face pressure to smooth earnings so that they can avoid reporting earnings surprises (Johnson, 1999), Jan uses the logarithm of the number of analysts following the firm as a control variable in his equations. This variable is "ANALYSTS" and the number of analysts following the firm is obtained from Bloomberg.

Finally, since firms with more diversified business are less stressed in using derivatives and accruals to smooth earnings, Jan uses the entropy index of business segment sales in (Palepu, 1985) as a measure of business diversification (DIVERSIFICATION) in his equations. He also uses the ratio of foreign sales to total sales (FRGN_SALES) to measure the company's exposure to foreign exchange rate risk.

Variables to Identify the Simultaneous Equations

In the equation for DERIVATIVES, i.e. equation (3), Jan includes variables to control for firm size (SIZE), dividend yield (DIV_YIELD), debt maturity (ST_DEBT), and cash cycle

(CASH_CYCLE). SIZE is measured as the logarithm of the sum of total liabilities, preferred stock, and market capitalization of common stock. DIV_YIELD is measured ratio of cash dividends to market capitalization of common stock. For the "firms with shorter debt maturity are more likely to use interest rate swaps (e.g., Visvanathan, 1998)", so short maturity debt (ST_DEBT) is also included in the equation and it is estimated to be positively associated with derivative use. Finally, "firms with long cash conversion cycles are more likely to benefit from hedging because their cash flows are exposed to fluctuations in market prices for a longer period", Jan uses CASH_CYCLE as another variable in the equation for DERIVATIVE and it is measured as the number of days that inventory is in stock plus the number of days that receivables (net of payables) are outstanding.

In the equation (4) for |DAC|, the variables include those to control for accrual reversals, LIFO reserve, dividend payout rate, industry flexibility to manage accruals, and extreme cash flow performance. "Due to the reversing nature of accruals, managers who manipulate accruals in one period will have to manipulate accruals in subsequent periods to achieve the same level of earnings, all else equal (Hunt et al. 1996)". Jan also includes the lagged value of |DAC| in equation (4). Since the managers' ability to increase income by liquidating LIFO layers is related to a larger beginning LIFO reserve (Hunt et al. 1996), so equation (4) includes a control variable LIFO_RESERVE measured as the beginning LIFO reserve scaled by lagged assets. Since "Managers can achieve expected dividend payout rates and distribute less cash by adjusting accruals to reduce earnings", Jan measures the dividend payout rate (DIV_PAYOUT) by the ratio of cash dividends to earnings net of discretionary accruals. Different industries with more flexible GAAP can enable the managers of the relevant companies to manage accruals to a greater extent, so industry flexibility (FLEXIBILITY) is included in equation (4). This control variable is measured by Jan as the root mean squared error of the regression used to estimate the firm-year's discretionary accruals. Finally, in order to control the overstated magnitude of the discretionary accruals for firms with extreme operating cash flows using the modified Jones (1991) model, Jan

also includes the absolute value of operating cash flows scaled by lagged assets (|OCF|) in the equation of |DAC|. Table 8.1 (Jan, 2001) reports descriptive statistics, including the mean, standard deviation, first quartile, median and third quartile for the control variables. There are three annual observations for the sample of 304 firms and hence n equals to 912.

Table 8.1 Descriptive Statistics for Control Variables

Control Variable	*Mean*	*Standard Deviation*	*First Quartile*	*Median*	*Third Quartile*
CASH_COMP	0.391	0.325	0.144	0.303	0.532
STOCK	0.591	1.531	0.010	0.039	0.181
OPTIONS	0.195	0.489	0.000	0.000	0.056
CONVEXITY	0.018	0.051	0.000	0.000	0.000
LEVERAGE	0.413	0.220	0.258	0.404	0.556
DISTRESS	0.123	0.135	0.037	0.081	0.154
RD	0.017	0.030	0.000	0.000	0.019
RD × LEVERAGE	0.005	0.010	0.000	0.000	0.007
ANALYSTS	3.211	0.805	2.996	3.401	3.738
DIVERSIFICATION	0.422	0.506	0.000	0.100	0.790
FRGN_SALES	0.187	0.206	0.000	0.134	0.343
SIZE	9.130	1.181	8.370	8.993	9.904
DIV_YIELD	0.021	0.019	0.006	0.021	0.030
ST_DEBT	0.228	0.230	0.043	0.149	0.343
CASH_CYCLE	57.563	91.081	19.715	48.748	92.404
$\|DAC\|_{t-1}$	0.019	0.046	0.016	0.034	0.067
LIFO_RESERVE	0.013	0.025	0.000	0.000	0.015
DIV_PAYOUT	0.275	0.620	0.000	0.219	0.475
FLEXIBILITY	0.198	0.121	0.129	0.145	0.245
|OCF|	0.113	0.079	0.070	0.110	0.152

Where:

- DERIVATIVES = notional amount of interest rate and foreign currency derivatives, scaled by lagged total assets. Data is obtained from the 1994-1996 Form 10-K filings received from EDGAR;
- |DAC| = absolute value of discretionary accruals, i.e. regression residuals from equation (1);
- CASH_COMP = salary and bonus compensation of CEO, scaled by lagged total assets;
- STOCK = fair value of shares owned by CEO, scaled by lagged total assets;

- OPTIONS = number of options outstanding held by CEO, scaled by lagged total assets; (The compensation details of CEO used in CASH_COMP, STOCK and OPTIONS are obtained from ExecuComp.)
- CONVEXITY = excess of marginal tax rate (calculated as in Graham [1996]) over average tax rate (calculated as tax expense divided by pre-tax earnings);
- LEVERAGE = total debt divided by total assets;
- DISTRESS = probability of bankruptcy using Ohlson's (1980) model 1;
- RD = research and development expense, scaled by total sales;
- ANALYSTS = natural logarithm of the number of analysts following the firm;
- DIVERSIFICATION = entropy index on business segment sales calculated following Palepu (1985);
- FRGN_SALES = foreign sales divided by total sales;
- SIZE = natural logarithm of the sum of total liabilities, preferred stock, and market capitalization of common stock;
- DIV_YIELD = cash dividends divided by market capitalization of common stock;
- ST_DEBT = short-term debt divided by total debt;
- CASH_CYCLE = cash conversion cycle, calculated as the number of days inventory is in stock plus the number of days receivables (net of payables) are outstanding;
- LIFO-RESERVE = beginning balance LIFO reserve, scaled by lagged total assets;
- DIV_PAYOUT = cash dividends divided by pre-managed earnings (i,e,, earnings minus proxy for discretionary accruals from equation (1));
- FLEXIBILITY = root mean squared error of regression (1) used to proxy |DAC|;
- |OCF| = absolute value of operating cash flows, scaled by lagged total assets.

8.4 Empirical Results

Table 8.2 (Jan, 2001) reports summary statistics for the estimated regressions. As previously mentioned, the equations (3) and (4): DERIVATIVES and |DAC|, describe the magnitudes of derivatives and discretionary accruals, respectively. In his study, Jan presented the "two-stage least squares (2SLS) regression results for the DERIVATIVES and |DAC| equations estimated only on the sample of derivative users".

Table 8.2 shows that the "coefficients of DERIVATIVES and |DAC| are both negative and significant". These results support the hypothesis of Jan, i.e. "DERIVATIVES and |DAC| will be negatively associated, conditional on managers' maintaining a desired level of earnings volatility." In addition, Jan also uses the conclusion by Hausman (1978) that "DERIVATIVES and |DAC| are endogenous." Combining his conclusion with that of Hausman (1978), Jan argues that "the results suggest that derivatives and discretionary accruals are partial substitutes for smoothing earnings and that their magnitudes are determined jointly."

The results in Table 8.2 also show some insight of the relationship of the control variables with DERIVATIVES and |DAC|. For instance, CASH_COMP is positively associated with |DAC| but it is not positively associated with DERIVATIVES. However, STOCK and OPTIONS are positively associated only with DERIVATIVES. These results show that managers adjust accruals to increase their cash compensation and use derivatives to increase the value of their stock and options. (Jan, 2001)

CONVEXITY is positively associated only with |DAC|. This result is consistent with tax function convexity creating an incentive to smooth earnings through accrual management by the managers. (Jan, 2001; Tufano, 1996; Geczy et al. 1997; Allayannis and Ofek, 2000; Graham and Rogers, 2000).

The results show that LEVERAGE is positively associated with DERIVATIVES, whereas DISTRESS is positively associated with |DAC|. These provide evidence that managers

use derivatives and discretionary accruals to lower debt financing costs by reducing creditors' perception of firm risk. (Jan, 2001)

The positive association between RD and |DAC| suggests that R&D-intensive firms are more likely to have large discretionary accruals. On the other hand, since RD* LEVERAGE is positively associated with DERIVATIVES, it shows that firms with significant investment opportunities, together with costly external financing, are more likely to benefit from hedging. (Jan, 2001)

ANALYSTS is positively associated with DERIVATIVES. This suggests that for those firms who have larger analyst following, it is more probable that the managers use derivatives. (Jan, 2001)

Since DIVERSIFICATION is only negatively associated with |DAC|, it suggests that diversified firms have relatively small discretionary accruals. Additionally, FRGN_SALES is positively associated with DERIVATIVES. This result is consistent with the argument that managers use derivatives to hedge foreign exchange rate risk generated from international diversification. (Jan, 2001)

Table 8.2 Regression Results for Self-section Simultaneous Equations

Variables	Expected Sign	DERIVATIVES Standardized Coefficient	t-stat.	|DAC| Standardized Coefficient	t-stat.
|DAC|	-	-0.347	-9.634		
DERIVATIVES	-			-0.345	-0.487
CASH_COMP	+	-0.027	-0.445	0.247	4.422
STOCK	+	0.104	2.302	0.047	0.756
OPTIONS	?	0.113	2.812	0.017	0.573
CONVEXITY	+	0.044	0.837	0.098	2.247
LEVERAGE	+	0.076	2.056	0.089	1.208
DISTRESS	+	-0.046	-0.867	0.098	1.460
RD	+	-0.085	-1.252	0.148	1.568
RD*LEVERAGE	+	0.097	1.446	0.048	0.599
ANALYSTS	+	0.080	1.823	0.061	1.077
DIVERSIFICATION	-	0.029	0.931	-0.067	-1.787
FRGN_SALE	+	0.142	3.982	0.027	0.521
SIZE	+	-0.072	-0.687		
DIV_YIELD	+	0.051	2.111		
ST_DEBT	+	0.068	1.334		
CASH_CYCLE	+	0.057	2.222		
$\|DAC\|_{t-1}$	+			0.265	5.378
LIFO_RESERVE	+			0.036	0.922
DIV_PAYOUT	-			-0.122	-3.860
FLEXIBILITY	+			0.206	3.683
|OCF|	+			0.153	2.117
MILLS	?	-0.103	-1.641	-0.069	-0.733

9 TESTING THE HYPOTHESIS OF JAN (2001) WITH DIFFERENT DATA

9.1 Introduction

The goal of our following empirical research is primarily to test Jan's conclusion using another set of data and sample companies. Since SFAS No. 133 was issued and required to be adopted by public companies in the US, there has been much controversy regarding its impact on companies' earnings volatility. One of the major concerns is that it will increase the earnings volatility and hence will affect investors' perceptions on companies' risks. However, as Jan shows in his study, since the use of derivatives and accrual management is negatively correlated, managers can actually use derivatives as partial substitutes of accruals to smooth their firms' earnings. Jan only provides evidence to his argument using the data of the sample companies for the period 1994-1996, i.e. before SFAS No. 133 was issued. We intend to test whether his argument is also supported by data of different companies after the above regulation was issued. Further research with similar methods and purposes is also suggested by Jan at the end of his study. Therefore, we conducted our empirical research using the simultaneous equations designed by Jan and the 2000-2002 data of a sample of 120 S&P 500 companies to testify whether there is also a negative correlation between the use of derivative and accrual.

9.2 The Sample

We selected our sample from S&P 500 firms. As shown in Table 9.1, we firstly exclude 134 firms in financial services or regulated industries. Among the remaining companies, the ones that are owned by foreign corporations, had missing data or did not use financial derivatives consistently during 2000-2002 are also excluded from our sample. As a result, the total number of companies in our sample is 120.

Table 9.1 Sample Selection

Companies included in S&P 500 lists	500
Less: Firms in financial services or regulated industries	(134)
Less: Firms that are foreign-owned, with missing information or not consistent use of derivatives during 2000-2002	(246)
Total firms in sample	**120**

Table 9.2 Sample Descriptive Statistics (Million US Dollars)

Variable	n	Mean	Standard Deviation	First Quartile	Median	Third Quartile
Total asset	360	14,787.73	27,375.79	3,206.99	7,138.00	16,047.30
EBIT	360	1,325.66	2,733.22	298.00	692.00	1,397.00
Sale	360	11,513.98	20,394.08	2,964.00	6,272.00	11,856.00
Net income	360	527.81	1,821.52	109.62	324.64	714.00
Gross property, plant, equipment	360	5,667.30	10,203.96	852.72	2,075.00	7,046.00
Account receivable	360	1,720.74	3,758.63	361.73	745.99	1,449.15
Account payable	360	1,187.34	2,846.62	183.97	456.00	1,168.00
Total current liability	360	4,665.25	18,951.05	709.20	1,514.70	3,639.00
Total Liability	360	10,276.40	23,384.03	1,946.37	4,552.00	10,156.90
Depreciation	360	589.04	996.35	150.32	301.30	723.00
Earning per share	360	1.56	1.82	0.78	1.45	2.49
Common equity	360	4,453.55	7,603.51	1,201.70	2,410.00	5,600.00
Cash dividends	287	323.69	711.78	51.49	127.55	334.63
Cash from operation	360	1,354.64	2,846.64	341.73	728.39	1,566.00
Receivable turnover	360	13.94	24.80	5.22	6.95	10.38
Inventory turnover	360	15.95	21.01	4.05	6.96	18.20
Days to pay account payable	360	63.38	131.96	29.52	41.62	58.07
Average collection period	360	57.84	57.02	34.68	51.78	67.86
Cash turnover	360	51.51	73.32	10.19	29.60	59.38
Derivative	273	108.94	227.64	22.72	54.00	124.40

9.3 Measurement of Derivative Use and Accrual Management and Relevant Data

9.3.1 Measurement of Derivative Use

We use the same measures in Jan's study for the use of derivatives (DERIVATIVES). We obtain the disclosed notional amount of interest rate and foreign currency derivatives from the 2000-2002 Form 10-K filings retrieved from EDGAR through SEC's website. Then the derivatives are scaled by lagged total assets. The other financial data of the sample firms are also obtained from the Standard and Poor's CompuStat Database. The descriptive statistics of all the financial information obtained from CompuStat are reported in Table 9.2. Similar to the method of Jan, we also use three annual observations of the 120 sample companies, including the mean, standard deviations, first quartile, median and the third quartile of the various financial information of the sample firms. Except for "Earnings per share", the unit of which is US dollars,

and for "Receivable turnover", "Inventory turnover", "Days to pay account payable", "Average collection period" and "Cash turnover", the unit of which is days, all the other financial data are measured with the unit of million US dollars. Table 9.2 shows that most of the firms in our sample have relatively large levels of assets, debt, cash flows and sales. Therefore, it is likely that these firms tend to use derivatives as a feasible alternative to accruals to manage the firms' earnings volatility.

9.3.2 Measurement of Accrual Management

Our measurement of accrual management of the sample firms is also the same as that used by Jan using equation (1) to develop a proxy. The equation and its variables are explained in detail in Section 8.2.3 above.

9.4 Our Hypothesis and Empirical Design

9.4.1 The Hypothesis

As we mentioned above, we intend to test whether Jan's hypothesis is also supported by the data of our sample companies for the period 2000-2002, the period when SFAS was issued and required to be implemented by public companies in the US. As such, our hypothesis is the same as that of Jan, i.e. "DERIVATIVES and |DAC| will be negatively associated, conditional on managers' maintaining a desired level of earnings volatility."(Jan, 2001)

9.4.2 The Empirical Design

We also adopted the following basic simultaneous equations designed by Jan to further test his hypothesis in our research.

$$DERIVATIVES_{it} = \gamma_0 + \gamma_1 |DAC|_{it} + \gamma' CONTROLS_{it} + \varepsilon_{it} \quad (5)$$

and

$$|DAC|_{it,} = \lambda_0 + \lambda_1 DERIVATIVES_{it,} + \lambda' CONTROLS_{it} + \acute{\varepsilon}_{it} \quad (6)$$

However, due to the lack of necessary information and data, the control variables in our equations do not include all those used by Jan. Most of the financial data are from the CompuStat Database and the information regarding the executive's compensation is obtained from the ExecuComp Database.

The Simultaneous Equations and Common Control Variables

The simultaneous equation used in our research for DERIVATIVES and |DAC| are:

$$\begin{aligned} DERIVATIVES_{it} = {} & \gamma_0 + \gamma_1 |DAC|_{it} + \gamma_2 CASH\_COMP_{it} + \gamma_3 STOCK_{it} + \gamma_4 OPTIONS_{it} + \gamma_5 LEVERAGE_{it} \\ & + \gamma_6 DISTRESS_{it} + \gamma_7 RD_{it} + \gamma_8 (RD*LEVERAGE)_{it} + \gamma_9 FRG\_SALES_{it} + \gamma_{10} SIZE_{it} \\ & + \gamma_{11} DIV\_YIELD_{it} + \gamma_{12} ST\_DEBT_{it} + \gamma_{13} CASH\_CYCLE_{it} + \varepsilon_{it} \end{aligned} \quad (7)$$

$$|DAC|_{it} = \lambda_0 + \lambda_1 DERIVATIVES_{it} + \lambda_2 CASH\_COMP_{it} + \lambda_3 STOCK_{it} + \lambda_4 OPTIONS_{it} + \lambda_5 LEVERAGE_{it} + \lambda_6 DISTRESS_{it} + \lambda_7 RD_{it} + \lambda_8 (RD*LEVERAGE)_{it} + \lambda_9 FRG\_SALES_{it} + \lambda_{10} |DAC|_{it-1} + \lambda_{11} DIV\_PAYOUT_{it} + \varepsilon_{it} \quad (8)$$

In the equations used in our research, the common variables include: CASH_COMP, STOCK, OPTIONS, LEVERAGE, DISTRESS, RD, RD*LEVERAGE and FRG_SALES. The variables CASH_COMP, STOCK and OPTIONS are exactly the same as those used by Jan in the equations (3) and (4) and they are also scaled by the respective company's lagged total assets in our study. We expected that CASH_COMP and STOCK are positively correlated with derivative use and accrual management.

We also measured the variable LEVERAGE as the debt-to-asset ratio of the company. Since highly levered firms need to smooth earnings to reduce creditors' perception of firm risk, it is expected that this variable is positively associated with derivative use and accrual management.

Our measurement of DISTRESS, i.e. the financial distress of the company, is different from that used by Jan. We used the "Z-Score" which is a measure of bankruptcy probability obtained from CompuStat Database as the proxy of financial distress. We predicted that DISTRESS is also positively associated with derivative use and accrual management.

The variable RD is also included in our equations measured as ratio of research and development expense to total sales. We expected that RD is positively associated with derivative use and accrual management. We also expected the interaction between RD and LEVERAGE is positively associated with derivative use and accrual management (Geczy et al. 1997; Graham and Rogers, 2000).

Finally, we included in both the equations the ratio of foreign sales to total sales (FRGN_SALES) to measure the company's exposure to foreign exchange rate risk. We expected that this variable is positively associated with derivative use and accrual management.

Variables to Identify the Simultaneous Equations

In the equation for DERIVATIVES, i.e. equation (5), we also included variables to control for firm size (SIZE), dividend yield (DIV_YIELD), debt maturity (ST_DEBT), and cash cycle (CASH_CYCLE). The measurements are also the same as those used by Jan in his study. Since larger firms with scale economies are more likely to find derivatives to be cost effective (e.g., Tufano, 1996; Geczy et al. 1997; Allayannis and Ofek, 2000), so we predicted that firm size (SIZE) is positively correlated with derivative use. We also predicted that dividend yield (DIV_YIELD) is positively associated with derivative, because large expected dividend yields increase the firm's needs for cash and hence gives the managers incentives to hedge (Graham and Rogers, 2000). According to some studies such as Visvanathan (1998), firms with shorter debt maturity are more likely to use interest rate swaps. Therefore, we expected that short maturity debt (ST_DEBT) is positively associated with derivative use.

In our equation for |DAC|, the variables include those to control for accrual reversals (lagged value of |DAC|) and dividend payout rate (DIV_PAYOUT). The measurement of these variables is the same as that used by Jan. We estimated that the dividend payout rate is negatively associated with accrual management. Table 9.3 reports the descriptive statistics for the control variables, including the mean, standard deviation, first quartile, median and third quartile for the control variables. As previously mentioned, we use three annual observations of the 120 sample companies.

Table 9.3 Descriptive Statistics for Control Variables

Descriptive Statistics for Control Variables (n=360)

Control Variable	Mean	Standard Deviation	First Quartile	Median	Third Quartile
CASH_COMP	0.366	0.368	0.112	0.230	0.464
STOCK	0.887	1.787	0.119	0.296	0.841
OPTION	0.256	0.552	0.036	0.087	0.249
LEVERAGE	0.620	0.192	0.511	0.640	0.738
DISTRESS	4.750	8.242	1.698	2.820	4.480
RD	0.094	0.250	0.012	0.034	0.065
RD*LEVERAGE	0.507	1.555	0.044	0.094	0.287
FRGN_SALES	0.585	1.199	0.116	0.267	0.485
SIZE	8.938	1.084	8.073	8.873	9.683
DIV_YIELD	0.051	0.524	0.023	0.048	0.079
ST_DEBT	0.416	0.216	0.245	0.377	0.511
CASH_CYCLE	51.519	73.422	10.193	29.597	59.396
$\|DAC\|_{t-1}$	0.052	0.108	0.016	0.031	0.057
DIV_PAYOUT	0.289	0.952	0	0.242	0.466

Where:

- DERIVATIVES = notional amount of interest rate and foreign currency derivatives, scaled by lagged total assets. Data is obtained from the 2000-2002 Form 10-K filings received from EDGAR;
- |DAC| = absolute value of discretionary accruals, i.e. regression residuals from equation (1);
- CASH_COMP = salary and bonus compensation of CEO, scaled by lagged total assets;
- STOCK = fair value of shares owned by CEO, scaled by lagged total assets;
- OPTIONS = number of options outstanding held by CEO, scaled by lagged total assets;
- The compensation details of CEO used in CASH_COMP, STOCK and OPTIONS are obtained from ExecuComp.
- LEVERAGE = total debt divided by total assets;
- DISTRESS = measure of bankruptcy using Z-score as a proxy;
- RD = research and development expense, scaled by total sales;
- FRGN_SALES = foreign sales divided by total sales;
- SIZE = natural logarithm of the sum of total liabilities, preferred stock, and market capitalization of common stock;
- DIV_YIELD = cash dividends divided by market capitalization of common stock;

- ST_DEBT = short-term debt divided by total debt;
- CASH_CYCLE = cash turnover days; and
- DIV_PAYOUT = cash dividends divided by pre-managed earnings (i.e. earnings minus proxy for discretionary accruals from equation (1)).

9.5 Empirical Results

Table 9.4 reports the results of our estimated regressions using equations (5) and (6) which describe the magnitudes of derivatives and discretionary accruals respectively. In our research, we ran the least square regressions using the sample of derivative users.

Table 9.4 Regression Results for Self-section Simultaneous Equations

	DERIVATIVES		|DAC|	
	Standardized Coefficient	**t-stat**	**Standardized Coefficient**	**t-stat**
|DAC|	-0.447	-6.54		
DERIVATIVES			-0.454	-7.658
CASH_COMP	-0.069	-0.336	0.365	2.543
STOCK	0.118	2.098	0.076	0.068
OPTIONS	0.213	3.031	0.006	0.898
LEVERAGE	0.187	2.348	0.076	1.785
DISTRESS	-0.076	-0.343	0.087	0.921
RD	-0.554	-1.676	0.188	1.634
RD*LEVERAGE	0.103	1.650	1.654	0.597
FRGN_SALES	0.321	4.872	0.045	0.344
SIZE	-0.067	-0.540		
DIV_YIELD	0.044	2.338		
ST_DEBT	0.009	1.552		
CASH_CYCLE	0.087	3.980		
$\|DAC\|_{it-1}$			0.786	6.768
DIV_PAYOUT			-0.258	-2.384

Table 9.4 also shows that the "coefficients of DERIVATIVES and |DAC| are both negative and significant", which is consistent with Jan's conclusion in his study. As such, using the 2000-2002 data for the 120 S&P companies, our research also supports Jan's hypothesis that

the use of derivative and accrual management are negatively correlated. If also combined with the conclusion in Hausman (1978) that "DERIVATIVES and |DAC| are endogenous," our research also suggests that "derivatives and discretionary accruals are partial substitutes for smoothing earnings, and that their magnitudes are determined jointly."

Some of the other coefficients shown in Table 9.4 also reflect consistency of our conclusion with Jan's. According to Jan, "the results provide further insight into how managers of firms that use derivatives might combine risk and earnings management strategies to achieve their goals". For instance, contrary to our expectations, the regression result presents a negative correlation between CASH_COMP and DERIVATIVES. STOCK and OPTIONS are positively associated only with DERIVATIVES. Accordingly, these findings also support Jan's argument in his study that "these results are consistent with managers adjusting accruals to increase their cash compensation and using derivatives to increase the value of their stock and options." (Jan, 2001)

There are positive correlations between LEVERAGE and DERIVATIVES but there is not a significant correlation between DISTRESS and DERIVATIVES or |DAC| in our results. However, in Jan's regression results, he obtained a positive association between DISTRESS and |DAC|. This is not surprising because we used different variable to measure the financial distress of the companies.

We also obtain a positive association between RD and |DAC|. Therefore, it also supports Jan's argument that the firms with intensive research and development are more likely to have large discretionary accruals. We can also concludes from the positive correlation between RD* LEVERAGE and DERIVATIVES that firms with significant investment opportunities, together with costly external financing, are more likely to benefit from hedging. (Jan, 2001)

Again, the result in Table 9.4 shows that FRGN_SALES is positively associated with DERIVATIVES. Hence it is consistent with the argument that managers use derivatives to hedge foreign exchange rate risk because of international diversification. (Jan, 2001)

For the variables to control DERIVATIVES, SIZE, which is measured as a proxy to the company's scale, is not found to have a significant association with DERIVATIVES. Consistent with our expectation and result obtained by Jan, DIV_YIELD is positively associated with DERIVATIVES, suggesting that large expected dividend yields give the managers incentives to hedge (Graham and Rogers, 2000). Similarly, ST_DEBT is also proved to be positively associated with DERIVATIVES. Finally, CASH_CYCLE has a positive correlation with DERIVATIVES, consistent with the argument that companies having a long cash turnover period tend to use more derivatives.

For the control variables for |DAC|, the variables to control for accrual reversals (lagged value of |DAC|) are positively associated with |DAC| and DIV_PAYOUT has a negative association with |DAC|.

10 CONCLUSION

Derivative contracts basically depend on interest rates, currencies, indexes, and commodities, and as such result in real cash obligations or rewards. A balance sheet that does not include them is sorely incomplete. After more than five years of studying possible alternatives, considering input from constituents, and compromising, FASB has published new accounting standards for derivatives and hedging activities. The new requirements will increase visibility, comparability, and understandability of the risks associated with derivatives since they all will be reported at fair value as assets or liabilities. Inconsistency and incompleteness of previous accounting guidance should be reduced since the new approach provides comprehensive guidance for all derivatives and hedging activities.

Although the new accounting standard does not completely resolve the previous problems, it presents great improvement over the previous accounting standards. SFAS No.133 offers a more objective criterion of hedge accounting and more consistent, visible, as well as complete accounting approach for derivative over previous accounting. There is no need to recognize deferred or realized gains or losses as liabilities or assets. It becomes easier to determine what qualifies as a hedge. The new accounting standard also promotes the matching principle and reduces the potential of window-dressing. Lastly, it provides a more comprehensive definition of and a unique measurement method for derivatives.

It is true that SFAS No.133 creates new problem. However, the extent that these problems would adversely affect the assessment of financial statement users should not be exaggerated. Research suggests that the assessment of financial statement users would not easily be misled by the earning volatility caused by such accounting changes. Even though earning

volatility may affect managers' hedging decisions, this problem may be resolved by revising the managers' compensation package. Although the compliance cost is considerable, it is compensated by the benefits of more credible and understandable information. Also, financial statement users may not be easily misled by the reporting of a hedge item between historical cost and fair value. In addition, that the new accounting standard cannot accommodate all hedging strategies is apprehensible. Lastly, it is justifiable that the new accounting standard has different treatment of the some financial instrument or transaction. As a result, though not perfect, SFAS No.133 does offer better accounting for free-standing derivatives.

Based on the empirical research conducted in Jan (2001), we test his hypothesis that the use of derivatives, i.e. DERIVATIVES, and discretional accounting accruals, i.e. |DAC|, are negatively correlated using the data of 120 S&P 500 companies for the period from 2000 to 2002. We used the equations designed by Jan and the result of our research also supports a negative correlation between the above variables. As such, as concluded by Jan, derivatives and accruals can be used as partial substitutes by managers to smooth the earnings volatility of their companies.

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