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MOVING FROM VOLATILITY TO VALUE: ANALYZING AND MANAGING FINANCIAL AND ECONOMIC RISK

MOVING FROM VOLATILITY TO VALUE: ANALYZING AND MANAGING FINANCIAL AND ECONOMIC RISK

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This article proposes a new volatility measure that will identify hedging effectiveness in terms of financial statement volatility.

Earnings management has become an issue of critical importance in today's financial markets, receiving wide publicity by the press and scrutiny from the Securities Exchange Commission (SEC) and Financial Accounting Standards Board (FASB). Earnings management is the intentional misstatement of earnings that would have been different in the absence of any manipulation. In general, earnings management is considered to be when managers make decisions not for strategic reasons but solely to change earnings.¹

Firms appear to have strong incentives to manage earnings in order to meet and exceed market expectations. This can mean upwards or downwards manipulation of earnings. Two common earnings management practices are known as "big bath" or "cookie jar reserve" earnings manipulation. A popular notion has always been that managers prefer to smooth their earnings to make their firms appear less risky. Volatility means risk. Volatility in earnings reduces the value of a firm to investors,² giving managers a strong incentive to opportunistically manage earnings.³ However, there may be motivations to manage earnings directionally at times, which increases volatility but is particularly beneficial to managers who own a large number of stock options. Recent news is full of companies involved in stock option scandals.

Management of earnings may be focused on meeting quarterly earnings expectations, instead of being strategically focused. Depending on a company's risk management strategy, earnings from a particular project or financial transaction can be more volatile in the near term than over the life of the transaction. Often, earnings volatility and long-term value creation are tradeoffs. This article proposes a simplistic measurement of hedge effectiveness to be used to evaluate operational decisions to determine the extent to which it will create current earnings volatility. This earnings volatility, or hedge effectiveness measurement, can be evaluated against common economic risk measurements such as Value at Risk (VaR) and risk-adjusted return on capital (RAROC) to appropriately manage risk hedging strategies that will reduce the least desired risk. In addition, the earnings volatility measurement can be compared to external costs, such as devaluation of company stock. This puts context around the importance of earnings volatility, which will facilitate the risk-management decision. An analytical framework that incorporates measurement of earnings volatility introduced by complex accounting rules (such as FAS 133) is proposed here as well as how companies can manage the potential

divergence of accounting treatment from economic reality to meet their objectives.

Background

Researchers have thoroughly documented that a firm's stock price rises following a 'positive' earnings surprise, while stock prices fall sharply following 'negative' earnings surprises. There is equally as much research documenting the relationship between smooth earnings and risk-adjusted returns; in other words, smooth earnings signal value to investors. Not surprisingly, earnings management practices are also well documented in many research studies across all industries.⁴ For the purposes of this article, earnings management is a presumed business practice, and mitigating earnings volatility is a priority across companies.

In June 1998, the Financial Accounting Standards Board (FASB) issued Statement No. 133, Accounting for Derivative Instruments and Hedging Activities (FAS 133). The purpose of FAS 133 is to enhance the visibility, comparability, and understandability of the risks related to derivatives. However, there have been many objections to FAS 133 because of concerns about its effects on financial statements and the usage of derivatives.⁵ This is particularly true of financial services companies because of their active use of derivatives both as revenue sources and as means for hedging other revenue strategies.

FAS 133 requires that all derivatives be marked to market and that those changes in their market value be recognized in earnings in the current period. Derivatives may qualify for special hedge accounting treatment, potentially dampening the overall impact on earnings — provided they are used to hedge specific risks and an effective hedging relationship can be documented.⁶

There are studies that say FAS 133 increases volatility and others that defend it, concluding that volatility has been better managed because of it. In either case, the flexibility in the interpretation of this accounting standard has created opportunities to manage earnings and risk at each manager's discretion.

Financial services companies regularly measure risk since exposure from financial transactions and value changes in resulting assets and liabilities can be very volatile and directly impact earnings. Financial institutions require a method for reporting their risk that is readily understood by management. At the transaction level, various risk-adjusted return measurements are commonly used to evaluate the economics of the transaction. VaR analysis is prevalent in the financial industry as a measure of portfolio risk and can be applied at the enterprise level, instead of merely at the transaction level. These existing frameworks focus on the economic risk of transactions and resulting assets and liabilities or portfolios. Although financial and economic risks may be identical for a transaction, they can differ due to interpretation of accounting rules and hedging strategy.

For the purposes of this article, *financial risk* refers to potential exposure to a firm's reported earnings and return on assets. It is the volatility in the earnings and balance sheet caused by reporting consistent with Generally Accepted Accounting Principles (GAAP), such as FAS 133, for every accounting period, such as monthly or quarterly. *Economic (or operational) risk* refers to the actual exposure of the financial transaction or business strategy from start to finish, which may extend over many reporting periods. In other words, did the company "win" or "lose" on the entire transaction?

For financial services companies, hedging is a critical risk management tool used to mitigate some of the *economic* volatility, but hedging strategy can have different implications on short-term earnings volatility due to accounting treatment. These common risk frameworks may not correctly capture financial exposure because they are not tied to accounting methodology. This article will propose a new volatility measure that will identify hedging effectiveness in terms of *financial statement* volatility. This new measurement can be used to manage earnings volatility against economic value and long-term volatility.

The initial purpose of this study is to explore the motivations for earnings management and how they affect operational decision-making. It will then focus on the effect of accounting treatment and the opportunities it presents for earnings management and its effect on financial and operational risks. The focus of this research is to develop a framework for managing these risks. Specifically, this article will present findings for the following questions as they relate to the U.S. financial services companies:

1. What are the challenges for managing financial and operational risks, and what is their impact on earnings volatility?
2. How are these risks managed? What frameworks exist, or could be implemented, to ensure consistent measurement of financial and operational risks and appropriate allocation of resources and capital?

Financial and operational risks create volatility in earnings and in meeting long-term strategic goals. This article will first examine the effects of earnings volatility on corporate value. In doing so, earnings management practices will be analyzed to determine motivations

and implications. Next, FAS 133 and other accounting standards will be analyzed to determine the extent to which it may cause earnings volatility and how it can be used to manage earnings.

This article proposes a hedge effectiveness measurement to determine earnings volatility, which will give managers a tool for evaluating operating decisions and hedging strategy. This measurement parallels VaR frameworks currently used in the industry. This measurement can then be compared to volatility in corporate value. Changes in corporate value can be derived from changes in stock price, or total market capitalization. Operating decisions can be made using this new volatility framework to create the most value for the company.

Analytical framework

The analysis presented in this section will address the above questions using existing research studies on earnings management and examining the effect of accounting standards on earnings volatility, combined with existing risk management frameworks. This analysis will result in proposing an integrated financial and operating risk decision framework for managing risks and earnings. We begin with analyzing the first question: What are the challenges for managing financial and operational risks, and what is their impact on earnings volatility?

This question will be addressed by examining the following two challenges.

Challenge 1: Managing the importance of reported earnings. Corporate risk management theory argues that shareholders are better served if a firm maintains smooth earnings and it is well documented that companies manage these earnings. Motivations for earnings management can be summarized from many research studies as follows:

1. EPS (earnings per share) focus — Chief financial officers state that earnings are the most important financial metric to external parties.⁷ This is especially true for public companies.
2. Earnings benchmarks — Common benchmarks include:
 - same quarter last year;
 - analyst consensus estimate;
 - reporting a profit; and/or
 - previous quarter EPS comparisons.

Some specific motivations for meeting earnings benchmarks include:

- *Stock price-driven motivation.* Firms that report continuous growth in annual earnings are priced at a premium, relative to other firms,⁸ and failure to meet earnings benchmarks can lead to major negative price reactions;⁹
- *Stakeholder motivations.* By managing earnings, firms are able to enhance their reputation with customers, suppliers, and creditors and perhaps get better trading terms;
- *Employee bonuses.* Several papers argue that managers exercise accounting discretion to maximize the present value of their bonus compensation;¹⁰
- *Career concerns.* Inability to hit earnings targets is seen by the executive labor market as a “managerial failure”;¹¹
- *Debt costs.* Loss avoidance reduces the cost of debt.¹² For example, Froot, Scharfstein, and Stein argue that smooth cash flows can add value by reducing a firm's reliance on costly external finance.¹³ Empirically, Minton, Schrand and Walther show that volatility is costly, as it affects a firm's investment policy by increasing both the likelihood and the costs of raising external capital.

¹⁴

Since the downfall of Enron and WorldCom, there have been many publicized earnings management discoveries, including the very recent rash of options dating scandals. Many of the studies done on earnings management give a number of examples of this behavior in actual practice. For example, in an effort to determine the degree to which companies will use legal accounting actions to smooth earnings and meet analyst estimates, professors Campbell Harvey and John Graham of Duke and Shiva Rajgopal of the University of

Washington surveyed financial executives at 401 firms in the second half of 2004 and conducted extensive interviews with 20 senior executives. The financial officers were eager to talk about how companies would forgo projects that would give them economic gain in order to put a finer gloss on earnings. Given the choice between hitting earnings expectations and missing them in order to improve their long-term financial health, most U.S. companies would go for the short-term target.¹⁵

In order to manage the importance of reported earnings, the consequences of failing to meet earnings benchmarks must be evaluated. Bordurtha and Thornton state that "reported volatility is likely to affect investor perceptions of firm risk."¹⁶ Market valuation of firms is largely driven by expected corporate earnings.¹⁷ Volatility in earnings increases the perception of risk in an investment and may cause loss of value. Thus, one measure of earnings failure consequence is the stock price volatility after an earnings announcement. For example, historical price volatility (i.e., how much the company's stock price devalues immediately after informing the public that it will miss EPS expectations by \$0.10, \$0.20, etc.) can be one measure of risk.

One of the ways that historical volatility (HV) can be measured is with this simple standard deviation (std dev) formula:

$$HV = \sqrt{\frac{1}{n-1} * \sum_{i=1}^n (M - X_i)^2}$$

where n is the number of days in the period (i.e., quarter), M is the mean, and X_i is price change. HV is the historical volatility for the period measured, such as quarterly. In order to have a meaningful estimate of volatility, there should be sufficient history of stock price measurements. At least 30 data points are recommended, but more history provides better precision in estimates. This corporate volatility value can be compared to earnings volatility measured in the risk framework discussed later to calculate hedge effectiveness (HE). Earnings volatility will have to be more closely managed in companies whose values are highly influenced by the extent to which they meet earnings expectations.

Another consequence of volatile earnings may be financing costs. A firm's cost of capital can implicitly be measured by the credit rating of the firm. Lower-rated companies have implied higher risk and typically higher cost of capital, which ultimately lowers the return on capital.

Firms can generate earnings that meet or exceed the consensus forecast in two ways. One way is by raising earnings. A firm can raise quarterly earnings indirectly via accounting methods by increasing accruals, or directly, for example, by postponing expenses to future quarters. There is additional volatility, as well as opportunities in managing earnings in financial services companies, because of the complexity and subjectivity of accounting rules for financial transactions, which will be addressed in challenge 2. The alternative method is to lower earnings expectations through earnings guidance given to the public, which will not be addressed in this article since there is a growing trend to move away from providing earnings guidance. In a CFA Institute survey of its membership, 76 percent of respondents supported companies moving away from quarterly earnings guidance.¹⁸

Regardless, whether a company chooses to provide earnings guidance or not, it should understand both the financial and economic risks of their operations in order to manage both short-term financial reporting risks and longer-term economic risks effectively and optimally.

Challenge 2: Interaction of financial risks and operational risks. *Financial risk*, in this article, refers to potential exposure in a firm's reported accounting results, such as earnings and return on assets. As such, the interpretation and adoption of accounting standards creates financial exposure and volatility. This article will focus primarily on the impact of FAS 133 on earnings volatility and how that may differ from true economic exposure.

FAS 133 establishes accounting and reporting standards for derivative instruments and for hedging activities. It requires companies to include their derivatives on balance sheets and to adjust their earnings to reflect changes in fair market value. Prior to this standard,

derivatives remained off the balance sheet, and changes in market value of these instruments did not flow through the income statement. FAS 133 affects all companies who use derivatives and are not exclusive to financial services companies. However, derivatives are commonly used by financial service companies as part of their normal operations or for hedging their main operations. Now let's discuss how derivatives (speculative and hedging) are reported and how they contribute to earnings volatility.

Reporting of derivatives

Firms are concerned that derivative disclosures mandated by FAS 133 will induce volatility into the short-term earnings or cash flows of firms that are appropriately using derivatives to manage their anticipated exposures. This volatility arises because firms do not recognize these anticipated exposures on their books until they are actually realized.¹⁹ The general rules of reporting derivatives are as follows:

- Derivatives must be carried on the balance sheet at fair value;
- The amount shown for the derivative has to be adjusted to fair value on each balance sheet date; and
- The change in the fair value of the derivative from the previous balance sheet date is reflected as a holding gain or loss on the income statement.

The only exception to the recognition of a holding gain or loss is for derivatives that qualify as hedges. FASB has specified exacting criteria for classifying a derivative as a hedge: Management must provide sufficient instrumentation at the beginning of the hedge term to identify the objective and the strategy of the hedge, the hedged instrument, and the hedged item and to identify how effective the hedge is in eliminating a specific market risk for a specific hedged item.²⁰

The default assumption under FAS 133 is that any derivative instrument holdings represent speculative or investment items unless it may be demonstrated otherwise. And, as such, any gains or losses in the value of those derivatives must be presented at their fair market value (i.e., they are marked to their fair value at the conclusion of the accounting period and realized in current income).²¹

The underlying broad concept of hedge accounting is to achieve some sort of symmetry between accounting for the hedging instrument and accounting for the assets, liabilities, or transactions being hedged. If specified criteria are met (reduction of risk, designation, effectiveness, and so forth), gains or losses on the hedging instrument are recorded at the same time and in the same manner as the losses or gains on the hedged item. If the losses or gains on the item being hedged are deferred — for example, assets carried at cost or a future transaction — then the gains or losses on the hedging instrument are deferred as part of the carrying amount of the hedged item, rather than recognized currently in income. If the hedging instrument does not meet the specified criteria for hedge accounting, it is accounted for separately at value with gains and losses recorded currently in income.²²

Firms are not uniformly opposed to marking to market all their derivatives. For example, many firms believe that derivatives held for trading purposes should be marked to market. Similarly, firms generally believe that derivatives used to hedge existing exposures should also be marked to market. The roots of the dispute between the accounting regulators and the industry lie in the treatment of the so-called cash flow hedges. *Cash flow hedges* are hedges of anticipated or forecasted exposures. Firms routinely engage in derivative transactions to manage their long-term anticipated exposures.²³

FAS 133 is the first standard issued concerning derivatives since 1984. Since that time, the use of derivative instruments by U.S. corporations has exploded. Not surprisingly, the standard is a complicated and controversial set of rules. It has 540 paragraphs and some 250 interpretations as to how to apply the rules.

Not only will FAS 133 be expensive to implement and maintain, it will also result in more earnings volatility. And with the derivative-induced blow-ups at such companies as Procter & Gamble Co., Orange County, and Long-Term Capital Management, many risk managers worry about how the market will react. Jonathan Boyles, director of financial standards at Fannie Mae (which held \$240 billion worth of interest-rate swaps at the end of 2004) said, "People may see our use of derivatives and think we're taking on a lot of risk, when that's not the case." Indeed, with its multi-billion-dollar portfolio of mortgage loans, Fannie Mae relies on derivatives to mitigate risk. Accounting for the derivatives under FAS 133 will increase earnings volatility that was mitigated economically through derivative use. His argument captures the challenge of the interaction of financial and operational risks that accounting rules impose.²⁴

It is important to note that FAS 133 offers conditions where mark-to-market gain and losses do not flow through current earnings. In

some parts of the FAS, it gives explicit direction on how companies can qualify for hedge accounting treatment, where gains and losses on derivatives can be deferred until they mature.

If certain conditions are met, a derivative may be specifically designated as one of three types of hedges. 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. This is an important component of the FAS because it offers an opportunity to avoid the volatility that this accounting standard would otherwise induce.

The three hedge relationships

To qualify for hedge accounting treatment, where gains and losses are deferred under FAS 133, the relationship between a derivative and an exposure can be defined in one of three basic ways: ²⁵

1. Fair value hedges — hedges of exposures to the changes in value of a recognized asset or liability, or unrecognized firm commitment. The derivatives are marked to market, and gains/losses are reported in earnings;
2. Cash flow hedges — hedges of forecasted transactions, or the variability in the cash flow of a recognized asset or liability. The effective portion of the hedge is recognized outside of current earnings in other comprehensive income, and the ineffective portion is recognized in current income.
3. Net investment hedges — hedges of the net investment in a foreign operation. They are only currency related.

These three definitions offer management the opportunity to hedge their risk for a specific operational execution, knowing the accounting financial risk implications. Management must identify, document, and test the effectiveness of those transactions for which it wishes to use specific hedge accounting treatment. Some specific requirements are:

- The hedging relationship must be formally designated and documented at the inception of the hedge;
- The hedge must be expected to be highly effective at inception; and
- The effectiveness of the hedge must be tested regularly throughout its life. Effectiveness must fall within a range of 80–125 percent over the life of the hedge (80/125 FAS 133 dollar offset ratio standard).

There are two kinds of effectiveness tests for which both need to be met:

1. *Prospective effectiveness test*. This is a forward-looking test of whether a hedging relationship is expected to be highly effective in future periods;
2. *Retrospective effectiveness test*. This is a backward-looking test of whether a hedging relationship has actually been highly effective in past periods.

FAS 133 exposes hedges by forcing companies to deliberately measure and record (in income) all ineffectiveness; plus, it essentially outlaws some common hedge practices, such as macro and portfolio hedging. It focuses only on single transactions and not portfolio- or enterprise-level diversified risk. The result is a much greater chance that hedge mismatch will create volatile earnings and will often do so for technical reasons that do not necessarily reflect the economics of the hedging relationship. For risk managers, these accounting changes are a paradox between measuring and reporting financial versus true operational risks. Hedges placed for macro- or enterprise-level risks will introduce more volatility to the financial statements, even though the economic effect of these hedges is reduction of economic risk. More explicitly stated, changes in value for these hedges must be separately accounted through earnings, even if the assets they are hedging are not. In reality, assets and their hedges move in opposite directions and (if perfectly hedged) will move with the same magnitude; therefore, they should have reduced volatility.

Real-life examples

Example 1: Time value in options must be marked to market in income, so even if the option hedge is perfectly effective at limiting the company's downside risk with respect to future cash flows, the cost of the hedge (which used to be amortized in a straight line fashion), because it must constantly be revalued for financial reporting purposes, can become a source of undue volatility.

Example 2: Distortions that arise from differences between fair value accounting of derivative instruments and the accrual accounting

valuations used in valuing bank loans make hedge accounting difficult to achieve. Unlike financial derivatives, bank loans typically are valued at their loan origination value (book value) under accrual accounting rules. Inevitably, the differences between mark-to-market accounting valuation used in valuing derivative instruments and the accrual accounting valuations used in valuing bank loans can lead to valuation distortions — and distortions in bank earnings from one quarter to the next.²⁶

Example 3: Consider a \$100 million two-year revolving loan to WorldCom that originated in July 2001. The loan is hedged with a five-year credit swap derivative. For the first several months, the bank loan and default swap are strongly correlated in value, and the net impact of marking the loan and the default swap to fair market value is quite nominal.

In February 2002, the swap valuation and the loan value begin diverging dramatically. What is happening is that the credit spread on WorldCom obligations widened significantly as the financial difficulties of the borrower became public knowledge. Because of the valuation divergence, under FAS 133 the lender is required to take into income the 71 percent gain of the credit derivative, but it cannot take into P&L a 19 percent loss on the loan. The lender is required under accounting rules to recognize a net gain of 52 percent on a deteriorating asset, assuming the loan is deemed to be impaired. The net profit in this illustration would be \$52 million.

If the borrower ends up defaulting on a fully hedged loan, the value of the loan would typically deteriorate further, which, in this example, is falling to 25 cents on the dollar. The net difference between the loan and the swap is 96.84 percent of par, which is about a 3 percent loss, or \$3 million. So economically, the loss is 3 percent, but, financially, the company recognized a 52 percent gain prior to the default. If this happens in different reporting periods, this would appear a very volatile transaction since the entire \$52 million gain would have to be reversed and an additional \$3 million loss booked.

How will banks react? Banks could respond to the accounting disparity created by the mark-to-market requirement by unwinding gains halfway through the migration of a loan out of the "highly effective" range. This approach might work if the loans do not become impaired or go into default — because gains otherwise would be reversed as the revolving loan and default swap approach maturity. However, this is an unreasonable expectation and defeats the portfolio manager's main purpose of using credit derivatives, which is protection in the event of default.

The risk management framework proposed in this article will seek to balance enterprise/macro-level risk, as well as transactional risk, in terms of financial statement risk and overall economic risk. That brings us to the next set of questions: How are these risks managed? What frameworks exist or could be implemented to ensure consistent measurement of financial and operational risks and appropriate allocation of resources and capital?

The role of risk management is the process of bearing the risk you want to bear and minimizing your exposure to the risk you do not want. Most companies hedge risk to mitigate or offset the risks that arise from their normal operating activities. Such hedging often involves the use of derivatives. Hedging aims to mitigate the impact of economic risks on an entity's performance, and it can be done at the transaction level or macro level. Existing risk management frameworks measure both. These include static scenario measurements as well as simulated prospective results. Some hedging strategies qualify for the special hedge accounting treatment, but others may not. Because of accounting rules, financial risks may be different than economic or operational risks, creating a conflict in hedging strategies and tactics. Common risk management practices should be used in conjunction with a risk framework that captures financial reporting risks as well. This combined risk framework can be used to evaluate the hedging tactic to deploy and management's risk appetite for both financial and economic risks.

Current risk management practices

Financial institutions and corporate treasuries require a method for reporting their risk that is readily understandable by executives, regulators, and the investment public. They also require that this mechanism be scientifically rigorous. A well-accepted approach for measuring risk is Value at Risk (VaR) analysis. VaR is a common risk measure used by financial institutions and a growing number of industrial companies in assessing and managing their exposures. It is a number that expresses the maximum expected loss for a given time horizon, for a given confidence interval, and for a given position or portfolio of instruments attributable to changes in the market price of financial instruments.²⁷

VaR is a measure of losses due to "normal" market movements. Losses greater than the VaR are suffered only with a specified small probability. Subject to the simplifying assumptions used in its calculation, VaR aggregates all of the risks in a portfolio into a single number suitable for use in the boardroom, for reporting to regulators, or for disclosure in an annual report. Using a probability of x

percent and a holding period of t days, an entity's VaR is the loss that is expected to be exceeded with a probability of only x percent during the next t -day holding period. Loosely, it is the loss that is expected to be exceeded during x percent of the t -day holding periods. A VaR number applies to the current portfolio, so a (sometimes implicit) assumption underlying the computation is that the current portfolio will remain unchanged throughout the holding period. In interpreting VaR numbers, it is crucial to keep in mind the probability x and holding period t . Without them, VaR numbers are meaningless. For example, two companies holding identical portfolios will come up with different VaR estimates if they make different choices of x and t .²⁸

Volatility, here, refers to the distribution of the return around the mean. Historical volatility is used as an input into the risk model. In practice, this is usually quantified in terms of one, two, and three sigma volatilities to produce risk exposures at those sigma levels. It also considers correlation of investments. Once optionality is involved, it becomes computationally difficult to calculate the VaR, requiring statistical simulation of the portfolio. *Optionality* is defined as the value of additional optional investment opportunities available only after having made an initial investment. In financial services companies, simulation of portfolios is a common approach to estimating VaR using historical volatilities and correlations. VaR is typically measured at the portfolio and/or enterprise level because there are often macro hedges or diversification benefits from combining financial assets. However, hedge effectiveness is measured at the transaction level for purposes of reporting gains and losses on the financial statements. As a result of this inconsistency, a company's hedging strategy may not hedge both financial and economic risks simultaneously. This worrisome potential of earning volatility has captured the attention of senior management and that of the investing public. Bankers and risk management advisers have been devising ways to limit the volatility of hedges, by either changing strategies or inventing new hedge products.

Technical application of determining hedge effectiveness under FAS 133

We begin with summarizing the FAS 133 financial statement impact for specific classifications, as shown in Exhibit 1.

Exhibit 1.

FAS 133 Financial Statement Impact for Specific Classifications

Classification	Measurement	Changes in carrying amount reflected here (unless part of a designated hedge relationship)
Financial assets & liabilities at fair value through profit or loss (held-for-trading)	Fair Value	Income Statement
Loans and receivables	Amortized cost	Income Statement
Held-to-maturity investments	Amortized cost	Income Statement
Available-for-sale financial assets	Fair Value	Equity
Other financial liabilities	Amortized cost	Income Statement

FAS 133 leaves it up to corporations to devise, apply, and defend their own tests for hedge effectiveness.²⁹ For example, a hedge is deemed effective if the R-squared of the regression line explaining the data is sufficiently high (80 percent). However, a high R-squared by itself is not a reliable indicator of effectiveness. In addition, the changes in value should be offsetting as much as possible. In other words, the slope of the regression line should be close to -1, where a change in the market value of the asset is offset by a change in its hedge.

The strength of a hedge relationship can be measured with regression analysis to determine effectiveness. This simple tool can be easily implemented in Microsoft Excel and should be run as frequently as desired by accounting and risk managers, but at least as frequently as an accounting reporting period (i.e., monthly or quarterly). The data points are market value changes in the asset and the hedge.

$$Y = a + bX + e$$

- Y = dependent variable, derivative change in fair value;
- a = y-axis intercept;
- b = slope of line, change in Y /change in X ;
- X = independent variable, hedged item change in value for designated risk;
- e = random error.

There are three critical test statistics to determine an effective hedge relationship when using regression analysis:

1. Slope of line must be negative and $-0.8 < b < -1.25$ (The change in hedged asset value is opposite change in derivative value.);
2. R-squared must be greater than .96 (The higher the R-square value, the more trust that can be placed on the test statistics. It is a subjective value established by the management of financial service company.); and
3. F-statistic must be significant (statistical validity of model).

Exhibit 2.

Hedge Relationship Illustrated through Regression Line (a=0, b= -1, e=0)

Quarter	Change in Value (\$ million)		
	Bond	Swap	Package (Bond + Swap)
1	1.1	(1.0)	0.1
2	1.0	(0.8)	0.2
3	2.0	(1.6)	0.4
4	(2.8)	2.5	(0.3)
5	(2.1)	2.6	0.5
Standard Deviation	2.1		0.3
Ratio of Standard Deviations:		14.5%	
Hedge Effectiveness:		85.5%	

However, the hedge equation above is limited in its applicability because R-squares and F-statistics are not commonly referenced in financial institutions as a measure of risk.

The hedge effectiveness model is similar to the idea of variance reduction introduced by Ederington in 1979 for assessing hedging performance. Ederington's method measures volatility reduction from a ratio of variances. The model proposed here uses standard deviations because they are more accepted and meaningful to management and consistent with VaR, which is commonly used in risk analytical framework. Although VaR is commonly used, it may present unintended financial implications, particularly during economic crisis.³⁰ VaR computations use standard deviation-based formulas that are applied to historical or simulated changes in the value of a company's portfolio. The hedge effectiveness model can be applied at the transaction level. The volatility of the item being hedged in the absence of a hedge is the reference against which this effectiveness should be measured.

The model presented below is favorable to other methods because of its simplicity as well as its defensibility. Standard deviation is the accepted measure of volatility. When expressed in dollar terms, standard deviation reflects actual business risk and is more familiar to management than R-squared. The hedge effectiveness model measurements are stated in terms of a ratio instead of dollars at risk under VaR methodology, but they can easily be translated into total dollars at risk, as well as translated into hedge effectiveness accounting tests.

$$HE = 1 - [(\text{std dev of hedge package}) / \text{std dev (item being hedged)}]$$

If optimal deviation is zero, in other words an idealized mean of zero, then:

$$HE = 1 - ((\Delta_a + \Delta_h) / \Delta_a)$$

$$HE = 1 - (1 + (\Delta_h / \Delta_a))$$

$$HE = - (\Delta_h / \Delta_a)$$

which equals 80/125 FAS 133 result (that is, the change in value of the hedging instrument will be between 80–125 percent of the change in value of the hedged item) where Δ_a = change in the value of asset being hedged and Δ_h = change in the hedge value.

An illustration using actual values (can be historical or prospective values) is shown in Exhibit 3.

Exhibit 3.

Change in Asset and Hedge Values and Hedge Effectiveness

Quarter	Change in Value (\$ million)		
	Bond	Swap	Package (Bond + Swap)
1	1.1	(1.0)	0.1
2	1.0	(0.8)	0.2
3	2.0	(1.6)	0.4
4	(2.8)	2.5	(0.3)
5	(2.1)	2.6	0.5
Standard Deviation	2.1		0.3
Ratio of Standard Deviations:		14.5%	
Hedge Effectiveness:		85.5%	

From Exhibit 3, volatility = (0.3MM / 2.1MM) = 14.5 percent, which means a hedge effectiveness of 85.5 percent. This hedge effectiveness ratio can be used to quantify financial risk as well as determine the applicability of the hedge tests in FAS 133 to determine if hedge accounting treatment is allowable. The change in value is based on marking both the bond and the derivative swap to market, thus in compliance with FAS 133 hedge accounting rules. Used in conjunction with common risk management practices such as VaR and scenario testing, the volatility in financial reporting can be measured against true economic volatility.³¹

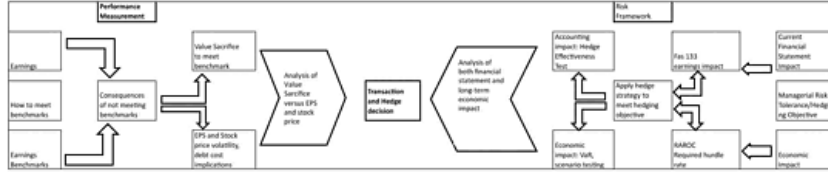
For example, in the previous illustration, the swap may hedge perfectly against certain interest rate risks of the bond, as demonstrated by various risk measures. So, over the life of the bond, all the interest rate risk is hedged away and ultimately risks no losses from interest rate moves. However, mark-to-market volatility will flow through to the financial statements, but one can approximate that risk as 14.5 percent of the bond value. This ratio will alert the user to when hedge accounting treatment will not apply and to the earnings volatility that is at risk. The risk manager can evaluate whether the hedge already in place is effective for the transaction to meet return on capital requirements or if the accounting volatility could be better managed. If a transaction fails the 80/125 rule using this hedge effectiveness ratio, the volatility of the derivative in its entirety may flow through to the financials. That is significantly different from the economic risks measured by VaR or other risk measurement frameworks. As a manager, the hedge strategy is dependent upon risk return tolerance.

Decision process map for managing risk and earnings

Exhibit 4 presents a decision process map to manage risk and earnings that incorporates measurement of some of the most influential components affecting earnings volatility for a financial services operation.

Exhibit 4.

Decision Process Map for Managing Risk and Earnings for a Financial Services Operation



Major elements of the decision process map illustrated in Exhibit 4 are described as follows. First, what is the hedging objective of the firm? This may be decided by executive management or risk management.

Objectives.

- Reduction in the variability of corporate income (for many);
- Elimination of risks peripheral to the company's core business in which they operate;
- Improvement or maintenance of the competitiveness of the firm; and/or
- Contingent on the preferences of the firm's shareholders.

What amount of volatility can they accept? Does a 1 percent miss in earnings lead to a 5 percent devaluation of the stock price? The value of the proposed financial transaction should be compared to benchmark failure costs (i.e., company devaluation) if they were to cause sufficient negative volatility to miss the earnings benchmark. One can use the historical stock price volatility model introduced earlier in this article to compare against financial risks of the transaction measured using the hedge effectiveness model and other risk management models. Another way to measure this is to determine how much value a firm would have to sacrifice in order to meet its benchmark. This may be due to additional hedging costs or to a restructuring of the transaction to meet hedge accounting treatment rules — but losing total economic return in the process.

Second, what is the firm's exposure to financial price risk? What is the potential liability from financial risks? It is risk management's role to identify and quantify economic risks. They must now understand the accounting implications in order to accurately capture total financial exposure, including economic risks. It is a combination of risk management of financial reporting and economic risks.

Third, what hedge instruments are available, and how do they behave in different pricing environments? Transactions must show hedge effectiveness in order to qualify for preferred accounting treatment, so scenario testing must prove this effectiveness over time from a mark-to-market perspective. Hedges can also be applied to mitigate total cash flow exposure over the entire transaction but may not mitigate daily mark-to-market exposure. Risk management practices should identify both current financial and long-term economic risks under various scenarios.

Fourth, are the risks appropriate for the return expected from the investment or transaction? Risk-adjusted return on capital (RAROC) analysis should be performed to ensure adequate risk/return profile. The focus is on identifying those business lines or transactions that offer the best use of the firm's limited economic capital. To make such assessments, firms employ risk-adjusted performance metrics (RAPMs) such as RAROC. A RAPM is a performance metric that is based on a standard accounting performance metric — but with some adjustment to reflect "true" or "economic" risk. Return on capital (ROC) is a widely used metric because economic capital reflects true or economic risk.

$$ROC = \frac{\text{revenue} - \text{expenses}}{\text{capital}}$$

When applied to individual business lines or transactions, the ROC formula may be modified slightly:

$$\text{ROC} = \frac{\text{revenue} - \text{expenses} + \text{income from capital}}{\text{capital charges}}$$

Perhaps the most common definition of RAROC is simply ROC with an adjustment for expected loss:

$$\text{RAROC} = \frac{\text{revenue} - \text{expenses} - \text{expected loss} + \text{income from capital}}{\text{capital}}$$

When ROC or RAROC is used to assess a firm's actual or projected performance, it is generally applied to one year's actual or projected results. This may not be appropriate when ROC is applied to assess a business line's or a transaction's performance. If the purpose is to select desirable business lines or transactions to invest in, one-year's projected ROC may be misleading. A business line or a transaction might be expected to lose money in its first year, only to turn profitable in subsequent years. Accordingly, when ROC is used for internal decision-making, the ROC of a business line or a transaction is typically calculated as an average ROC over several years or the life of the transaction. Management should evaluate base case returns, which are the expected returns, as well as volatility under various scenarios as presented from both financial and economic risk viewpoints.

Many companies adopt a hurdle ROC rate for new projects/transactions to ensure growth. Hurdle rates or other tolerance measures may also cover various economic scenarios to test volatility effects.

Managerial implications

Many of the earnings management techniques illustrate how short-term goals take priority over strategic and economic value. This is one of the challenges of managing between financial and operational risks.

Although the creation of long-term company value is widely accepted as management's primary responsibility, this research suggests that managing volatility in short-term earnings expectations is often inconsistent with long-term value creation. The costs of hedging for smooth earnings may reduce the total value or economic return of a transaction or a business. In other words, short-term risks are managed at the expense of value creation in order to mitigate financial volatility. Sometimes this is appropriate because external costs such as stock market price volatility may be greater than the value lost. All of these risks should and can be measured and put in a framework to be evaluated by management.

Conclusion

One recurring theme in earnings management literature is that firms with smoother financial statements are more highly valued. Therefore, risk management practices that offer smoother financials must be evaluated. The core problem when deciding upon a hedging policy is to strike a balance between uncertainty and the risk of opportunity loss. We must consider the risk aversion and preferences of the shareholders when establishing this balance. Shareholder risk appetite can be measured by stock price movements. How volatile is your stock price when earnings are not met? How sophisticated or tolerant are investors to earnings volatility? This may influence the type of transactions executed and hedged.

Accounting standards such as FAS 133 introduce new risks to current earnings that can be managed. Volatile earnings risk aversion may determine the extent to which you hedge financial and economic risks.

There are trade-offs between managing short-term financial risk versus long-term value creation. Operationally, companies may choose to effectively hedge for short-term financial reporting risks and returns instead of longer-term economic returns in order to reduce volatility and meet short-term objectives to the detriment of foregone strategic opportunities or return on capital. Accounting rules can

introduce more volatility to earnings, which may misrepresent economic risk of a business strategy or a transaction. To make the optimal decision, one must evaluate the effects of volatility from earnings on external costs (such as company value), increased financing costs, or decreased access to capital. These costs must then be evaluated against the project or transaction risk/return profile based on both current earnings volatility and long-term economic risks. An illustration of the decision process map is presented. In summary, a transaction or project has to be evaluated in terms of how it will affect both current earnings and economic value-add in the long term. For financial services companies, current earnings volatility will be greatly affected by the use of derivatives as part of their normal operations or as instruments to hedge their operations. Risk must be measured both in long-term economic risk terms as well as in impact to current period financial statements.

Recommendations for future work

The broad scope of the risk framework may be one of the limitations of this study, but it allows for more flexibility in its use. Furthermore, not all of the common risk frameworks used by financial service companies were identified and evaluated here as part of the overall earnings/risk decision flow. Only one approach to measuring stock price sensitivity was addressed in this article. There are many ways to measure this sensitivity, and the most appropriate measure should be used. However, some measurement for the cost of earnings volatility should be considered in the decision process. In addition, the hedge effectiveness model proposed here must be back-tested for validity for each type of derivative/asset hedge relationship to determine if prospective results would be adequately represented by the model.

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