A Note on Fair Value Accounting in a Crisis: The Influence of the Hedge Accounting Regulations

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Abstract

The role of fair value accounting in the financial crisis is controversial and heavily debated. Some claim that fair value accounting of financial instruments contributed to the recent crisis. This note acknowledges that, in many industries, a significant proportion of the financial instruments are entered into for hedging purposes. I examine if a crisis, through the hedge accounting regulations, can affect the *overall use* of fair value accounting in an economy. I present analytical evidence that the boosting price volatility during the crisis lead to more companies complying with the hedge accounting requirements, and thus to an increased extent of hedge accounting at the expense of fair value accounting. Hence, the analysis suggests that the hedge effectiveness provisions ensure more hedge accounting in uncertain and turbulent times, which are exactly the periods when hedge accounting is especially called for.

Keywords: Cash flow hedging; nonhedgeable risk; hedgeable risk; SFAS 133; IAS 39; mark-to-market accounting; fair value accounting; hedge accounting.

1. Introduction

In the wake of the financial crisis, there has been a huge debate, both among academics and practitioners, of accounting's role in the crisis [1, 2, 3, 4]. The bone of contention is the use of fair values in the financial reports; some claim that fair value accounting contributed to, and maybe even caused, the financial crisis – others harshly dismiss all such claims and state that accounting's only role was to render visible the true values of companies' assets [5, 6, 7, 8]. The focus is primarily on the use of fair values for financial assets and liabilities, although fair value accounting may also be applied for other groups of assets, for instance biological assets and investment property. In the aftermath of the crisis, both the International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) have accelerated long-lived plans to improve and simplify the financial instrument provisions of respectively International Financial Reporting Standards (IFRS) and US Generally Accepted Accounting Principles (US GAAP) [9]. The IASB seeks to replace International Accounting Standard 39 (IAS 39) in three phases and the phases comprise classification and measurement, impairment methodology, and hedge accounting, respectively. In contrast to the IASB's three-phase approach, the FASB is taking a "one-shot" approach to revising the accounting treatment of financial instruments, but both boards expect to complete their work on financial instrument standards by the end of 2010 [10]. Thus, there is an evident need for knowledge on how the financial crisis interacted with the prevailing accounting provisions, and how the financial crisis influenced the implementation of these provisions.

The fair value accounting of financial instruments in a crisis can be analyzed along several dimensions. Some studies investigate how market prices that resulted from a bubble possibly affected the financial crisis [5, 6]. Others look into the effects of illiquid markets and the problems related to correct measurement of fair value [2, 4]. This note is devoted to the use of fair value accounting for hedging instruments. Hence, the note does not analyze fair value accounting in general; instead, it examines if the extent of fair value accounting of financial instruments may be affected by the hedge accounting regulations. Specifically, the note focuses on cash flow hedging and illustrates that a crisis can have consequences for the extent of fair value accounting. I apply the well-known risk management model of Brown and Toft [11] and the hedge effectiveness measures of Finnerty and Grant [12] as the basis for the analysis. The note adds to existing research by illustrating how the measurement procedures for hedge effectiveness lead to a larger extent of hedge accounting at the expense of fair value accounting during a crisis situation. The increased hedge effectiveness is driven by the spikes in price volatility in commodity and energy markets that typically characterize a crisis, compare the recent financial crisis.

2. Background and Motivation

The accounting treatment of derivatives was incomplete and inconsistent prior to IAS 39 and Statement of Financial Accounting Standards 133 (SFAS 133) [13]. Hedging derivatives were often not reflected in the financial statements. Most firms only disclosed derivatives in the footnotes of the financial report. Gains and losses from a hedge instrument were recorded when the corresponding gains or losses from the hedged item or activity were recognized. This deferral-hedge accounting practice was changed with the introduction of IAS 39 and SFAS 133. The main principle of these accounting standards is that derivatives are recognized as either assets or liabilities at fair value on the balance sheet, and unrealized gains and losses are reported in the income statement. However, under the hedge-accounting rules of IAS 39 and SFAS 133, companies can recognize gains and losses on the hedging derivatives in the income statement in the same period as offsetting gains and losses on the hedged item. If the requirements for hedge-accounting are met, all value changes of the derivatives are recognized as a "hedging reserve" in equity. The fair value changes are not recorded in the income statement until the hedged transaction affects profits or loss.

Hedge accounting is a privilege that has to be earned by satisfying a set of criteria [12]. The criteria for hedge accounting demand that the management must identify, document and test the effectiveness of those transactions for which it wishes to use hedge accounting. IAS 39 and SFAS 133 require the hedging to be "highly effective", meaning that "…the changes in fair value or cash flow of the hedged item and the hedging derivatives offset each other to a significant extent" [12, p. 96]. IAS 39 and SFAS 133 do not endorse the specific testing methodology to be applied to qualify for hedge accounting. Finnerty and Grant [12] describe four methods of testing hedge effectiveness: the dollar offset method, the relative difference method, the variability reduction method, and the regression method. I do not go into the details on the four methods, but note that the dollar offset method requires that the derivative's change in value should offset at least 80 percent and not more than 125 percent of the value change of the hedged item, whereas the explanatory power – the R^2 – in a regression of the value changes of the derivatives on the value changes of the hedged items must exceed 80 percent under the regression method.

IAS 39 and SFAS 133 recognize three types of hedge accounting: fair value hedges, cash flow hedges and hedges of the net investments in foreign operations. This note is devoted to cash flow hedging and I focus on companies that apply derivatives as a means for reducing cash flow variability. The magnitude of future random cash flows often depends on hedgeable as well as unhedgeable risk. For instance, in markets for commodities and energy, the price risk will typically constitute a hedgeable risk, whereas the quantity will be unhedgeable. In the aftermath of the financial crisis, an interesting question arises: will a crisis in itself affect the extent of hedge accounting in markets characterized with frequent risk management activities? Such an influence can only occur if the statistical parameters that decide the hedge effectiveness are affected by the crisis. There is solid evidence that the price volatility of energy and commodities spiked during the financial crisis [14, 15, 16]. This is illustrated by Table 1. Section 3 analyzes how such a change in the price volatility is likely to affect the hedge effectiveness of cash flow hedges.

Table 1: Commodity Prices.

		2006	2007	2008	2009
Aluminium	Average	2573	2640	2578	1669
	Standard Deviation	156	178	506	281
	Coefficient of Variation	0.06	0.07	0.20	0.17
Coal	Average	53	70	136	77
	Standard Deviation	4	14	33	7
	Coefficient of Variation	0.07	0.19	0.25	0.10
Average Petroleum Spot Index	Average	120	133	182	116
	Standard Deviation	10	23	54	24
	Coefficient of Variation	0.08	0.17	0.30	0.21
Copper	Average	6731	7132	6963	5165
	Standard Deviation	1172	830	1955	1307
	Coefficient of Variation	0.17	0.12	0.28	0.25

Table description: Table 1 lists the annual averages, standard deviations, and coefficients of variation of the aluminium price, the coal price, the average petroleum spot index, and the copper price. Aluminum: LME standard grade, minimum purity, cif UK. Coal: thermal for export, Australia. Average Petroleum Spot index of UK Brent, Dubai, and West Texas. Copper: LME, grade A cathodes, cif Europe. All numbers are based on monthly observations. Source: The International Monetary Fund (http://www.imf.org/external/np/res/commod/index.asp).

3. The Effect on Hedge Effectiveness from Increased Price Volatility: Analytical Results

There is a huge literature on whether or not companies should engage in risk management. In fact, under the *hedging irrelevance proposition* "Hedging a risk does not increase firm value when the cost of bearing firm risk is the same whether the risk is borne within the firm or outside the firm by the capital markets" [17, p. 46]. However, hedging may increase firm value if firms face some costs in low-profit states that make value a concave function of accumulated profit or terminal wealth [18]. Such a concave relationship can be generated by convex tax functions, costly external financing, and direct and indirect costs of financial distress. Overall, there is an abundant literature suggesting that the hedging irrelevance proposition does not always hold, and that risk management activities indeed can increase firm value [see 19 and the references therein].

Consider firms with hedging programs designed to maximize firm value in anticipation of deadweight costs concurrent with low future earnings [see 11, 19 for different types of deadweight costs that could motivate this type of hedging program]. I analyze hedge effectiveness in the economic setting of Brown and Toft [11] in order to learn how the IASB and the FASB's "high effectiveness" criterion is affected by a spiking price volatility, compare the recent financial crisis. In the economic environment of Brown and Toft [11] the future net profits of a firm that faces hedgeable price risk ($\tilde{p}$), unhedgeable quantity risk ($\tilde{q}$), constant marginal costs (s_1), and fixed costs (s_2) are given as $\left(\tilde{p}-s_1\right)\tilde{q}-s_2$. For a firm that adheres to linear hedging strategies, these random net profits are modified by derivatives payoffs given by the number of forward contracts (*a*) times the difference between the price and the forward price *f*.

$$np(a) = (\tilde{p} - s_1)\tilde{q} - s_2 + a(\tilde{p} - f) \qquad (1)$$

Brown and Toft [11] show that the optimal number of forward contracts for firms maximizing firm value is given by a^* given a deadweight cost function $c_1 e^{-c_2 np}$ where "the parameter c_1 measures the overall level of deadweight costs, while c_2 controls slope and curvature" [11, p. 1291] and expected production and price are set equal to one.

$$a^* = -1 - (1 - s_1)\rho \frac{\sigma_{\tilde{q}}}{\sigma_{\tilde{p}}} + (1 - s_1)(1 - \rho^2)c_2\sigma_{\tilde{q}}^2 \qquad (2)$$

The firm is allowed to apply hedge accounting if the *a** position in forward contracts leads to a hedge effectiveness of minimum 80%, i.e., the variance reduction achieved by the forward position must reduce the cash flow variability by at least 80% [12]. The purpose of this note is to analyze how hedge effectiveness is related to price volatility. This is illustrated in Figure 1. In their study of how firms should hedge, Brown and Toft [11] analyze a base case and several alternative risk exposures. I assume that the price volatility exceeds Brown and Toft's [11] "low price volatility case" of 0.1. Further, I present results for three different correlations between price and quantity, equal to 0.5, 0 and -0.5, respectively. All other assumptions are set equal to Brown and Toft's [11] assumptions for a "base case". However, note that the structure of the graphical representation is unaffected by the specific level of the model parameters: all cases provide a similar picture. The main message of this note is that, ceteris paribus, the hedge effectiveness is positively related to the price volatility. Assume for instance that the price volatility increases from 0.15 to 0.3 as a direct consequence of a crisis situation. Before the crisis, none of Brown and Toft's [11] "base case" companies would be able to apply the hedge accounting provisions of IAS 39 and SFAS 133. All hedging instruments would have to be accounted for under the main principle of IAS 39 and SFAS 133, i.e., fair value accounting. However, if the price volatility increases to 0.3, all companies would be allowed to apply hedge accounting as long as the correlation between price and quantity exceeds -0.5. Should the volatility increase further would even companies with an extremely large negative correlation between price and quantity be allowed to apply the hedge accounting provisions.

The requirements for hedge accounting have been widely criticized for being overly rigid and complex [20], and recent evidence suggests that many firms find these requirements difficult and costly to satisfy [21]. However, Figure 1 illustrates that in a crisis situation characterized by boosting price volatility in energy and commodity markets, more companies will be able to meet the requirement of high hedge effectiveness. It should be noted, though, that there might be an indirect effect of a price volatility spike on the hedge effectiveness if the price volatility influences the firm specific production (quantity) volatility. Nevertheless, as the production capacity is given, at least in the short run, for most producers of commodities and energy, the effects on the produced quantity are likely to be minor. It can be shown that the conclusions of Figure 1 still hold in the case of increased quantity volatility as long as the relative increase in the price volatility is larger than the relative increase in the quantity volatility. Note also that if there is a negative correlation between price and quantity, and the price volatility increases moderately from an initially very low level, it is theoretically possible that the increase in price volatility can lead to a drop in hedge effectiveness. The assumptions underlying this scenario are considered highly unrealistic and not discussed further in this note.

Figure 1: Hedge Effectiveness as a Function of Price Volatility.

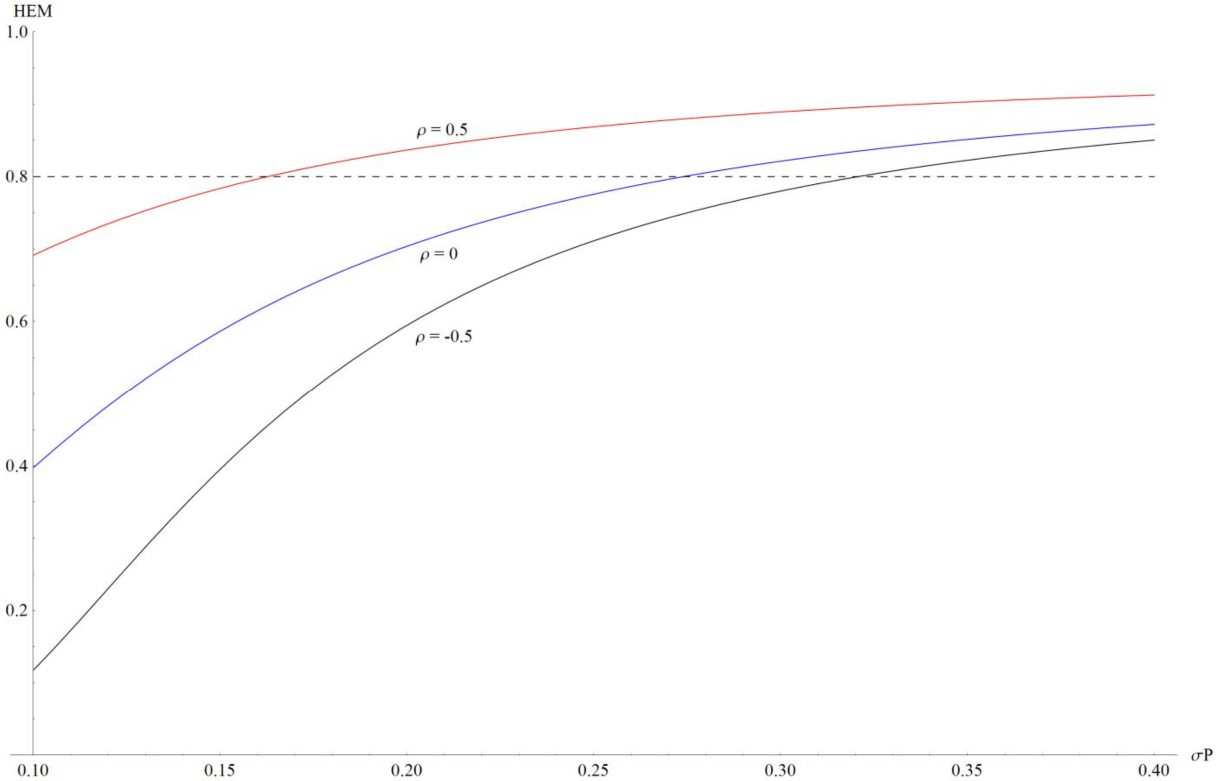

Figure description: Figure 1 displays prospective hedge effectiveness (HEM) for value-maximizing firms facing the random net profits $np(a) = (\tilde{p} - s_1)\tilde{q} - s_2 + a^*(\tilde{p} - f)$ as a function of price volatility. p and q denote price and produced quantity, respectively, and both variables are stochastic. s_1 and s_2 are marginal and fixed costs, respectively, and *f* is the forward price. a* is the value-maximizing number of forward contracts in Brown and Toft's [11] model, given a deadweight cost function $c_1 e^{-c_2 np}$ where "the parameter c_1 measures the overall level of deadweight costs, while c_2 controls slope and curvature" [11, p. 1291]. All firms that face risk exposure with prospective hedge effectiveness below the 80% threshold (dashed line) fail to qualify for hedge accounting [12]. The figure shows the hedge effectiveness under three different assumptions for correlation between price and quantity, respectively 0.5, 0, and -0.5. All other assumptions are in accordance with Brown and Toft's [11] "*base case*": s_1=0.25, s_2=0.4, $\sigma_P=\sigma_Q$=0.2, $\mu_P=\mu_Q$=1, c_1=0.1, c_2=5. The structure of the graphical representation is independent of the chosen parameters. The mathematical expressions underlying Figure 1 are rigorous and non-intuitive and are thus not included in this note. All formulas are available from the author upon request.

4. Conclusion

It has been claimed that fair value accounting of financial instruments contributed to and reinforced the financial crisis. A significant proportion of many companies' financial instruments are entered into for hedging purposes. Under the prevailing hedge accounting regulations, the instruments have to be recorded at fair value unless the companies satisfy some strict requirements for hedge accounting. Thus, the hedge accounting regulations have a direct effect on the overall extent of fair value accounting in an economy. The effect is largest for companies operating in markets characterized with substantial hedging activities, such as most financial markets and the markets for energy and commodities. This note illustrates that during periods of high price volatility, the hedge effectiveness of cash flow hedges typically increases, meaning that more companies qualify for hedge accounting than in a non-crisis situation. Thus, the extent of fair value accounting is reduced following the increase in price volatility induced by a (financial) crisis. One may claim that it is particularly during a crisis, when uncertainty in general reaches its highest level that companies are in the need of accounting rules which secure a proper matching of derivatives payoffs with underlying cash flows. Hence, whether intended or not, the hedge effectiveness provisions ensure more hedge accounting in times when it is especially required.

Competing Interests

The author declares that he has no competing interests.

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