Enron Corporation and Using EVA to Consolidate Special Purpose Entities

Neal M. Stoughton
Graduate School of Management
University of California at Irvine

February, 2003

ABSTRACT

Beginning with the downfall of the Enron Corporation in 2001 extraordinary attention has been focused on the use of special purpose entities (SPEs), structured finance and other methods of managing earnings for the purpose of artificially inflating stock prices of American companies. This paper shows that the principles of shareholder value, when properly applied, can resolve these difficulties. Economic Value Added [®] (EVA) along with modern risk management techniques can be used to design an appropriate method of accounting for and consolidating special purpose entities into the financial statements of parent firms. The basic idea is to include an additional liability for the credit risk deficiency of the SPE on the balance sheet of the parent. The method is illustrated with numerical examples from several of the infamous Enron SPEs.

The authors web site is http://www.gsm.uci.edu/stoughton, on which updated versions of the paper may be obtained.

"We would have a very strange accounting standard that was focused on the outcome that is a 1-in-a-100 chance, as opposed to the outcome that is a 99-out-of-100 chance."
   - J. Kravitt at 1996 FASB hearings supporting nonconsolidation of special purpose entities.

Beginning with the downfall of the Enron Corporation in 2001 extraordinary attention has been focused on the use of special purpose entities (SPEs), structured finance and other methods of managing earnings for the purpose of artificially inflating stock prices of American companies. Corporate scandals were the top general news story in 2002.[1] As a consequence, top executives have been indicted, one of the big-five accounting firms (Arthur Anderson) was forced into liquidation, firms have been forced into bankruptcy protection and major new regulatory initiatives were enacted by the congress of the United States. All of this poses the greatest challenge ever faced by proponents of the shareholder value movement.

The purpose of this paper is to show instead that the principles of shareholder value, when properly applied, can resolve these difficulties. Indeed Economic Value Added $^{®}$ (EVA) along with modern risk management techniques can be used to design an appropriate method of accounting for and consolidating special purpose entities into the financial statements of parent firms. That is, instead of abandoning shareholder value concepts, or instead relying on overbearing legalistic regulations, it is possible to design a consolidation method that is both practical and also provides an economically meaningful measure of the risk impact involved in special purpose entities. In order to illustrate the method proposed here, we apply it to the well-known special purpose entities created by Enron to manage its earnings in 1999 and 2000.

Recently the Financial Accounting Standards Board (FASB) of the U.S. has produced an interpretation of Accounting Research Bulletin No. 51 involving the consolidation of business

---

[1] Three female 'whistleblowers' were named as Persons of the Year by *Time* Magazine for 2002.

statements.[2] This interpretation of longstanding regulations from the 1950s increases the equity

requirement for nonconsolidation to 10% from 3% and also attempts to introduce a risk-based

test. This test, however, is based on expected losses rather than a true measure of risk as applied

in other contexts at financial institutions. Moreover, the only possible outcomes are either 100%

consolidation or 0% consolidation – which can exaggerate attempts to game the regulations. The

approach detailed here is based on market principles of internalizing the appropriate level of risk

within the parent company. The approach we document is capable of internalizing decisions to

utilize SPEs within optimal risk management principles.

Background

The genesis of the problems at the Enron Corporation arose relatively quickly and involved a

volatile mixture of two key ingredients. The first ingredient was the issuance of FAS statement

No. 133 in 1998, *Accounting for Derivative Instruments and Hedging Activities*, which applied

beginning in 1999. This statement required firms such as Enron to attempt to use so-called *fair-

value* accounting treatments to mark-to-market all of their energy contracts and positions in

merchant assets. For instance, if Enron had a long term energy contract it would have to attempt

to value the future cash flows from such a contract and then to value this stream and include all

of the gains or losses into earnings in the current year. This created a new source of income

statement volatility, and dealing with it became a major concern of the Enron executives.

The second key ingredient for disaster was the fact that Enron as well as many other

firms were utilizing earnings management practices. Earnings management occurs when firms

use accounting 'interpretations' to make decisions that effectively shift earnings from one period

to another. There are many legitimate differences in interpretations that make this feasible.

---

[2] FASB Interpretation No. 46, *Consolidation of Variable Interest Entites, an interpretation of ARB No. 51*, January
2003.

However, Enron was so driven to 'hedge' their income statement volatility that they felt it was necessary to do this regardless of the cost or potential calamity involved. Initially they approached a number of financial institutions attempting to get them to hedge their holdings. But after this proved futile, they decided to set up their own hedging vehicle – the SPE. As a result, in June 1999 they enlisted Andrew Fastow their CFO to set up the LJM1 partnership and create an SPE that was designed to hedge the equity interest that Enron had in a newly public firm called Rhythms Netconnections. The rest is history.

There is a large literature in both the theoretical as well as empirical area that documents possible reasons for earnings management. Theoretical models inevitably require some element of market inefficiency in which shareholders are unable to 'reverse engineer' the earnings management (Stein 1989). For instance Titman and Trueman (1988) developed a model in which earnings management signals a lower variance of cash flows and therefore this results in a higher valuation of the firm. Another explanation is that managerial compensation is based on nominal contracts which are dynamically updated over time. If there is a 'ratchet-effect' in which past performance establishes a benchmark for future performance then a risk averse manager will want to smooth performance measures over time.

There is strong evidence of earnings management provided in the empirical literature. Most remarkably Hayn (1995) shows that small increases in earnings are unusually common whilst small increases in losses are unusually rare. This is not consistent with a symmetric distribution of changes in earnings. Degeorge *et al* (1999) find that there is a hierarchy in management techniques: firms first attempt to avoid losses, then they increase earnings and finally try to meet analysts expectations. Barth *et al* (1999) find that firms reporting continuous growth in earnings are priced at a premium relative to other firms with otherwise similar

characteristics. Teoh *et al* (1998) show that reported earnings are unusually high at the time of secondary equity offerings. Finally Dechow *et al* (1996) consider governance principles and find that these are weaker for firms practicing greater degrees of earnings management.

Consolidation

At the time of the Enron debacle, the major issue that regulators, the U.S. congress and the U.S. Justice Department were concerned about concerned the question of whether Enron should have consolidated their SPEs into the parent company. Indeed the restatements that occurred and triggered the sharp stock price selloff were due to ex post consolidation. FAS No. 51 originating in 1959 states that "there is a presumption that consolidated statements are more meaningful than separate statements and that they are usually necessary for a fair presentation when one of the companies in the group directly or indirectly has a controlling financial interest in the other companies…". This seems to imply that SPEs ought to have been consolidated. However two conditions were employed to overcome this conclusion. If an independent owner makes a substantive capital investment (judged to be 3% of total capital) or if an independent owner exercises control over the SPE then consolidation would not be required.

Newly issued regulations continue to focus on the whether the SPE should be consolidated or not, i.e., 'all or nothing'. In FASB Interpretation No. 46, again the presumption is in favor of consolidation. Now the outside equity requirement has been raised to 10% from 3%, but an additional test has been proposed based on 'expected losses'. Expected losses are defined as the difference between the mean cash flow and expected cash flows conditional on being below the mean cash flow. If the outside equity in the SPE (or variable interest entity as it has been redefined) is greater than these expected losses, then it is possible that the 10% requirement could be waived. Conversely if the equity were judged to be insufficient based on

these expected losses, the SPE would need to be consolidated even if the 10% outside equity requirement was met. There are two potential difficulties with this approach: (1) the notion of expected losses is arbitrary and does not correspond to any risk measure used in risk management practices at modern financial institutions; (2) the result of the regulations is either no consolidation or 100% consolidation with no middle ground. The incentive will be for firms to go to extraordinary lengths to minimally satisfy the constraints since the final consequences are so disparate.

Optimal Risk Management

The method we propose here involves a variable amount of consolidation, depending on the amount of risk that is imposed on the parent firm. This method is rooted in the literature on risk management for financial institutions. Indeed, corporations such as Enron that were engaged in an extraordinary amount of financial contracting adopt many of the characteristics of large multinational banks, with their many disparate activities, organized in different divisions. The use of EVA on a divisional level was considered in Stoughton and Zechner (1999) who derived the optimal amount of economic capital to be allocated to divisions under conditions of both symmetric as well as asymmetric information. They showed that the amount of equity capital, E, allocated to a division must be augmented by the economic or risk capital taken up when a firm satisfies a capital structure constraint that ties its equity to the overall risk of the firm. In particular they demonstrated that if the overall firm equity satisfies a value at risk (VaR) criterion, then the amount of economic capital should be directly related to the incremental value at risk of the division in question.[3] The use of VaR in bank capital regulation is now standard. In 1996 the Bank of International Settlements adopted the amendment to the Basel accord

---

[3] The VaR is the maximum unexpected loss that occurs with a given confidence level (probability) for a given horizon. The incremental VaR is the marginal change in the overall firm VaR with respect to the change in risk of an individual division.

6

covering market risk; now banks have been able to apply their own internal models to measure VaR.[4] In this case the economic capital is equal to a multiple of the VaR calculated using a probability of solvency equal to 99% over a 10 day window.

When divisional managers are compensated based on EVA they will have incentives to adopt the level of risk-taking that is consistent with the overall firm optimum. In this case EVA is implemented via the following equation:

$$EVA = NI - r_E E \; ,$$

where *NI* is the net income of the division, r_E, is the cost of equity capital and *E* is the amount of economic capital allocation. We now show how this procedure can be adapted for the case of SPEs.

Step One

The first step is to develop of quantitative model of the net income of the SPE in the form of a probability distribution of flows at a future point in time. For the types of contracts involved in the Enron situation, the cash flows are often dependent on some type of underlying asset. Thus the tools of derivatives analysis may be used to derive the probability distribution. In this respect payoff diagrams that have been often applied to options pricing can be utilized.

Step Two

The next step is to determine the (incremental) VaR of this probability distribution. While optimality across multiple SPEs could conceivably utilize the incremental concept, it is obviously easier to ignore cross-correlations and use unadjusted VaR for each SPE. In doing so, this would represent a conservative approach.

Step Three

---

[4] This method is being extended to credit risks in the new Basel II accord to be finalized in 2003.

Next, the VaR for the SPE is compared with the amount of equity capital as of the time of assessment. If for instance, the SPE is being initiated, then the equity capital would be the original book value. If the equity capital is greater than the VaR then there is no risk imposition on the parent firm and therefore no consolidation would be necessary. However, in the more interesting scenario where the VaR exceeded the equity capital, then the difference or *deficiency* would be transferred back to the parent. When the parent owns a partial fraction of equity, then this fraction times the deficiency would be transferred back to the parent.

Step Four

This is the final stage in the consolidation process. The amount of the deficiency attributable to the parent is placed on the balance sheet of the parent as an additional liability. This additional liability will be larger the more risk is undertaken by the SPE relative to its own equity capital and the lower is the amount of outside equity or guarantees provided by investors other than the parent firm. It therefore satisfies the basic requirement that consolidation be related to both risks as well as outside equity capital. However it is far from an all-or-nothing criterion leading either to no consolidation or 100% consolidation.

In order to assure that the decision of the parent to utilize an SPE is optimal, it is crucial that managers are given incentives by the EVA compensation schedule. The net income of the SPE is also proportioned according to equity ownership and allocated back to the parent. Then the risk capital deficiency entered onto the parents liabilities is multiplied times the cost of equity capital and compared to the net income to see whether the EVA is positive. This then provides the ex post criterion for determining whether optimality has been achieved.

Examples

We now illustrate the above method using two of the most prominent SPEs of the Enron Corporation. The major source of information about the structure of the SPEs is the Powers (2002) report.

Rhythms Netconnections

The Rhythms transaction was the first attempt by Enron to hedge their income statement risk. Rhythms was a DSL provider for business that went public on April 7, 1999 at a price of $21. In March 1998 Enron had purchased a stake in the firm worth $10 million by purchasing stock at $1.85. Immediately after the IPO, the price of Rhythms had gone up to $69 implying that Enrons stake was now worth approximately $300; but it was subject to the 'lockup' restriction. Nevertheless this stake had to be marked to market. Because of the inability to hedge through more conventional means, Enron solicited assistance from their CFO, Andrew Fastow, who put together a consortium of investors called LJM1. Enron capitalized the Rhythms with $80 million of Enron restricted stock obtained from restructuring forward contracts that they had purchased earlier. The partners in LJM1 put up $15 million of cash of which $3.75 was given to the Rhythms SPE representing the minimal 3% equity requirement. The Rhythms SPE then wrote put options to Enron on Rhythms stock in order to insure Enron against price declines. The structure of the deal appears in Figure 1.
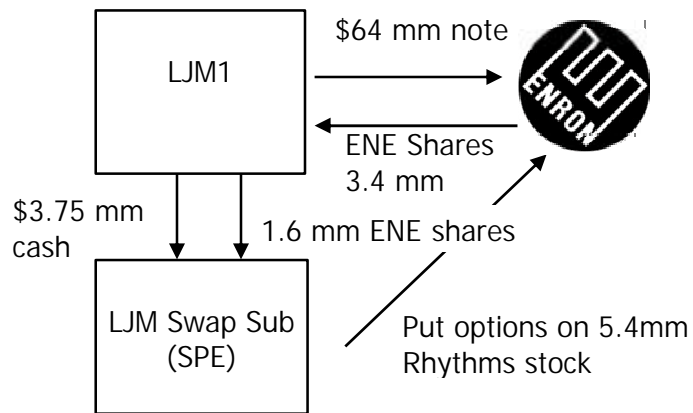
Figure 1: Rhythms Transaction

Based on the transactions illustrated in Figure 1: Rhythms Transaction, the cash flow implications to Enron can be illustrated on a 3-dimensional graph as a function of the Enron and Rhythms stock prices. Figure 2: Rhythms Payoff Diagram illustrates payoff to Enron.
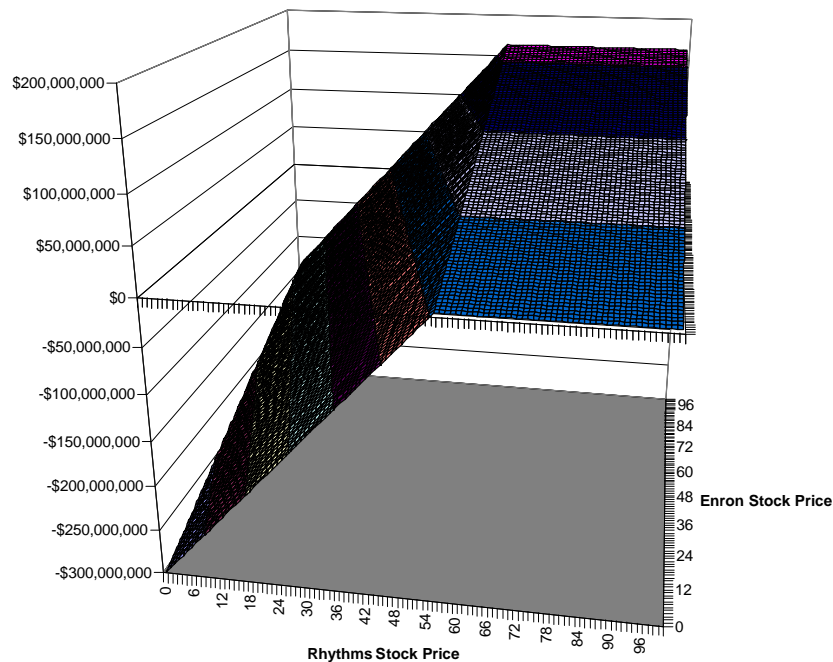
Figure 2: Rhythms Payoff Diagram

As can be seen above the consequences to Enron are very dire when Enrons stock price and the

Rhythms stock price simultaneously decline. In this case the potential loss is $300 million. We

performed a Monte Carlo simulation using the parameter values in Table 1: Rhythms Simulation

Parameters

Time Horizon	1 year
Solvency Probability	97%
ENE stock mean	20%
ENE stock standard deviation	40%
ENE initial stock price	$81
Rhythms stock mean	0%
Rhythms stock standard deviation	200%
Rhythms price	$56
Rhythms put exercise price	$56
Correlation coefficient between Rhythms and Enron	0.50

Table 1: Rhythms Simulation Parameters

The probability distribution of cash flows from the SPE back to Enron is illustrated in Figure 3:

Rhythms Cash Flow Distribution
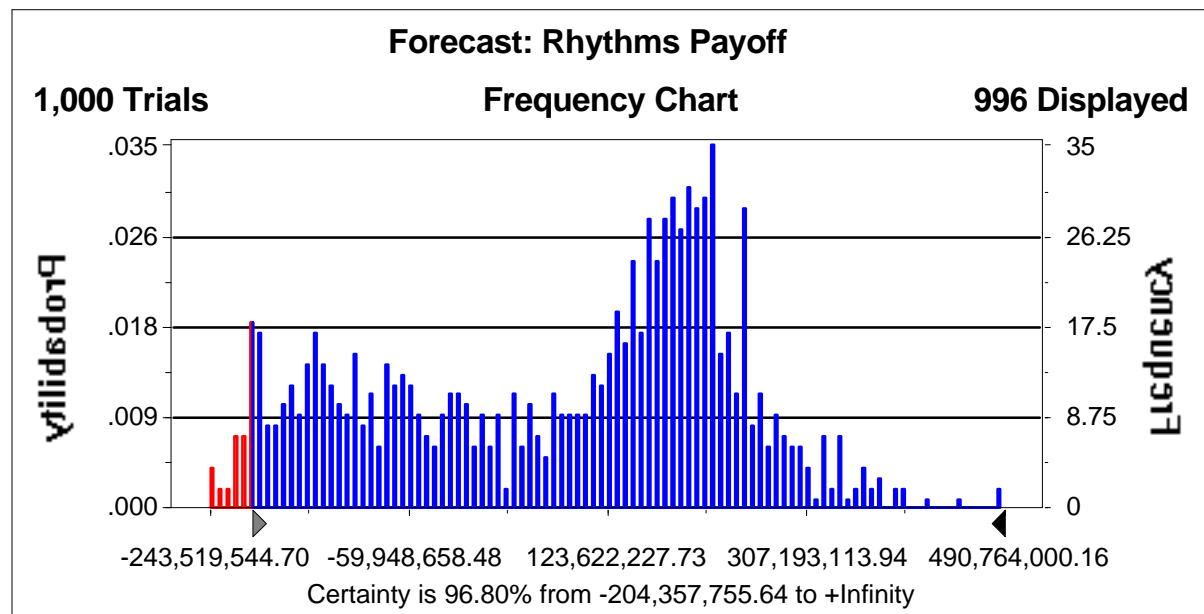
Figure 3: Rhythms Cash Flow Distribution

As can be seen above, the VaR for the Rhythms transaction is about $200 million. This is the amount that would need to be added as a liability for Enron just for this single SPE.

Unfortunately for Enron the 'hedge' did not function as anticipated. The put had one sided volatility and time volatility. After adding 4 more derivative zero-cost transactions, the SPE was wound up in March 2000, after the expiration of the lockup on the Rhythms stock. At the time, the risk analysis group of Enron had estimated the probability of default of the SPE at 68%. The unwinding transaction was of questionable value for Enron as the valuation of the put was suspect. Nevertheless the Rhythms transaction did not lead to the greatest impact in the eventual restatement of Enrons financials.

The Raptors

Of somewhat greater consequence for the downfall of Enron were the four Raptors transactions. We provide an analysis based on the risk management principles of the first of these. The basic idea was similar in concept to Rhythms. Enron had appreciated value in terms of forward contracts on its stock. However it was subject to income statement volatility by needing to mark to market the various merchant investments.[5] Enron utilized the four Raptors vehicles between the third quarter of 2000 and the third quarter of 2001. During this period Enron reported $1.5 billion of earnings, whilst avoiding $1 billion of losses due to the merchant investments. Raptor I was consummated on May 2, 2000. The SPE associated with Raptor I was called Talon and was designed to facilitate derivative transactions amongst many merchant investments. Most of these derivative transactions were of the form of total return swaps (forward contracts where the SPE would pay losses and Enron would pay gains). Talon was capitalized with Enron stock, a $50 million note and a tiny amount of cash. For this purpose Fastow again organized a new

---

[5] Merchant investments are investments in various activities, firms and partnerships, often not publicly traded.

partnership called LJM2 and arranged a $30 million equity capital injection into Talon.

However before undertaking the derivative transactions, LJM2 insisted on a return on capital

equal to $41 million. As a result, Enron purchased a put option on its own stock, thereby

effectively betting on a decline in its share price. Figure 4: Raptor I Structure indicates the

structure of the Raptor I transaction.
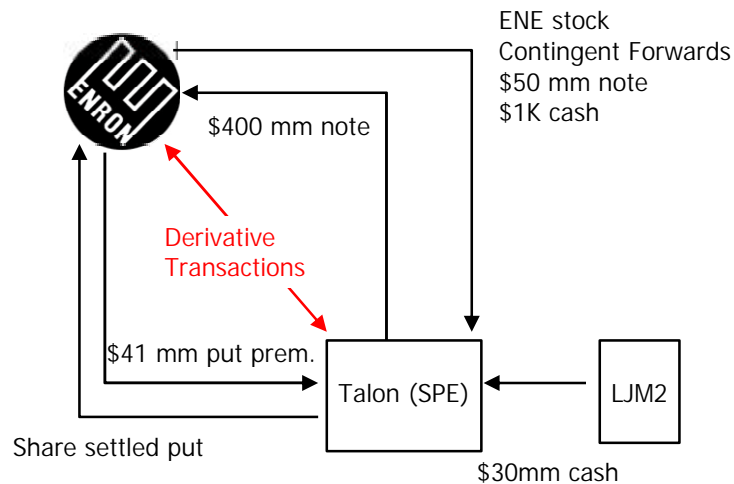
Figure 4: Raptor I Structure

To further illustrate the method, we compare the risk deficiency imparted to Enron by Raptor I at

three stages during the process. The payoff to Enron as a function of the Enron stock price is

illustrated in Figure 5: Initial Raptor I Payoff prior to the use of the put option. Also, this figure

represents the payoff before any derivative transactions are implemented.
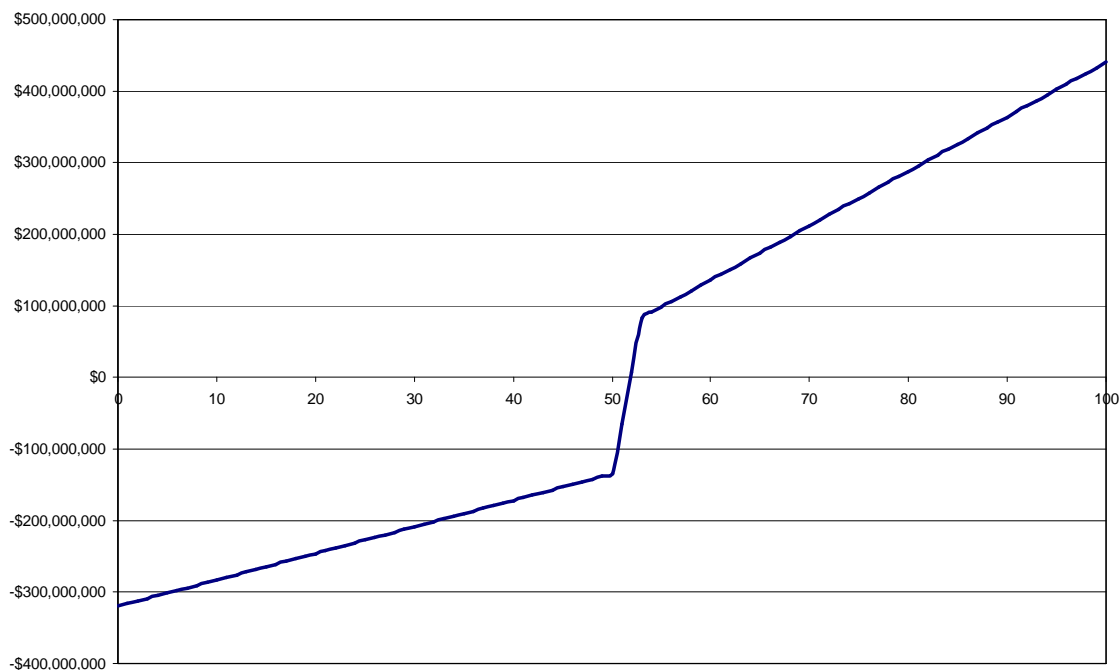
Figure 5: Initial Raptor I Payoff

The effect of the contingent forwards on Enron stock created a sharp 'kink' in the payoff diagram around the price of $50 per share. Below this price the SPE would have negative capitalization and would require a subsidy in order to provide loss protection. The numerical simulation of the VaR of Raptor I is based on the data in Table 2: Raptor I Data

|	
Time Horizon	1 year
Solvency Probability	97%
ENE stock mean	20%
ENE stock standard deviation	40%
ENE stock prices	Actual at the time of events

Table 2: Raptor I Data

The VaR simulation of the initial structure of Raptor I is depicted in Figure 6: Raptor I Initial VaR

14
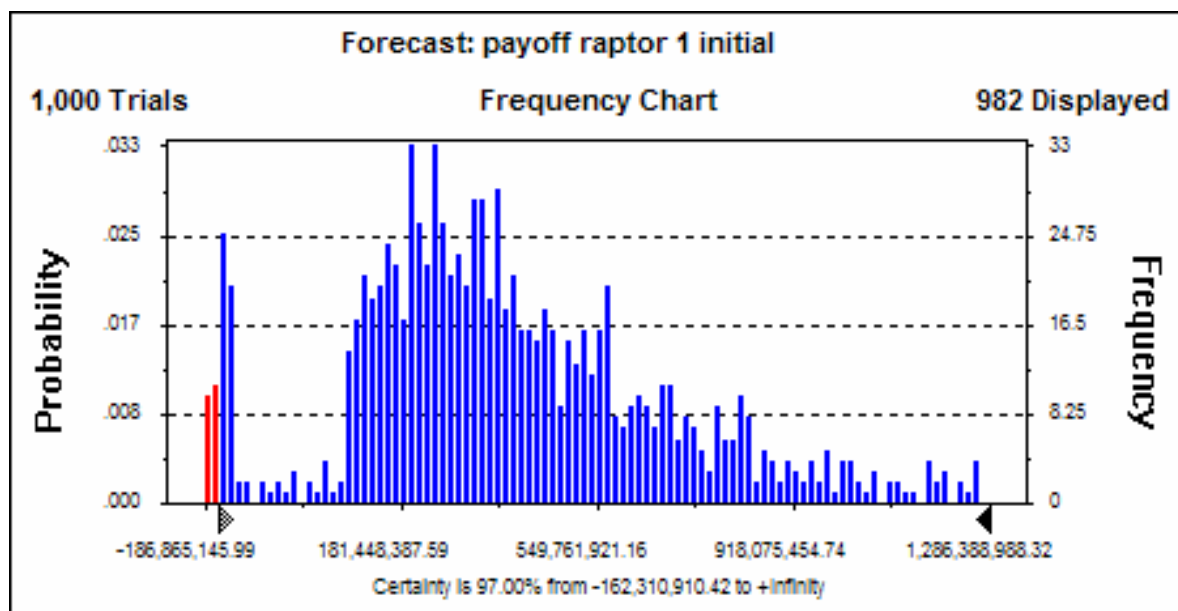
Figure 6: Raptor I Initial VaR

The consequences of the sharp kink are evident as there is a concentration of probability mass in the left tail. In this case the negative credit deficiency is computed as $162 million impact to Enron.

Following the put option the situation changes rather dramatically. Figure 7: Raptor I After Put now shows the impact. Although the fall off around $50 is similar, there is essentially a 'doubling' of the risk on the downside. The impact on VaR is illustrated in Figure 8: Raptor I VaR after put wherein we see that the magnitude of the losses in the left tail are virtually doubled from the initial situation. As a result the VaR now grows to more than $320 million.
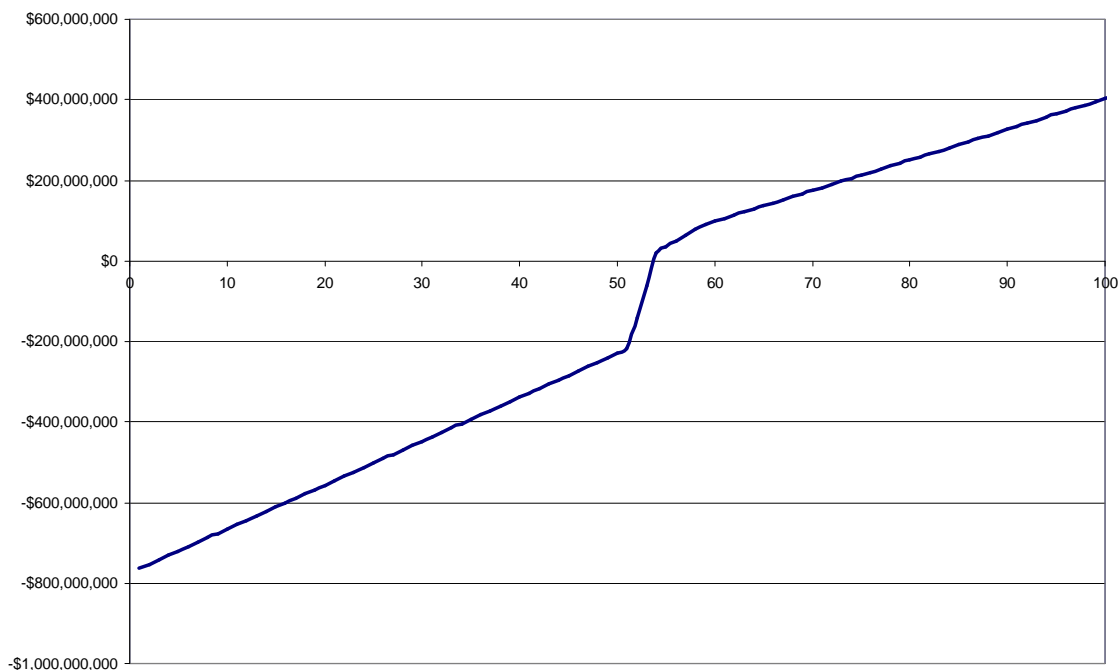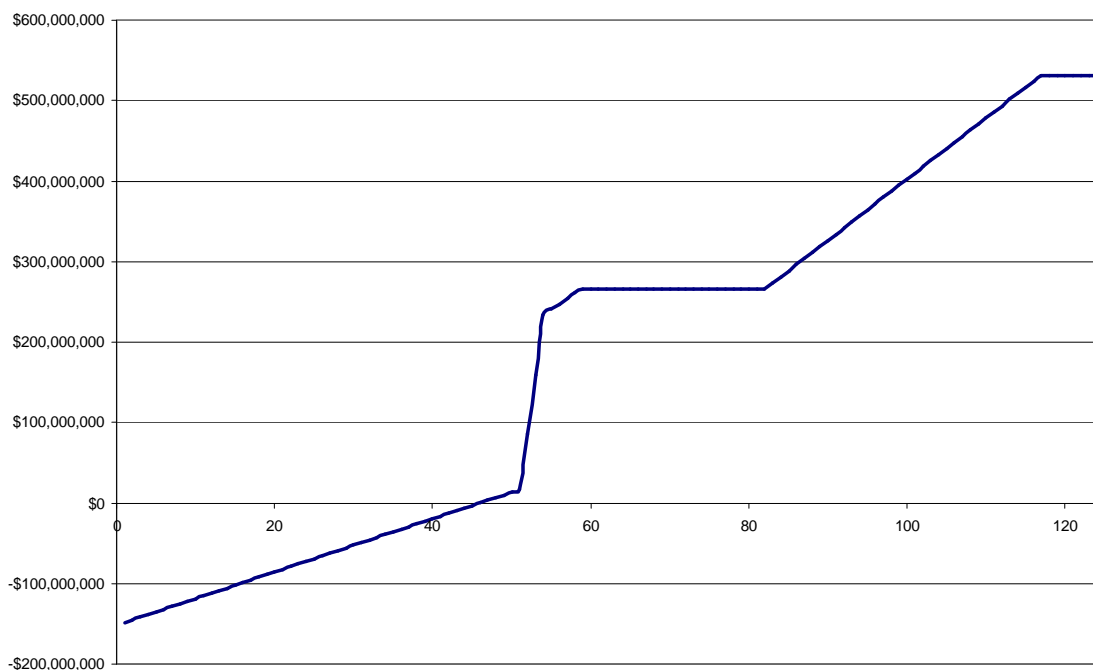
Figure 7: Raptor I After Put
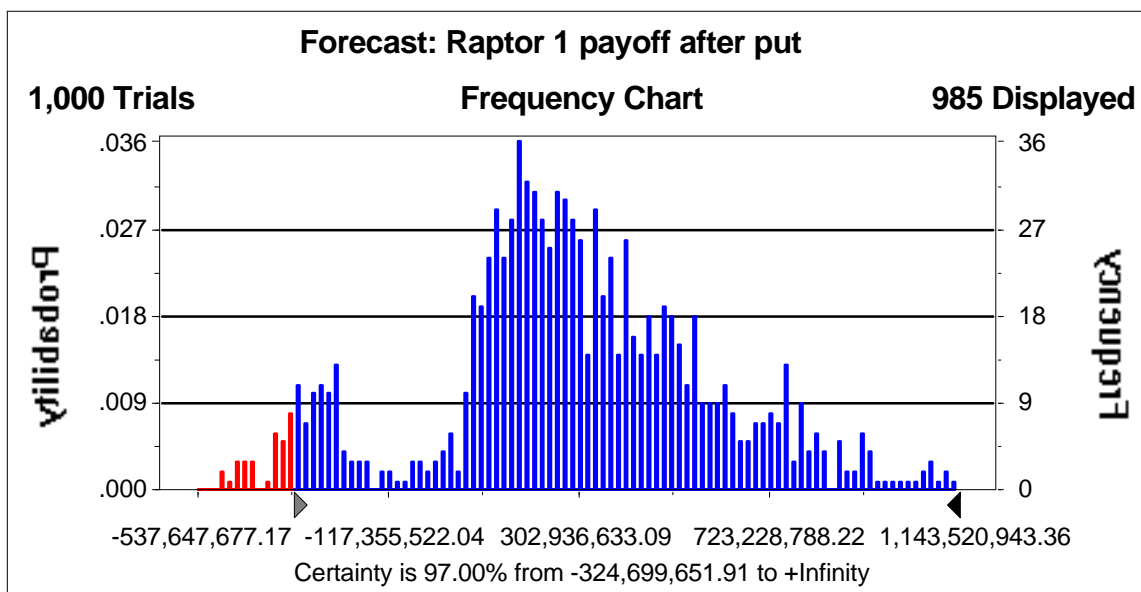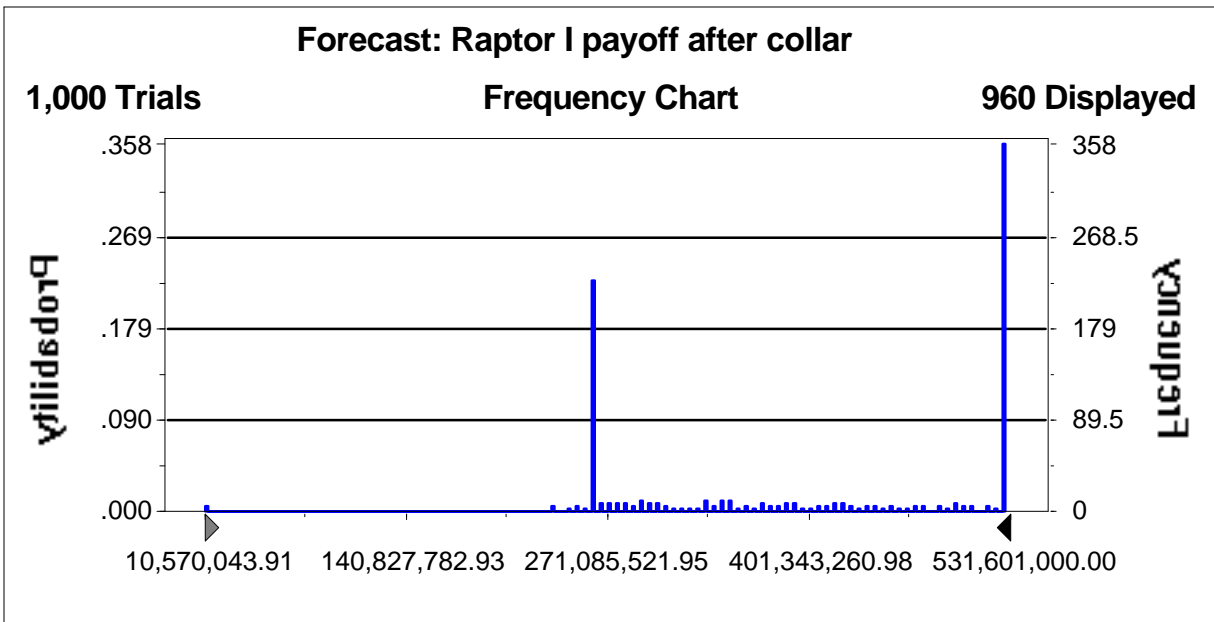

Figure 8: Raptor I VaR after put

After the Raptor I SPE was put in place and the derivatives transactions ensued, losses mounted

rapidly. One merchant asset in particular, Avici Systems, lost $75 million during the third

quarter of 2000; all of which was eliminated from the income statement of Enron due to the Raptor I SPE. On October 30, 2000, because of the sharp losses, Enron added another derivative collar to Raptor I to protect against further undercapitalization. This collar would require Enron to pay Talon if the Enron stock price declined below $81; on the other hand Talon would pay Enron if the stock price rose above $116. Otherwise there would be no cash transaction. As can be seen from Figure 9: Raptor I After Collar and Figure 10: Raptor I VaR After Collar, the collar effectively 'froze' the economics of Raptor I and for all intents completely eliminated the credit deficiency. Of course it is worth pointing out that this is the credit deficiency of the SPE itself; now Enron has an additional liability due to the downside risk of insuring the SPE on the collar. Once this is accounted for, the net effect of the collar on Enrons risk position is not necessarily positive.

Figure 9: Raptor I After Collar

Forecast: Raptor I payoff after collar

| 1,000 Trials | Frequency Chart | 960 Displayed |

Figure 10: Raptor I VaR After Collar

Raptors II and IV were similar in nature to Raptor I and are omitted from the discussion here.

Raptor III was created to hedge a large investment in The New Power Company (TNPC), which

was privately held and subject to a planned IPO in the fall of 2000. In a stunning extrapolation

of the stock capitalization strategy, the Raptor III SPE (Porcupine) was capitalized with shares of

the very stock it was designed to hedge (TNPC)! For the sake of brevity we have not provided

the graphical illustration for this SPE; however the credit deficiency created by this one structure

was more than $460 million.[6]

As the first quarter of 2001 began, there was a significant credit shortfall in Raptors I and

III calculated at $500 million. As a result, a cross-guarantee between all four of the Raptors was

implemented along with an infusion of additional stock contracts in Enron. But this only

exacerbated the problem as the dependence on Enron stock was further leveraged. In the

meantime Enrons stock price had declined from $81 at the initiation of the Raptors to $55.

---

[6] Details are available from the author upon request.

October 15, 2001 was the date of the fateful announcement of the unwinding of the Raptors SPEs. The consequence was an unexpected after-tax charge of $544 million and a write-down of equity equal to $1.2 billion. In view of the enormous credit risk deficiency imparted to Enron, it is doubtful that these SPEs would have ever been conceived if this huge liability had been recorded on Enrons balance sheet.

Conclusion

The demise of the Enron Corporation in late 2001 triggered one of the most turbulent periods in U.S. corporate history. Executives were vilified, congressional hearings were called, new regulatory legislation was passed by Congress, DAs filed criminal charges, U.S. attorneys filed civil charges, firms declared bankruptcy and were liquidated, and the notion of shareholder value was ridiculed.

This paper has demonstrated that the use of EVA as a management incentive device can be applied to the key issue of consolidation of SPEs. The essential idea is to record an additional liability on the balance sheet of the parent related to its implicit responsibility for the risk of the SPE. If the method is applied rigorously firms can be assured that the decision to utilize an SPE makes sense from the standpoint of shareholder value creation. We have illustrated the method by applying it to several of the SPEs of the Enron Corporation. Just the few transactions included here could have accounted for much more than a billion of risk capital dissipation.

Although the FASB has already proposed new changes in the regulations considering consolidation of SPEs, it is our hope that the methods documented herein can be applied to internal management practices and thereby avoid ever having to go through such a catastrophic period again.

References

Barth, M.E., J.A. Elliot and M.W. Finn (1999), "Market Rewards Associated with Patterns of Increasing Earnings," *Journal of Accounting Research* 37, 387-413.

Degeorge, F., J. Patel and R. Zeckhauser (1999), "Earnings Management to Exceed Thresholds," *Journal of Business* 72, 1-33.

Dechow, P.J., R.G. Sloan and A.P. Sweeney (1996), "Causes and Consequences of Earnings Manipulation" An Analysis of Firms Subject to Enforcement Actions by the SEC," *Contemporary Accounting Research* 13, 1-36.

FASB (2003), *Interpretation No. 46, Consolidation of Variable Interest Entites, an interpretation of ARB No. 51*, January.

Hayn, C. (1995), "The Information Content of Losses," *Journal of Accounting and Economics* 20, 125-153.

Powers, W.C., R.S. Troubh and H.S. Winokur (2002), *Report of Investigation by the Special Investigative Committee of the Board of Directors of Enron Corporation*, mimeo.

Stein, J. (1989), "Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior," *Quarterly Journal of Economics* 104, 655-559.

Stoughton, N.M. and J. Zechner (1999), "Optimal Capital Allocation Using RAROC™ and EVA®," working paper available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=118208.

Teoh, S.H., I. Welch and T.J. Wong (1998), "Earnings Management and the Underperformance of Seasoned Equity Offerings," *Journal of Financial Economics* 50, 63-99.

Trueman, B. and S. Titman (1988), "An Explanation for Accounting Income Smoothing," *Journal of Accounting Research* 25 (Supplement), 127-139.