Super Cats as Alternative Investments

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Black's Law Dictionary [6th ed.] defines *catastrophe* as "A notable disaster; a more serious calamity than might ordinarily be understood from the term 'casualty.' Utter or complete failure." Therefore, if one were to define a super catastrophe, or *Super Cat*, as an extreme catastrophic event with a monetary value in excess of $50 million, it might not appear to be an alternative investment opportunity.[1] And yet, in some cases, that is exactly what we will argue.

When a catastrophe or Super Cat occurs the costs can be exorbitant as Hurricane Andrew in 1992 dramatically showed. While the probability or odds of a hurricane striking southern Florida are rather high, not all catastrophes or Super Cats occur with such frequency. In fact, the probability of many Super Cats actually occurring is extremely low. And for those financial institutions with the requisite resources and proper valuation methodology, such Super Cats can present a potentially lucrative alternative investment opportunity, which is currently little understood and thus scarcely covered.

In this article we present a methodology for evaluating Super Cats by way of the 2003 Pepsi *Play For a Billion* sweepstakes case. The background section immediately following explains the particulars of the Pepsi *Play For a Billion* sweepstakes while the valuation section presents a methodology that combines basic insurance and value investing theory in a way that, to the best of our knowledge, has never before been presented. The aftermath and guidelines section describes what happened in the Pepsi *Play For a Billion* sweepstakes, and presents practical guidelines that can be used to evaluate future alternative Super Cat investments. The article then concludes with a brief summary.

BACKGROUND

In mid-2003, PepsiCo announced a promotional $1 billion sweepstakes that was the largest promotional event in history. Nevertheless, the basic mechanics of the event were relatively simple: PepsiCo included game pieces on "specially-marked 'Play For a Billion' and/or 'BillionSweeps.com'" products, such as all the various brands of Pepsi, Mountain Dew, Sierra Mist, Mug Root Beer, Orange Slice, Mr. Green, and Lipton Brisk. Each game piece contained a 10-character alphanumeric code that the contestants could use to enter the sweepstakes. From all of the entries received, PepsiCo would randomly choose 1,000 contestants who would compete, by process of elimination, for a *guaranteed* $1,000,000 prize. The contestant that won that prize would also hold a six-digit number. If that number *exactly* matched the numbers drawn at random on live television the contestant would win the $1 billion grand prize.[2] The television show was hosted by personality Drew Carey, and was produced by Diplomatic Productions, which also happened to

EXHIBIT 1
Payout Table

Probability (p)	Loss (L)	
0.0001%	$250,000,000	= $250
99.9999%	$0	= $0
		$250 = Expected Loss ($E(L)$)

be the producer for the popular television show *Who Wants to Be a Millionaire?*

PepsiCo planned to spend $15,000,000 advertising the event, in addition to other "extensive promotional tie-ins with the WB Network and its corporate parent, AOL Time Warner" (Anderson [2003a]). This highly innovative marketing initiative was designed to promote, and increase awareness of, the Pepsi brand.

At the end of the year 2002, PepsiCo had a book value of $9.5 billion,[3] and therefore a large loss such as this would have affected the firm's value, and possibly even the scope of its operating ability. In order to proceed with the sweepstakes, PepsiCo therefore sought to transfer its risk through the purchase of specialty "prize coverage" insurance that was brokered through SCA Promotions. According to Anderson [2003a], "'It doesn't take long to call the roll of companies that would be willing to take part in a super-jumbo case like this,' says [Robert] Hamman [of SCA Promotions]. The only possible U.S. underwriter: Warren Buffett's Berkshire Hathaway."

At the end of the year 2002, Berkshire Hathaway's balance sheet contained $10.3 billion of *cash*, was debt free, and had a book value of $33.6 billion.[4] Consequently, its ability to assume a Super Cat risk such as this was without question. This is a significant point because creditworthiness is a central concern for financial institutions in general (Mason [1995]), and thus alternative Super Cats investors in particular. Therefore, SCA Promotions could not have chosen a better financial institution with which to partner in this alternative investment.[5]

To sum up the case thus far, PepsiCo is the sponsor of the *Play For a Billion* sweepstakes and is seeking to transfer the risk of the $1 billion grand prize. They approached SCA Promotions to broker the risk transfer which, in turn, approached Berkshire Hathaway to assume the risk. Thus the question at this point is at what price would Berkshire Hathaway likely be willing to assume such an enormous risk, i.e., at what price is this Super Cat a viable alternative investment?

We were not provided with any information on this alternative investment other than what is publicly available. Moreover, we are not privy to the pricing methodology that either Berkshire Hathaway or SCA Promotions uses to value alternative investment opportunities. Nevertheless, by combining basic insurance and value-investing theory we present a method for valuing alternative Super Cat investments in general, and the Pepsi *Play For a Billion* sweepstakes in particular.

VALUATION

According to the rules of the Pepsi *Play For a Billion* sweepstakes, the $1 billion grand prize has a present value of $250 million as it is structured as a 40-year annuity with a 4.5% interest rate. Furthermore, "each Sweepstakes Winner's odds of winning the One Billion Dollar Prize are 1 in 1,000,000."[6] We will use these statistics to construct a basic payout table and to calculate the expected loss of this event as illustrated in Exhibit 1.

As can be seen, the $250 million present value of the $1 billion grand prize has an expected loss of only $250. However, the volatility of this event is obviously much greater than $250 as the standard deviation of $250,000 reflects.[7] Traditional insurance pricing theory utilizes standard deviation to calculate the price of risk assumption, or premium, as reflected in the following equation (Whalen and Mason [1996]):

$$Pr = E(L) + (c \times s)N^{1/2}/N \qquad (1)$$

where

Pr = premium
$E(L)$ = expected loss
c = confidence level (one tail)
s = standard deviation
N = number of homogenous events

Exhibit 2 utilized Equation (1) to calculate the premium for the grand prize of the Pepsi *Play For a Billion* sweepstakes at the commonly used confidence levels of 90%, 95%, and 99%.

At a 99% confidence level the calculated premium for assuming the risk of this Super Cat amounts to $582,750. However, we are not aware of any alternative investor or insurance company that would be willing to assume Super Cat level risk like this for only $582,750, and with good reason. In order to be 100% confident that the premium charged is sufficient to cover a sweepstakes payout, the entire present value of the grand prize—$250 million—would have to be charged. Such a huge varia-

EXHIBIT 2
Traditional Premium Calculations

Premium		
90%	95%	99%
$320,250	$412,750	$582,750

tion between premium levels, i.e., $582,750 at 99% confidence versus $250 million at 100% confidence, is caused by the extreme "all or nothing" nature of this Super Cat. Events such as this are inherently variable as reflected by the *coefficient of variation*, which is the ratio of the standard deviation to the expected loss. In this case, the coefficient of variation is 1,000, which is extremely high.

Nevertheless, given the slight odds of payout it is virtually a statistical certainty that no one will win the $1 billion-annuity grand prize. Therefore, if an alternative investor such as Berkshire Hathaway, for instance, assumed the risk of this exact Super Cat every year into perpetuity the $582,750, 99% confident, premium would have a capitalized value of $9,210,522. The premium was capitalized before taxes as a simple, non-growth perpetuity at a 6.33% discount rate,[8] which is our estimated cost of capital for Berkshire Hathaway in mid-2003.[9,10] Nevertheless, assuming the risk of a Super Cat with a present value of $250 million for a premium of $582,750 amounts to a *Rate on Line* of only $.002. Rate on Line is a common insurance measure, and is calculated by dividing the premium received by the amount of risk assumed.[11] Therefore, this Super Cat does not appear to be a viable alternative investment at this point in the case, where viable is defined as an alternative investment that includes a reasonable margin of safety.

According to Graham [1973, p. 281], "The margin of safety is always dependent on the price paid. It will be large at one price, small at some other price, nonexistent at some still higher price.[12] . . . It is available for absorbing the effect of miscalculations or worse than average luck." Regarding the importance of the margin of safety concept on long-term investment success, Warren Buffett—who was both taught by and mentored by Graham—has stated, "We insist on a margin of safety in our purchase price. If we calculate the value of a common stock to be only slightly higher than its price, we're not interested in buying. We believe this margin of safety principle, so strongly emphasized by Ben Graham, to be the cornerstone of investment success."[13] Thus, the question at this stage in the valuation is how can a reasonable margin of safety be factored into traditional risk/insurance pricing to make this Super Cat a viable alternative investment?

Even though extreme events like the Pepsi *Play For a Billion* sweepstakes generate substantial measurement variation, which can be problematical from a traditional valuation or pricing perspective, the mathematical precision of the payout odds is extremely strong. This is significant because over time, and given a sufficient number of events, "the odds always win." Therefore, the challenge for alternative Super Cat investors is to competitively price at a level high enough that allows the odds to work out favorably over time, i.e., at a reasonable margin of safety. This is a significant challenge because no financial institution, not even Berkshire Hathaway, can withstand 8 or 9 (or 10) figure losses for very long.

However, if Berkshire Hathaway were to assume the risk of this Super Cat risk for the *theoretically* full-capitalized value of the $582,750 premium, i.e., $9,210,522, it would equate to an *Adjusted Rate on Line* of $.04 = $9,217,853 / $250 million. We emphasize the word theoretical here because this investment is being valued as a one-time deal rather than a going concern. Nevertheless, we utilized the "full-capitalized value" of the premium—theoretical though it is—as an *adjusted premium* to determine if assuming the risk of this Super Cat at that price would be a viable alternative investment. Think of this price as the traditional premium times a *Super Cat-Risk Multiple*, which we calculated as one divided by the firm's required rate of return.

While the Adjusted Rate on Line of $.04 may still seem low, it equates to $40,000 of premium charged for a traditional $1,000,000 commercial general liability policy, which is quite common. Alternatively, a *maximum premium level* can be calculated by adding the adjusted premium of $9,210,522 to the original premium of $582,750 for a total premium of $9,793,271, in which case the *Super Cat-Risk Premium* of $9,210,522 provides the margin of safety.[14] A margin of safety such as this—calculated and applied consistently across a portfolio of non-correlated alternative Super Cat investments—should materially and substantially reduce the effects of "worse than average luck."

Rate on Line was utilized above to add a level of perspective to the valuation by way of comparison, and it proved useful. However, it could be just as useful to identify how an alternative Super Cat investment differs from traditional insurance coverage. And in this case there is one highly significant difference: a commercial general liability policy usually provides insurance coverage for 365 days. In the case of the Pepsi *Play For a Billion* sweepstakes, the assumption of risk period is only *one* day.

Therefore, given the reasonable adjusted Rate on Line of $.04 and limited risk assumption period of *one* day, we would argue that assuming the present value risk of the Pepsi *Play For a Billion* sweepstakes, i.e., $250 million, at either the adjusted premium level of $9,210,522 or, preferably, the maximum premium level of $9,793,271 is a viable alternative investment.[15] And as reported in the mainstream press, Berkshire Hathaway did alternatively invest in this Super Cat. While it is our understanding that the specific amount of premium Berkshire Hathaway charged was/is confidential, Anderson [2003a] reported, "In return for a seven-figure premium (though less than $10 million) [*sic*], Berkshire [Hathaway] has assumed the risk of a payout."

In the section immediately following we report on the results of the sweepstakes, and provide some general guidelines for future alternative, Super Cat investments.

AFTERMATH AND GUIDELINES

In a grand act of showmanship, before the September 14, 2003 *Play For a Billion* television show, it was announced that a chimpanzee by the name of "Kendall" would draw the winning grand prize numbers (Anderson [2003b]). Warren Buffett summed up the results of this alternative investment to Berkshire Hathaway shareholders as follows:

> . . . PepsiCo promoted a drawing that offered participants a chance to win a $1 billion prize. Understandably, Pepsi wished to lay off this risk, and we were the logical party to assume it.[16] So we wrote a $1 billion policy, retaining the risk entirely for our own account.[17] Because the prize, if won, was payable over time, our exposure in present-value terms was $250 million. (I helpfully suggested that any winner be paid $1 a year for a billion years, but that proposal didn't fly.) The drawing was held on September 14 [2003]. Ajit [Jain] and I held our breath,[18] as did the finalist in the contest, and we were happier than he. PepsiCo has renewed for a repeat contest in 2004.

Thus, the final contestant did not win the $1 billion grand prize, which is the exact outcome the odds reflected. As a result, the Pepsi *Play For a Billion* sweepstakes was a successful alternative investment for Berkshire Hathaway. Significantly, it was also a successful business transaction for PepsiCo as it allowed that firm to advertise and promote its brand in an innovative and unique way, absent the risk of the Super Cat's possible effects on its value and operating ability. Given this dual benefit, it is not surprising that this event seemed to mark the beginning of an ongoing business relationship between Berkshire Hathaway and PepsiCo. As Buffett indicated above, PepsiCo seems to be planning other *Play For a Billion* sweepstakes in the future.[19]

Because this form of alternative investment is likely to grow in popularity over the coming years given the escalating nature of global risk and global risk transfer, the following guidelines may prove useful to future alternative Super Cat investors.

First and foremost, there* must *be an unquestioned ability and willingness to immediately pay any Super Cat claim. Due to the amount of money involved in Super Cats those transferring the risk require, appropriately, near instantaneous payment of any claim. For example, if the final contestant in the Pepsi *Play For a Billion* sweepstakes did win the grand prize neither PepsiCo, the grand prize winner, nor anyone else for that matter, would have doubted for even a second that Warren Buffett was going to timely pay the claim.

The universe of financial institutions able to assume Super Cat level risk is, at the present time, rather small. For example, Warren Buffett has made creditworthiness a competitive advantage for his reinsurance arm, Gen Re. In the *Berkshire Hathaway, Inc. 2002 Annual Report* [p. 9] he stated that due to the financial backing of Berkshire Hathaway:

> . . . General Re, rated AAA across-the-board, is now in a class by itself in respect to financial strength. No attribute is more important. Recently, in contrast, one of the world's largest reinsurers—a company regularly recommended to primary insurers by leading brokers—has all but ceased paying claims, including those both valid and due. This company owes many billions of dollars to hundreds of primary insurers who now face massive write-offs. "Cheap" reinsurance is a fool's bargain: When an insurer lays out money today in exchange for a reinsurer's promise to pay a decade or two later, it's dangerous—and possibly life-threatening—for the insurer to deal with any but the strongest reinsurer.

The reinsurer mentioned above was widely believed

to be Gerling Re, but that firm publicly rebutted Buffett's allegations. While it was uncharacteristic of Buffett to go after a competitor in so public a forum, it did underscore the importance he placed on his competitive advantage, i.e., owning the most creditworthy reinsurer during a time of geopolitical and macroeconomic instability.[20]

Given sufficient demand over time we are reasonably certain that financial syndicates will form to assume Super Cat risk. And if demand continues those syndicates could evolve into a specialized market with clearinghouses that would financially guarantee all risk transfers.

Well-defined risk. The word "risk" has many different meanings. For example, *Black's Law Dictionary* [6th ed.] lists a number of definitions for risk including the following: "the element of uncertainty in an undertaking; the possibility that actual future returns will deviate from expected returns." According to Bernstein [1998 (1996), p. 8], "The word 'risk' derives from the early Italian *risicare*, which means 'to dare.' In this sense, risk is a choice rather than a fate." Harrington and Niehaus [2004, p. 2], meanwhile, note that the term "risk is sometimes used in a specific sense to describe variability around the expected value and other times to describe the expected losses." Furthermore, Groppelli and Nikbakht [1995, p. 485] define risk as "instability; uncertainty about the future; more specifically, the degree of uncertainty involved with a project or investment."

An argument can be made in support of each of the above definitions, and yet, each of them falls short with respect to Super Cat risk. For example, regarding the word "risk" meaning uncertainty, that is not accurate inasmuch as uncertainty cannot be quantified. In other words, if one is uncertain about the nature of an event one cannot assign odds to that event other than by guessing, and guessing has absolutely no role whatsoever in Super Cat valuation.

As to risk being a probability weighted return or payout, in the Pepsi *Play For a Billion* sweepstakes case that amounted to only $250, which very clearly did not reflect that Super Cat's risk. And while the event's standard deviation of $250,000 did reflect the significant variability of the expected loss, it also did not adequately represent the risk of that Super Cat as reflected in the inadequate traditionally calculated premium of $582,750, and its paltry Rate on Line of $.002.

In light of the above, we define the term "risk" in the context of alternative Super Cat investments as the monetary amount that could be lost at any time during the investment. For example, in the case of the Pepsi *Play For a Billion* sweepstakes the risk was clearly $250 million.

Well-defined time frame. Time is money; therefore, given any two investments with relatively the same level of profitability, the one that pays out the quickest is generally preferable. Consequently, if an alternative Super Cat investment has a relatively small exposure window, its benefit should not be overlooked.

Stick to simple, "user-friendly" risk assumption language. Given the magnitude of a Super Cat, it is imperative that the scope of risk assumption is completely clear and unambiguous to all concerned. Complicated or convoluted risk assumption contract language increases the possibility of miscalculation, which is absolutely unacceptable in the field of Super Cat alternative investments. Additionally, lawyers make a very good living exploiting complicated or convoluted events when the stakes are much lower than Super Cat levels. They therefore will not hesitate to initiate litigation in any disputed Super Cat claim, which will only increase costs for all concerned, except the lawyers of course.

Deep statistical or actuarial expertise. Accurate calculation of the odds is critically important in this form of alternative investment. Therefore, we suggest having the odds calculated, checked, and then double-checked by statisticians or insurance actuaries as the mathematical margin of error in this field is zero, without exception.

Insist on a reasonable margin of safety. Whether you agree with margin of safety theory for mainstream investments or not, given the magnitude of Super Cat risk it would be fiscally irresponsible to undertake such alternative investments without a reasonable margin of safety as "worse than average luck" could very well mean insolvency.

Marketing expertise. Berkshire Hathaway is presented with opportunities to alternatively invest in Super Cats like the Pepsi *Play For a Billion* sweepstakes because of the Warren Buffett brand. While Buffett is a shrewd businessman who makes no bones about only buying at a margin of safety,[21] he is seen as honest and trustworthy, which is critically important in alternative Super Cat investments. While this level of trust partly rests in the strength of his firm's balance sheet, much of it is generated by his personal brand.[22] Therefore, any financial institution or financial syndicate that wishes to compete for these types of alternative investments must engender the same level of trust to be successful.

It is not as easy as it may look. The stress involved in risking $250 million on the numerical draws of a monkey, on nationwide television, should not be under-

estimated. Thus, Super Cat alternative investments are not for everyone, and they should not be marketed as such. For those financial institutions with the requisite resources and psychological makeup, however, Super Cat alternative investments could be a lucrative part of a value-creating portfolio.

CONCLUSION

This article introduced the concept of Super Cat alternative investments. Using the case of the recent Pepsi *Play For a Billion* sweepstakes, we presented a method for valuing Super Cats. Our methodology combines basic insurance and value-investing theory, and demonstrated how alternative Super Cat investments can be valued with a reasonable margin of safety. Linking the disciplines of insurance and value investing is significant because even though both Benjamin Graham (the founder of value investing) and Warren Buffett (the most successful value investor in history) were/are heavily involved in insurance operations, the methodological link between the two disciplines has not, to the best of our knowledge, been made before.

The Pepsi *Play For a Billion* alternative investment was a success for Berkshire Hathaway, and it seemed to offer the prospect for future business dealings between PepsiCo and Berkshire Hathaway. This potential development, as well as the escalating levels of global risk and global risk transfer, could lead to an increased popularity for this type of alternative investment in the future. Toward that end, we presented practical guidelines for future alternative Super Cat investors to consider.

ENDNOTES

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[1]For purposes here, an alternative investment is an investment instrument other than straight debt, equity, or real estate. Examples include options, futures, and as presented here, Super Cats.

[2]*Source:* http://sweepstakes.yahoo.com/billionsweeps/static/rules.html.

[3]*Source:* www.wallstreetjournal.com.

[4]*Berkshire Hathaway, Inc., 2002 Annual Report,* p. 26.

[5]Possible exceptions to this statement are the American International Group (AIG), General Electric (GE), and Citigroup.

[6]See the rules referenced in note 2. The odds could be verified given complete disclosure of the sweepstake specifics using one of the various permutations of n objects taken r at a time.

[7]The equation for calculating the standard deviation is:

$$s = \{p_1[L_1 - E(L)]^2 + p_2[L_2 - E(L)]^2\}^{1/2} \quad (2)$$

where

s = standard deviation
p = probability
L = loss
$E(L)$ = expected loss

[8]When estimating the cost of equity, value investors do not utilize beta-based measures. Rather, they subjectively estimate the cost (Greenwald et al. [2001, pp. 97-98]). Mario Gabelli confirmed this in a presentation to our value investing class on March 4, 2004 at the University of Connecticut (Stamford branch). Therefore, we estimated Berkshire Hathaway's cost of capital—as Berkshire is debt free the cost of equity equals the cost of capital—at 6.33, which is slightly less than two times the June 2003, 10-year T-note yield of 3.33%. Data source: the *Board of Governors, Federal Reserve System.*

[9]The theoretical capitalized value of the premium = $9,210,522 = $582,750 × (1 / 6.33%).

[10]According to Greenwald et al. [2001, p. 39], value investors essentially calculate a firm's earnings power value by capitalizing expected sustainable earnings as a simple, no-growth perpetuity.

[11]The Rate on Line = $.002 = $582,750 / $250 million.

[12]Graham's comments pertain to mainstream investment purchases. Simply invert the comments for risk assumption purposes, e.g., and to paraphrase Graham: The margin of safety is always dependent on the price *quoted.* It will be large at one price, small at some other price, nonexistent at some still *lower* price.

[13]*1992 Berkshire Hathaway Annual Report,* http://www.berkshirehathaway.com/letters/1992.html

[14]The maximum premium level = $9,793,271 = $582,750 + [$582,750 × (1 / 6.33%)]

[15]Tactically, we recommend that the quoting process begin with the maximum premium level for negotiating flexibility purposes. For example, if Berkshire Hathaway's initial quote in the above case was the maximum premium level of $9,793,271, and they received pushback, they could always negotiate down to the adjusted premium level of $9,210,522. Such flexibility could become valuable as this field becomes more competitive.

[16]Buffett has long held an interest in volatile Super Cat-like investments. For example, Berkshire Hathaway insured the $252 million baseball contract of Alex Rodriguez and the Texas Rangers in the year 2000. (Cohen and Wallace [2003])

[17]In other words, Berkshire Hathaway did not transfer (or hedge) any of the risk to a reinsurer, i.e., if someone won the grand prize Berkshire would pay the $250 million without contribution from any other financial institution.

[18]Ajit Jain is Buffett's catastrophic and Super Cat underwriter.

[19]The 2004 *Pepsi Play For a Billion* sweepstakes was held on September 12, 2004, and was hosted by personalities Damon Wayans and Tom Bergeron. As with the 2003 event, the final contestant did not win the grand prize.

[20]It is interesting to note that the competitive dynamics would be dramatically different if GE continued to support its reinsurance arm, Employers Re, so that it too had across-the-board AAA ratings.

[21]For example, and as Buffett noted in the *1984 Berkshire Hathaway Annual Report,* "Simply put, we feel that if we can buy small pieces of businesses with satisfactory underlying economics at a fraction of the per-share value of the entire business, something good is likely to happen to us—particularly if we own a group of such securities." *Source:* http://www.berkshirehathaway.com/letters/1984.html

[22]See D'Alessandro [2001, pp. 47-48], himself the CEO of an insurance company (John Hancock), for information on personal brands.

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