

# Risks & Rewards

ISSUE 53 FEBRUARY 2009

## Actuaries

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### TAKING STOCK: IS THE EFFICIENT MARKET HYPOTHESIS IN TROUBLE?

By Nino Boezio

**N**eedless to say, the last calendar year had many financial events occur that made it quite interesting.

The volatility of the equity markets in 2008 was also remarkable and in many cases hard to understand. Sometimes in a single day equities would fluctuate in a range that would not even occur over a period

of a couple weeks under prior market environments, and it would often move wildly without the occurrence of any major news. It was evident in many cases that the market was driven by emotion or fear, but at other times it seemed to be driven by other factors having nothing to do with erratic or emotional behavior. But was the market behaving inefficiently as appeared to be the case in 2008, or was there something truly rational going on, which for most people was hard to see?

There were a number of factors operating last year which we need to explore in order to understand some of the reasons why the markets in 2008 were so volatile, and perhaps even inefficient.

#### MARKET ISSUES: BIG MONEY AND MAJOR MONEY FLOWS

Unlike other financial eras, we likely now had many more and much bigger funds (particularly hedge funds) with a much larger market punch. How these funds can invest in certain areas without affecting market valuation would really require considerable skill. When those managing such funds decide to enter or exit a particular market, it could be like a herd of elephants trying to go through a subway tunnel crowded with commuters. They also may or could not move into or out of these positions patiently, so we can get very large and dramatic swings in a short period of time. These funds can now affect highly capitalized equity markets, not just smaller niche sectors.

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Meeting Rep  
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Sim Segal, Board Partner

**Nino A. Boezio**, Newsletter Editor  
(Chief Editor of this issue)  
CIBC Wealth Management  
20 Bay Street, Suite 805  
Toronto, ON M5J 2N8  
ph: 416.943.5734 f: 416.943.4249

**Joseph Koltisko**, Newsletter Editor  
(Chief Editor of next issue)  
New York Life Insurance Co  
OCIO, rm 1113  
51 Madison Avenue  
New York, NY 10010  
ph: 212.576.5625 f: 212.770.3366

## Friends of Council

Nancy E. Bennett, Council 2007  
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## SOA STAFF

Sam Phillips,  
Staff Editor  
e: sphillips@soa.org

Jill Leprich,  
Section Specialist  
e: jleprich@soa.org

Robert Wolf,  
Staff Partner  
e: rwolf@soa.org

Julissa Sweeney,  
Graphic Designer  
e: jsweeney@soa.org

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Marc N. Altschull

## CHAIRPERSON'S CORNER

Attention all section members, this is your new chairperson speaking and as you are certainly aware, we have encountered almost unprecedented (most definitely during our lifetimes) turmoil in the financial markets. At this time I would like to ask that you remain in your seats with your Bloombergs on. I assure you that we have an excellent crew on the section council to help guide us through this next year.

At the Annual Meeting in October we had our face-to-face meeting of the section council. In addition to being an opportunity for the old and new council members to meet, this meeting provided us an opportunity to develop a strategy for this year. You may recall that we conducted a survey last summer, and we want you to know your voices have been heard loud and clear. In fact, we have decided to let the survey results guide us in our efforts to improve the section in the following areas you identified:

- Communications
- Networking
- Education
- Research
- Integration with non-SOA organizations

Each section council member will be focusing on an area of concern that was identified in the survey. Hopefully at the Annual Meeting this year we will be reporting on our successes in these areas. We welcome your feedback and of course your assistance with these efforts, so please do not hesitate to contact me or any of the other section council members.

Much as I started this article, I want to close by sharing with you the main objective that your section council has identified for this year. In line with our mission as representing the interests of the Society of Actuaries with regard to investment issues, we are going to be more proactive with the SOA to respond both internally and externally to the financial crisis. As I write this in November, plans are currently underway with the Risk Management section to collect articles of interest about the financial crisis. We will be reviewing these articles and plan to publish a summary in late November. Furthermore, we will be hosting webcasts and presenting sessions at meetings on this topic.

The section council welcomes your support and ideas as we navigate these precarious times. I am hopeful that our Investment Section will be able to take advantage of this situation to elevate the status of the Society of Actuaries within the investment community. ☺

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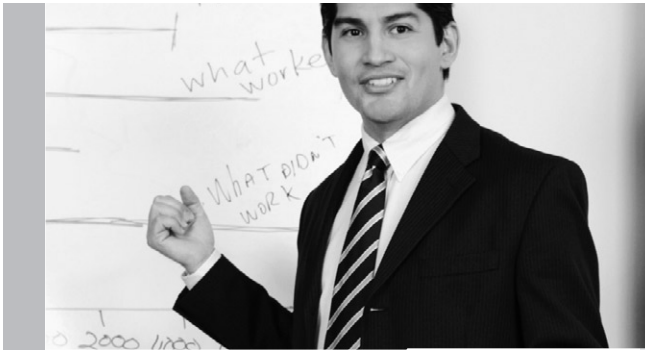
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### RELATIVELY SMALL MARKETS

Even though it can be claimed that commodities form one of the largest components of the world economy, this does not necessarily translate into large open interest numbers on commodity exchanges. Therefore certain vehicles of investment simply cannot absorb large investment flows. We see this problem even in certain emerging markets. It is not clear whether it should be appropriate to limit an investor from taking on too much of a position, since exiting a strategy or security creates a problem of significant magnitude in the opposite direction (in other words, we like the upside created when too much money enters a small market, but not when the opposite happens). When an emerging nation needs capital, it still might prefer the necessary evil of inflated market valuations in the near term in order to get that capital, and worry about any future decline only when it happens (hoping that it will never occur in any violent fashion).

### CAPITALIZATION

One of the factors that has escaped most investors' attention (including my own) is the impact of market capitalization. Somehow many perceived the market capitalization of a firm to be somewhat resilient when the firm at the same time would sustain financial (earnings) losses. But as any particular company deteriorated in value in 2008 and thus needed to raise more capital, more dilution of shareholders would take place if new securities were issued, and the price of the stock would thereby decline further. It would become somewhat of a spiral. Also market events would get to the point that the company would now have to sell new stock (or issue fixed income investments) at a severe discount, since the financial environment for new security issuance became so negative. Ironically, even if the company's underlying asset portfolio was not so bad in quality or value (at least theoretically), the falling market capitalization of the company decreased the spread between its assets and liabilities, resulting in even less

net capitalization (shareholder value) as a buffer to absorb losses. The company was now also an easier target to be pummeled down in market value, since it was now so much smaller. Market capitalization was not really contemplated by many as a major issue in an industry's survival, but most investors instead had primarily focused on revenue and earnings.

### LOW YIELDS AND LEVERAGE

As bond yields have decreased around the world in recent decades, it certainly put pressure on the investment industry to find new ways to provide higher investment returns. Understanding that investments do trend up over time and that a portfolio of investments should not go to zero, then why should an investor have \$1 invested for each \$1 of investment exposure? One should thus just borrow at a low rate and invest at a higher rate (leverage the portfolio), with the return increment (spread) adding to investment performance. It does make sense, assuming the investment does not go down far enough such that the leverage would wipe out the entire net value of the portfolio. But for most investors there was a breaking point that was never expected to be reached—where the losses become so large that it could lead to panic. Investors do worry when they see the real possibility that their investments can now reach zero, even though the market decline has not reached 100 percent.

### POSITION CONCENTRATION

Unfortunately it appears that various funds had taken very large long or short positions in various commodities and even on the short side of equities. When restrictions were being placed by regulators or governments on position concentration in various commodities or on naked short-selling, there did appear to be a halt in certain market moves, even if at times it was only temporary. There were some studies of position holdings in various investments, and in some cases it was certainly found to be excessive (e.g., supposedly in at least one case there were more



# // NO ONE WAS SURE AS TO HOW MUCH OF WHAT HAD BEEN REPORTED IN FINANCIAL STATEMENTS WAS REAL. ... //

shorts in a stock than its entire market capitalization, in another case several banks sold the equivalent of over 20 percent of a commodity's annual level of production). There would be some incentive for a fund to buy or sell an equity or commodity with the hopes of selling or buying that investment back at a better price (especially as outside technical traders would base their decisions on price movements and get caught on the wrong side, and as buy and sell stops could be triggered unexpectedly). It is not clear how severe this problem was last year, but I would argue that this is definitely an issue. It hurts the ability of an average investor to be diversified and base investment decisions on fundamentals, when another investor could establish very large positions and thus control or influence the market direction for a period of time. In such instances, a small investor can be crushed even if the fundamentals were properly analyzed, since the investor would be swamped by trading volume and price movements in the counter direction. Of course that is part of the risk of investing, but not when the market may be prone to what some may consider short-term manipulation by a dominant player.

## **STRATEGIC AND FINANCIAL ISSUES: "SOMETIMES" BAD ACCOUNTING**

Whether current accounting practices are inappropriate or inadequate is a debate for another forum. However, the accounting practices as applied to many companies could not withstand a serious stress test as occurred last year, as a number of mortgage and other assets started to fall dramatically in value, and did so quickly. Eventually it was getting to the point where balance sheets for any financial institution could not be trusted. Earnings, assets and liabilities were being seriously questioned. No one was sure as to how much of what had been reported in financial statements was real, and how much was not reported properly or not even shown. Accounting rules enabled certain investments and liabilities to stay off balance

sheet, only now to raise uncertainty about the future viability of various companies. As we understand regarding a risk premium on any investment, this premium does in part reflect uncertainty, and this uncertainty now unfortunately took a big leap. One really needs to question whether the accounting treatment is still really doing its job when it allows a variety of items to be off balance sheet (when there are a lot of these items) and when it is anticipating all sorts of offsets to hold under periods of stress. Of course the evolution of derivatives and the trading of risk has become commonplace in the last 20 years, but it reflects a view that only a limited number of defaults are expected to take place, but not the scenario when the entire financial system is sustaining substantial pressure at the same time.

## **MARKET VALUATION**

In part tied to the previous point, a company can grow in value as it marks-to-market, if its underlying asset pool grows in value. A rising tide raises all boats. But when the tide sinks as has occurred in 2008, then like a domino effect, all the companies tend to impact one another, and hence we even see a correlation between investments getting closer to one. Diversification no longer works very well. There was probably little concern in the final implementation that mark-to-market exaggerates a company's stress in troubled times, and boosts its fortunes in good times. The mark-to-market impact can make all companies much more volatile during economic and market extremes. This can also make companies more able to buy other companies in good times due to the larger market capitalization, and be forced to put on a fire sale when times are bad due to severely falling prices. Mark-to-market has the tendency to make all organizations more correlated to one another, even if indirectly. It makes more sense in times of stability.

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## DOING THE SAME THING

When a trend continues for a prolonged period of time, whether it be in a real estate, resources or a gold boom, eventually most investors and particularly investment funds, will start to do the same thing. The peer pressure becomes enormous. When a number of firms are making money using a certain strategy, it takes an incredible amount of stamina and foresight to do something different. Investments in real estate have been successful for over 10 years. We note, however, that Goldman Sachs was acclaimed last year for largely staying out of (and even shorting) the toxic investments that have plagued most other firms and banks. In many ways this is a feat that should be commended when it is done successfully, in doing something different from the rest. But how can so many buy the same product and have the same expectations? There is peer pressure to participate in the same activities within the financial industry and also in buying the same investment products. Investors often look to see what others are doing and feel that they are either missing out on an opportunity or are not keeping up with the latest innovations, if they are not involved (I recall at least one case, for example, where a board member wanted their organization to invest in hedge funds without knowing what they were, simply because others were doing it). There is also strength in numbers, because if you do what everyone else is doing and it fails, you can blame the entire industry and not yourself. But if you as an individual or a company do something different and then fail, then you alone become answerable for the bad outcome. Not too many have the fortitude or the psyche to be contrarian.

## USING THE SAME APPROACHES

We have likely heard that many hedge funds do not want to provide transparency in terms of their trades and holdings, in order to safeguard their trade secrets. They want to keep their strategies and approaches proprietary. I have often wondered what these approaches could possibly be, since I rarely come across any form of investment or theory that proves to have promise, either in investment literature or offered by software vendors. When I had the opportunity to question investment managers on various techniques, I often found nothing to be

particularly novel. It finally became apparent last year that many of these funds were actually using the same or similar models, software and techniques, and these were driving them to do the same or similar things. If these funds had been transparent on their activities, it would simply reveal to the public that nothing special was often going on, but rather they were all mostly thinking alike in chasing opportunities. So the extra fees being charged may not have been truly justified, but it was paying for a hope or a product design, not a special skill.

## HEDGING THE SAME THING

Also in connection to the prior point, one of the problematic assumptions was that we can all invest and speculate in the same vehicle, since we can hedge it away to another party. Little consideration was given to the fact that others are also hedging the same investment nor were there reasons to care, since the markets were considered deep with sufficient capital supporting the opposite end of the transaction, which turned out not to be the case. This certainly raises concerns that we may need to monitor certain business or financial activities on a national or global basis going forward, as we may not be as diversified as we think, as the world moves increasingly toward higher globalization. Many firms were thinking in compartments without worrying or caring about their competition or counterparties. It was probably believed that market forces would correct any excesses somewhat painlessly and such an industry correction would not be so severe.

## HEDGING WITH THE SAME COMPANY

Even though diversification has been a mantra and byword for decades, ironically financial institutions were hedging with only a few select institutions, since they were the only players in town. When we consider life insurance, we know that only a certain number of people should die each year (barring a cataclysmic event). There seemed to be a belief that only a certain number of mortgage defaults would take place and not all at the same time, just like we think in life insurance. There is an implicit assumption in all this—just like we all do not want to die or issue insurance to a terminally ill policyholder, likewise it was believed that we do not want to issue bad or

poorly underwritten mortgages to everyone. We have little control over the former case, but in the latter, even though we could control it, we apparently did not. Securitization was a neat way to package liabilities for someone else to buy, and it was expected that somewhere along the way a buyer beware philosophy would take hold and proper due diligence would be exercised. Former Fed Chairman Alan Greenspan admitted that in his influence on past monetary policy, he thought there would be adequate incentives in place to discourage certain risky behavior from occurring, which apparently did not properly operate in practice.

## FINANCIAL RECYCLING

One of the unsettling things that occurred in 2008 was the endless spiral down of investment performance. Companies with portfolios holding such bad investments (call them A companies) had their market values impacted by fears concerning further write-downs. But no one could really be sure of the magnitude of the write-downs, and market value declines were also spurred by the fear that many of these investments could still stay off balance sheet (so we would never know what they were or their size). But this entire mood generated by this fear of the unknown then impacted the entire stock market, which then also affected the market capitalizations of those most exposed to large sub-prime and related holdings, particularly the hedgers (call them B companies). This led to further deterioration of the B companies' market values as well. Then their market value woes filtered back to the A companies. The interconnectedness of companies was not really at the forefront of financial thinking, even though many understood this possibility in years past.

## ANOMALIES: CONTAGION

Probably one of the biggest surprises for everyone is the extent that this crisis has spread to other countries, market sectors and even currencies. Also past correlation studies have been somewhat of an anomaly, as there is no true way to diversify in such an environment. We certainly need to revisit this subject of correlation as it simply has been used too liberally to promote

diversification, which does not exist in all market environments. We should see many interesting papers come out in the years to come, addressing this matter of contagion. Previous stock market crashes also exhibited this high correlation phenomenon, even though they seemed to be generated more by a behavioral phenomena rather than a rational one.

## ONCE IN A LIFETIME EVENT

We may need to reassess how to deal with these once in a lifetime events. These seem to occur more than once in a lifetime as well. The sometimes bad accounting referenced above is an important case in point. Current accounting practices could be appropriate in many cases, but not all. We probably cannot establish accounting practices that are solid in a bad environment for they could become just too conservative in normal periods (a lack of flexibility or over-conservatism can stifle economic activity). The focus on mark-to-market may have had a good principle behind it by suggesting we look at changing market environments, and perhaps as we have in other industries, including insurance, consider setting aside an appropriate reserve amount to account for those adverse contingencies that may at times arise.

## STRESS TESTING OR TESTING YOUR STRESS

Stress testing a financial environment is much different than living through it. How to deal with a financial crisis is still not completely understood other than to ride it out, or to bail out. Meanwhile it is always easy to become complacent after a number of years of good times. Behavioral finance has made a number of useful observations regarding human behavior in a number of environments, but it is still unclear as to how to incorporate it into financial thinking, such that booms and busts do not arise or do not cause so much damage when they happen.

## LIQUIDITY

One of the areas that certainly now is an issue when considering the efficient market hypothesis or capital market theory, is the ability to enter or exit a market, or buy or sell as many units

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# // WE WILL CERTAINLY NOW ENTER A DEBATE OVER THE NEXT SEVERAL YEARS AS TO WHETHER THE FINANCIAL MARKETS CAN POLICE THEMSELVES. //

as desired, without affecting market value. Due to the rather stable market conditions of the past several years, many investors and particularly funds, wound together an intricate web involving a wide array of investments and specialty strategies, hedges, shorts, longs, and adding to it all, a layer of leverage. But then when cash positions were getting strained and even redemptions were taking place, positions had to be unwound. Ironically some of this unwinding did not even make sense, but they were required anyway in order to raise cash and answer margin calls. This, in part, led to incredible strength in the U.S. dollar, when earlier in the year it was getting beaten down on currency exchanges. Liquidity is still something that is not well understood, but we probably have seen more of its impact than at most other times in history, and its importance in financial markets. There will be quite a number of lessons learned about liquidity in this financial crisis, as we see attempts to increase liquidity by the central banks to have limited impact for prolonged periods.

## GOVERNMENT INTERVENTION

We will certainly now enter a debate over the next several years as to whether the financial markets can police themselves. The response right now is “no,” even though some will prefer to blame bad central bank policy or government factors which have fostered and encouraged wrong behavior. Some may try to blame bad incentive programs for chief financial executives, where they were encouraged to seek their own profit motives in deference to that of their organization, somehow thinking that the two should still intertwine or intersect at a certain point.

The United States in particular has been considered an advocate of the free market and the invisible hand, but now the merits of this philosophy are unclear. Also, as governments have taken a large stake in various financial institutions, it will be interesting to see how government philosophy will now play a role in investment markets, as they work through the financial institutions they now own, by being major shareholders.

## SUMMARY

We can probably say that markets are efficient, but this is only true under limited conditions. We have a long way to go before we can ensure markets are stable under all circumstances. This financial crisis will pass, but we should expect another one in the future (probably a long time from now—perhaps we should expect one every 20 years or so). Our investment markets are designed to entertain supply and demand, but this in part also depends on money flows, central bank and fiscal activity (government spending), economic expectations, limited wars, and investment fads and investment product innovation. Also, it may make some of us feel uncomfortable to reflect emotion and behavior into our investment decisions, but unfortunately it is not something that will go away. In all cases there are winners and losers and market imperfections will continue to exist. Some of the points expressed above perhaps cannot be solved without sacrificing a smoothly functioning financial system that works under most environments. Maybe the pain of going through some market dislocations every several decades could be a small price to pay for the benefits we receive under the much longer periods of financial stability. **5**



*Nino Boezio, FSA, FCIA, CFA, is a Senior Consultant at CIBC Wealth Management. He can be contacted at [nino.boezio@CIBC.ca](mailto:nino.boezio@CIBC.ca)*



# ARE U.S. STOCKS A GREAT BUY? THE ANSWER MAY SURPRISE YOU

By Steve Scoles

In mid-November, I went to a local store to buy some running shoes. When the clerk heard I was in the investment business, he quickly said, “I hear it’s a buying opportunity.” I couldn’t help but chuckle a bit—2008 should go down as “the year of the buying opportunity.”

Right from the start of 2008, everyone has been telling me how great a buying opportunity stocks were. In January, with the S&P500 at 1310, local financial personalities came on TV to tell the uninformed public that this was a buying opportunity. In July, with the S&P at 1200, infamous TV personality Jim Cramer told CNBC viewers that the bottom was in. In early October, at 1100, even Canadian Prime Minister Stephen Harper chimed in that people should use this as a buying opportunity. Later that same month, at 940, legendary investor Warren Buffett, in a New York Times article, said it was time to buy. And now, with the S&P hitting 850, the store clerk told me about the great buying opportunity.

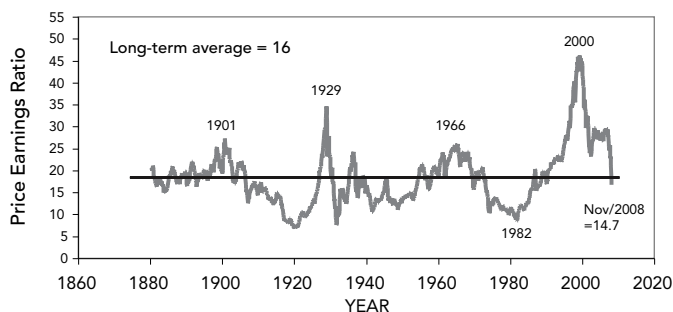
How lucky it was in 2008 to have so many buying opportunities!

Over the last 20 years, many people have learned that when stock prices drop, you should buy. But is it really a buying opportunity? And why do so many think it is? The answer may really surprise you.

## HISTORICAL PERSPECTIVE

To add some historical perspective to these questions, there is an extremely useful (and likely startling to most) graph of price-earnings ratios that gives us a sense of whether U.S. stocks are really a buying opportunity. While price-earnings ratios are a very crude way to look at how expensive or inexpensive individual stocks are, they have proven to be useful on an aggregate basis, and if the earnings are normalized, they do not overdo recent high or low earnings levels. Ben Graham, a former mentor of Warren Buffett, used a price earnings ratio where he would take an average of the previous 10 years earnings in order to normalize earnings (often referred to as P/E10). Robert Shiller, in his book *Irrational Exuberance* (published in 2000 and revised in 2005), calculated P/E10 ratios for the S&P 500 from 1880 to current times.

Price Earnings Ratios - 1880 to 2008



Several important conclusions can be drawn from the above graph:

- 1) Even with the recent historic panic and forced liquidation, stocks have only now returned to about their historical average valuation levels of a 16 P/E10 ratio. That is, stocks only recently became a slightly above average buying opportunity. At the S&P level of 750 reached on November 21, the P/E10 ratio reached down to 12—a moderately above average buy on an historical basis.
- 2) The great stock market boom of the last 20 years (where the normalized price-earnings ratio peaked at 45 in the year 2000) has finally come back to earth.
- 3) Stocks not only have a tendency to revert to the mean, but they must revert beyond the mean. And often dramatically beyond the mean for many years.
- 4) Historical lows in the P/E10 ratio is around seven. At current normalized earnings levels, that would suggest an S&P level of about 400 or so. There is no certainty that we will see this level, but it should be considered a distinct possibility.
- 5) The graph does not give any reasonable timing indicator for when reversion beyond the mean happens. It can happen in years or in decades after the top or bottom. Imagine someone who sold their equities in 1995 when the ratio was first hitting 25 and the S&P500 was at 600. They would have had to have waited 13 years before they might have felt they made the right decision. But perhaps someone buying now will have to wait just as long before they feel they made the right decision.

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Now, this is only one set of data points. You may even dismiss this graph saying that historical averages no longer apply in current times. However, when Robert Shiller's book first came out in 2000 (when the ratio was in the 40s), many dismissed the graph, pointing out the dramatic productivity improvements made in recent times and the central bank's ability to maintain economic stability.

As well, price-earnings ratios do not need to drop for stock prices to fall further—earnings could fall. Perhaps the high leverage and low borrowing spreads of the last 10 years have helped keep earnings much higher than they will be going forward.

## ANCHORING

One very strong behavioral tendency humans have is anchoring. Anchoring is our behavior of judging things relative to some arbitrary value or anchor. Humans are great at relative and proximate comparisons, but not so good at absolute evaluations. This is why you get pro athletes who are upset when they earn \$10 million but find another player on their team earns \$11 million.

Anchoring also explains why so many people felt 2008 was filled with such great buying opportunities. It seemed like such a great buying opportunity because so many people are still anchored to the greatest stock bull market of all time.

It may be hard to acknowledge that so many were so wrong, but anchoring is a very common mistake in financial markets. For example, in the mid 1980s it was deemed ridiculous by many investment professionals to match long-term liabilities with bonds yielding a “very low” 10 percent. At that time, many people were anchored to the much higher interest rates of a few years earlier. Yet here we are with long-term U.S. treasuries currently hitting multi-decade lows below 4 percent.

## JAPAN REDUX?

Most people hate when I bring out the dreaded Japan Scenario, but it does provide a scenario that should be considered. Japan's Nikkei index peaked at 39,000 at the end of 1989 and now, almost 20 years later, it sits at about 20 percent of that level. For fun, the following graph compares the paths of the S&P500 to the Nikkei with their respective 2000 and 1989 peaks lined up.



I'm not trying to say that the future path of the S&P500 will be the same as the Nikkei, but rather that it should be considered a possible path or at least a possible set of future destinations.

I recall back in 1998, when a financial commentator suggested the United States might be on a similar path as Japan partly because Japan's aging demographic was about 10 years ahead of where the United States' was. At that time it was dismissed by many that it couldn't happen here. Yet, here we are 10 years later and things are starting to look similar to Japan. But many still dismiss a Japan Scenario as a possibility.

Financial writer Bill Bonner suggests what may be the closest we have to a physical law in financial markets: “the force of a correction is equal and opposite to the delusion that preceded

it.” Is it not at least slightly possible that the biggest stock market boom in history could be followed by one of the greatest busts of all time? It may very well turn out that this bust ends up looking different than Japan’s. Western governments may be so determined to avoid a Japan-like downturn, they may just create other serious problems!

### ARE U.S. STOCKS A BUYING OPPORTUNITY?

Stocks have likely only recently entered the buying opportunity range on an aggregate basis. However, from a psychological and risk management perspective, we should strongly consider

that stock prices will revert beyond the mean for many years, perhaps even decades, before they get better. Why is this so possible? At a true long-term bottom in stock prices, it will be very difficult to find anyone who calls it a buying opportunity. ☹

### REFERENCES AND SOURCES:

Robert Shiller’s price-earnings data:  
[www.econ.yale.edu/~shiller/data.htm](http://www.econ.yale.edu/~shiller/data.htm)  
S&P500 and Nikkei 225 index values: Yahoo! Finance



*Steve Scoles, FSA, FCIA, is director of Asset/Liability Management at Great-West Life in Winnipeg, Manitoba. He can be reached at [Steve.Scoles@gwl.ca](mailto:Steve.Scoles@gwl.ca).*

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# INVESTING IN ILLIQUID ASSETS

By Xavier Timmermans

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**X**avier Timmermans, head of Alternatives Investment Specialists at Fortis Investments, recently presented a research paper on the potential benefits and possible pitfalls of investing in illiquid assets. This newsletter provides a brief summary of that paper. The full paper is available upon request.

Long-term investors do not necessarily need 100 percent liquidity for all their assets. The illiquidity premium is currently exceptionally high due to the ongoing credit crisis. Institutional investors have an opportunity to lock-in this high premium, which should boost the returns of their portfolios during the lengthy period in which they are invested in illiquid holdings.

## WHAT IS ILLIQUIDITY?

A liquid asset is one that can be sold rapidly, with minimal loss of value from bid-ask spreads, at any time within market hours. The essential characteristic of a liquid market is that there are ready and willing buyers and sellers at all times.

Illiquidity, liquidity's opposite, comes in different forms:

- Markets that are normally liquid may suddenly become illiquid if there are too many sellers for the number of buyers, and market makers withdraw from the market.
- Restricted liquidity, as for hedge funds where subscriptions and redemptions can typically only be made once a quarter with a notice period of at least a month.
- Illiquidity due to the absence of a secondary market. Private equity funds, for example, typically have 10-year duration with no exit possibilities other than via coupons and regular reimbursement in the final years of the lock-up period.

## ILLIQUIDITY IN TRADITIONAL ASSET CLASSES

### *The illiquidity premium*

The difference in the yield of two assets that are similar in all aspects apart from their liquidity is called the illiquidity premi-



um. This is the compensation an investor receives for accepting lower liquidity.

In the government bond market, for example, for the same issuer, maturity and coupon, a large, recent issue has a lower yield to maturity than an older or smaller issue. However, it is important to note that the transaction costs are smaller for liquid instruments, so a bond manager must find a balance between the need for mobility and the quest for higher yield to maturity. (Indeed, transaction costs in illiquid instruments may completely negate the benefit of their higher yields.)

Such liquidity premia exist in every market and their magnitudes change over time. In the example above, the cost of liquidity tends to decrease when yields are low and investors' risk appetite is high. Conversely, the illiquidity risk premium increases during sell-offs when investors are looking for safety.

Different studies show that expected returns are positively correlated with illiquidity. A recent study<sup>1</sup> showed a strong positive relationship between equity returns and the aggregate commission rate for NYSE trading, which itself exhibits a strong correlation with illiquidity indicators such as bid-ask spreads, order imbalance, and small-trade ratio.

### ***Restricted liquidity can protect fund investors against losses***

Excessive liquidity can be detrimental to a fund's performance. In principle, a fund's redemption period should not be shorter than the average time required for the liquidation of its assets. Also in principle, fund redemptions should not be allowed if the liquidation prices are lower than the net prices used to compute the fund's net asset value.

This may sound obvious, but many corporate bond funds and credit spread products lost value during the recent credit crisis

<sup>1</sup> "Is Illiquidity A Risk Factor? A Critical Look at Commission Costs," Jinliang Li, Robert M. Mooradian and Wei David Zhang, *Financial Analysts Journal*: Jul/Aug 2007.

# A WELL-KNOWN FRENCH MID CAP MANAGER HAD TO BE RESCUED BY ANOTHER COMPANY EARLIER THIS YEAR. ...

when bid-ask spreads and market volatility were much higher than usual. A well-known French mid cap manager had to be rescued by another company earlier this year because it was unable to guarantee the liquidity of its funds when liquidity disappeared in the small and mid cap market.

Therefore, restricted liquidity, a minimum holding period and high early-exit fees to the benefit of the fund, should be seen as protection for investors that are not looking to exit the fund.

## *Investing in illiquid traditional strategies in a crisis*

Illiquidity premia tend to increase in crisis situations. Today, the illiquidity premium is extremely high as we are in the middle of a credit crunch. Investors with deep pockets who can tolerate high temporary mark-to-market volatility are well placed to harvest this premium and generate what could be attractive returns for years to come.

An institutional investor willing to accept some illiquidity can obtain today's much-increased illiquidity premium on top of credit risk premia, for example. The true opportunities lie in the less liquid segments of the credit market, in bank loans, in small-size issues, and even in convertible bonds, which have suffered abnormally.

In most of these cases, the opportunities need to be structured in a fund or special mandate in order to optimize the risk-return trade-off, for example by hedging duration and currency risk or to get the right average maturity. Such funds tend to have a fixed maturity to reinforce the lock-in feature. The lock-in feature and other restrictions to liquidity also aim to protect investors from difficulties in determining accurate valuations (Mark-to-market

prices may be out of line with realistic acquisition prices, for example.).

## ILLIQUIDITY AND HEDGE FUNDS

Hedge fund redemptions can typically only take place quarterly, and with a notice period of several weeks. However, some hedge funds have restricted their liquidity further in order to exploit longer-term strategies and protect themselves against the arrival of a client base that is quick to punish poor short-term performance.

Dr. Fabrice Dusonchet, a Quantitative Analyst with E.I.M. S.A., demonstrated in a recent article<sup>2</sup> that between January 1997 and September 2006, hedge funds with annual liquidity outperformed hedge funds with monthly liquidity by about two percentage points per year.

This may be partly due to factors other than liquidity, but these results are hardly surprising when we consider the nature of hedge fund strategies, many of which aim to exploit market anomalies that take time to disappear. Distressed debt, for example, can take a couple of years before delivering the returns it targets. We do not expect to see hedge funds' liquidity improving—massive recent redemptions due to short-term underperformance will probably lead the best of them to add further restrictions to liquidity.

## *Vulnerability of some hedge funds in a liquidity crisis*

In theory, genuine hedge fund strategies should perform well whatever the market conditions: they do not have systematic exposure to bond or equity markets, and may even have a net negative exposure via short positions. Yet, in the past few quar-

CONTINUED ON **PAGE 14**

<sup>2</sup> See "Hedge Funds, Is their illiquidity worth it?" Dr. Fabrice Dusonchet, November 2006. EIM Web site <http://www.eimgroup.com/jahia/page86.html>

ters, many hedge funds have failed to meet their performance targets. In order to understand why this has happened and why we believe it does not discredit hedge funds, it is important to look at the ways in which hedge fund managers aim to generate performance.

Specifically, they can exploit two types of opportunity—directional and relative value—by taking long or short positions in different instruments. These techniques can be successful in both rising and falling markets. They are vulnerable, however, when there is a sudden withdrawal of liquidity, such as we saw recently when many market participants tried to reduce their risk (their leverage) at the same time. This is dangerous for hedge fund strategies because it means a lot of investors are trying to close their long and short positions at the same time by buying back the instruments they have sold and selling those they have bought. In other words, investors buy back the instruments they thought were overvalued, pushing their price up further, and sell the instruments they thought were cheap, making them even cheaper, in order to reduce their overall exposure to the markets.

A hedge fund manager who has made a correct initial assessment of the relative value of two instruments will lose money when this happens. The situation is even worse when the markets are highly leveraged, as this heightens the selling pressure. On top of this, long-short hedge fund managers tend to be short in liquid assets—since they must be able to buy back the instrument in the future to close the position—while they may take more long positions in less liquid assets. In a liquidity crisis, investors try to move their funds into liquid assets and offload less liquid instruments, creating the risk of further losses on both the long and the short sides of a relative value trade and increasing correlations across asset classes.

Crises such as these are hard to predict, can be violent, and may do considerable damage, especially to highly-leveraged funds. However, they are generally relatively short lived. Prices do

eventually adjust sufficiently to attract new buyers and sellers. This can create opportunities for hedge funds that are able to increase their positions and so generate better future performance.

## PRIVATE EQUITY

Private equity funds are the most illiquid of all alternative investments. Once invested in limited partnership interests (which are the dominant legal form of private equity investments), it is very difficult to achieve liquidity before the manager starts to sell the investments in the portfolio. Capital is locked up for as long as 12 years and distributions are only made as and when investments are converted to cash; limited partners typically have no right to demand that sales be made.

There is a wide range of types and styles of private equity, such as leveraged buy-outs, venture capital, capital growth, infrastructure, real estate and distressed situations. Institutional investors are increasingly interested by private equity as they seek:

- Higher returns than can be achieved on public stock markets;
- Diversification from traditional listed securities; and
- Lower volatility, as private equity can be a means of avoiding the volatility brought on by new regulatory mark-to-market requirements.

The private equity business model has a straightforward goal: to increase the value of a business as much as possible within a defined timeframe, typically eight-12 years. In contrast to public companies, private equity firms seek to sell all of the businesses they own. This influences every stage of a private equity investment's lifespan. Throughout the ownership period, private equity stewardship is relentlessly focused on improving aspects of the business in order to increase its attractiveness to new owners.

### *Is private equity illiquidity worth it?*

It could be expected that on average, private equity would generate higher returns than public capital markets because it involves



# “THE PERFORMANCE OF PRIVATE EQUITY FUNDS OVER THE PAST FEW YEARS HAS DIFFERED DEPENDING ON THE TYPE OF FUNDS AND THEIR VINTAGES.”

higher risk. However, the reality is much more complex. The performance of private equity funds over the past few years has differed depending on the type of funds and their vintages. Even within a specific type of private equity fund of the same vintage, the performance of the top- and bottom-quartile managers has varied dramatically.

A number of recent studies<sup>3</sup> have demonstrated that on a risk-adjusted basis, private equity does not outperform the public capital markets on average. The adjustments for risk in question take into account that private equity portfolios are typically far more highly leveraged than public companies and also their lack of liquidity, which adds a further element of risk and should justify an illiquidity discount.

A particular problem in such analyses is that these asset classes—including leveraged buy-outs, venture capital and real estate—are not valued on the same basis as traditional, more liquid asset classes such as cash, bonds and public equities. Illiquid asset classes have artificially-smoothed return series, making them look both less volatile than, and less correlated with, other asset classes. However, when methods are used to make the returns of publicly-traded assets more comparable with those of illiquid assets by removing serial autocorrelation in the data and treating errors in measurement, the results<sup>4</sup> lead to a dramatic revaluation of both the risk-adjusted returns and the diversification benefits of the asset classes.

This note is not intended to add to the debate, but we believe the conclusion of The Boston Consulting Group in the study referred to above<sup>3</sup> is very important:

“On a risk-adjusted basis, private equity does not outperform the public capital markets; nevertheless, it remains an attractive asset class for investors. The reason: there are indications that the best private-equity firms consistently “beat the fade”—that is, they avoid the reversion to average returns, which, over time, afflicts the vast majority of investment opportunities. In other words, some private-equity firms do have a strong likelihood of outperforming the market over time—something rarely witnessed in other asset classes, such as mutual funds or individual public companies.”

Leverage, meanwhile, is not necessarily a bad thing, as it contributes to the excess return of the asset class. Using leverage is not compatible with liquidity, however. This is one of the reasons why private equity illiquidity is worth it.

## CONCLUSION

Investing in illiquid assets can provide clear benefits—namely higher returns and diversification. However, this kind of investment is not for the fainthearted and any potential investor must make a detailed assessment of their liquidity needs beforehand—if they get this wrong then they run the risk of not locking-in the illiquidity premium (which is currently extremely attractive) or of not being able to meet their liabilities.

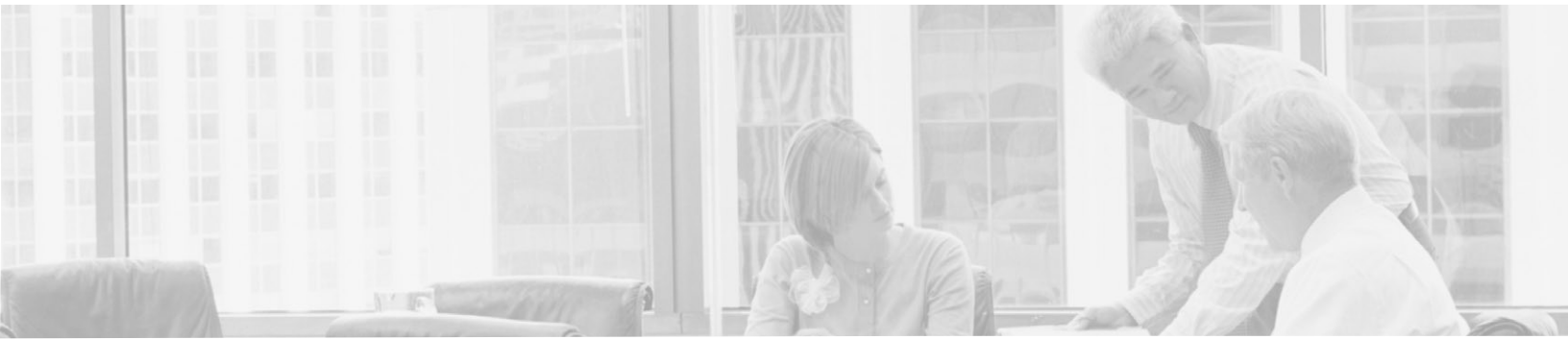
In particular, institutions investing in illiquid assets must be certain that they will not need to access the money they have invested in the near future. Illiquid assets are just that—they can often only be cashed-in several years after the initial investment, and so are only suitable for investors with an appropriate time horizon.

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<sup>3</sup> See “The Advantage of Persistence, How the Best Private-Equity Firms ‘Beat the Fade,’” The Boston Consulting Group & University of Navarra, February 2008.

See also “Private Equity Performance: Returns, Persistence and Capital Flows,” Steve Kaplan and Antoinette Schoar (Kaplan is at the University of Chicago Graduate School of Business and at the NBER; Schoar is at the Sloan School of Management at MIT, and at the NBER, and the CEPR).


<sup>4</sup> See “How Risky are Illiquid Investments? A practical approach to estimating volatilities and correlations for non-traded assets,” Vineet Budhreja and Rui J. P. de Figueiredo, Jr. The Journal of Portfolio Management, Winter 2005.



In addition, investors must have the knowledge and time to be able to manage what are somewhat complex asset classes. In general, this involves selecting an investment manager to carry out this role for them, but even then they should conduct extensive due diligence as managers vary widely in their ability.

In short, the longer institutional investors are prepared to lock up their money, the higher the return on their investment is likely to be. Given that the illiquidity premium is currently high

as a result of the ongoing financial turmoil, institutions may be well-advised to carefully consider investing in illiquid assets.

For more information please contact Simon Segall at [simon.segall@fortisinvestments.com](mailto:simon.segall@fortisinvestments.com) or 647.826.4404, Vincent Marcoux at [vicent.marcoux@fortisinvestments.com](mailto:vicent.marcoux@fortisinvestments.com) or 514.989.3135, Xavier Timmermans at [xavier.timmermans@fortisinvestments.com](mailto:xavier.timmermans@fortisinvestments.com). 

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*Xavier Timmermans is head of Alternatives Investment Specialists at Fortis Investments.*



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# VA GMxB AND DELTA HEDGING IN OCTOBER '08 AND BEYOND

By Craig Turnbull

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**V**ariable Annuity products with significant guaranteed minimum benefits have been one of the biggest sales successes of the US insurance sector over recent years. These guarantees must be 'marked-to-market' under US GAAP (FAS 133), and this has encouraged firms to hedge the market risk exposures created by such guarantees.

There are a variety of hedging strategies that can be implemented by VA GMxB writers, and each of these strategies has its own relative merits with respect to costs and risks. These trade-offs can be brought into sharp relief by volatile trading conditions such as those in October 2008. This note produces some high-level analysis of the likely strains that such conditions would have placed on the performance of a delta hedging strategy over that period, and discusses the implications this may have for the sector.

Market risk management strategies for VA GMxB vary across the sector and include:

- *Do nothing but hold capital.* Not a common approach, but leaving some GMxB exposures 'naked' may be considered by firms that are not particularly concerned with US GAAP earnings volatility and believe they have sufficient capital to fund the economic risks.
- *Reinsure.* Pass these market risk exposures on via a reinsurance treaty. This has been significantly used by some firms in the past, but the reinsurance sector appears to have a limited appetite for these risks, especially at the prices at which the guarantees are being sold.
- *Structured OTC hedging solution.* Pass the risk on to the capital markets through the purchasing of a hedging solution that has been tailored to (permanently) match the specific characteristics of the GMxB liabilities. Note this will leave policyholder risks (lapse behaviour and its impact on the amount of GMxB that is in play). Like the reinsurance solution, firms may find it difficult to achieve a solution at a cost commensurate with the product pricing of the guarantees.
- *Dynamic internal hedging.* The firm dynamically manages a portfolio of exchange-traded vanilla derivatives in a way



that matches the short-term market value sensitivities of the GMxB liabilities. This may be, *on average*, a cheaper solution than the structured approach, but it can leave material residual market risks behind.

The dynamic internal hedging approach is the most commonly used risk management strategy (particularly if weighted by \$ exposure). Firms using the dynamic strategy may make different choices as to which market risk sensitivities are hedged. For example, firms may hedge the sensitivity of the liability value to changes in the underlying asset values (*delta*); its sensitivity to changes in risk-free interest rates (*rho*); its sensitivity to changes in option-implied volatility (*vega*). Some firms may choose to hedge all three (and perhaps more) of these, but many will choose to focus solely on the biggest sensitivity and will hedge only the *delta* exposure.

A delta-hedging strategy recognises that the guarantee value will change as the underlying fund value changes, and so the hedge portfolio takes an off-setting position in the underlying fund to neutralise this impact. The *delta* of the guarantee cost is the ratio of how much the guarantee cost changes relative to a small change in the fund value. For example, if a \$1 fall in the underlying fund value results in the market-consistent guarantee cost increasing by \$0.1, the *delta* is -0.1 (i.e. -\$0.1/\$1). If the hedge portfolio's position in the underlying fund portfolio is *delta* of the underlying fund value of the policy, the hedge portfolio is *delta-neutral*, and we are hedged – a change in the fund value does not affect the net position of the hedge portfolio less the guarantee value. Okay, great. So what's the problem?

## WHAT'S LEFT BEHIND BY DELTA HEDGING

Generally, any delta-hedging strategy will leave a couple of key risks 'on the table':

- From a mark-to-market valuation perspective, the balance sheet remains exposed to changes in option-implied volatility. This will impact on the liability mark-to-market value, but will not impact on the value of the (pure) delta-hedging portfolio

(the short position in the underlying fund portfolio will not be increased in value by an increase in option-implied volatility).

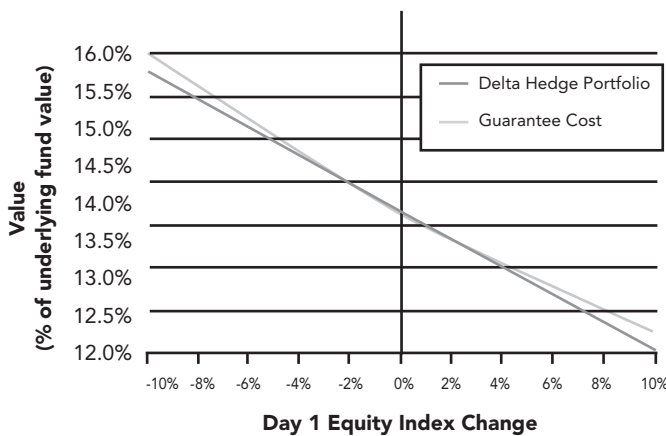
- There is a more fundamental risk exposure that is left behind by the *delta* hedging strategy: the delta of the guarantee continuously changes as the underlying fund value changes. In particular, as the fund value rises (falls) and it becomes less (more) likely that the guarantee will ‘bite’, the delta will decrease (increase) in magnitude. This second-order sensitivity is so important that it has its own greek name, *gamma*.

The trouble with *gamma* is that it creates a convexity in the guarantee cost such that a delta-hedging strategy loses money in *both* market directions. As markets fall, the guarantee cost delta rises in magnitude and become more negative, and our net position develops a positive *delta* exposure which loses money in falling markets. Conversely, when markets rise, the guarantee cost *delta* falls in magnitude and becomes less negative, which creates a net negative *delta* exposure which loses money as markets rise.

The bigger the market rise or fall, the more money the delta hedger loses. In this sense, delta hedging has removed exposure to *directional* equity market changes, but leaves an exposure to unexpected changes in *realized fund volatility*. This is illustrated by the chart below, which is based on an example we discuss further later.

This mis-match can be mitigated by frequently re-balancing the size of the *delta* exposure in the hedge portfolio (i.e. increasing the size of the short equity position when the underlying fund value falls). This dynamic re-balancing can, in theory, perfectly capture this non-linearity in the *delta*, if the hedge portfolio is re-balanced continuously. But, in real life, continuous re-balancing isn’t practically possible, and the discrete re-balancing frequency leaves the hedger exposed to the risk that the underlying fund value moves a lot before the hedger gets the chance to re-balance the hedge portfolio to the required exposure. In this case, the hedger will make a loss (irrespective of whether the big price change was up or down).

Exhibit 1: Guarantee Cost and Delta Hedge Portfolio Behaviour



This risk is naturally most pronounced when markets are very volatile or ‘jumpy’. Markets were especially volatile and jumpy in October 2008 – realized daily volatility of the S&P 500 over this month was 78%! We now use a simple GMWB case study to estimate what damage this volatility may have done to hedging performance during this period.

### A SIMPLE VA GMWB CASE STUDY

The case study makes the following key assumptions:

- 5% GMWB for life, starting immediately for a 60 year-old male;
- 5% lapse rate that dynamically reduces to 0% as the underlying fund value approaches 0;

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- 0.75% AMC and 1.5% guarantee charge deduction;
- 100% of underlying funds invested in S&P 500 index.

Using the B+H VA Hedging ESG, the starting market-consistent guarantee cost for the GMWB is estimated at 13.7% of the starting underlying fund value on October 1<sup>st</sup>. The accompanying delta is estimated at -0.16.

We now consider how a daily-rebalanced delta-hedging program would have fared in the following weeks. In particular, our analysis focuses on estimating the losses that arise from the *gamma* slippage in this particularly volatile market environment. Exhibit 2 charts the daily S&P 500 price change between October 1<sup>st</sup> and November 20<sup>th</sup> and an estimate of the cumulative daily losses that would arise from the hedge strategy's *gamma* exposure that is highlighted in Exhibit 1 on page 19.

Exhibit 2 highlights how daily hedging losses were most significant when the magnitude of the equity index change is greater than 5%. Again, this can also be observed in Exhibit 1. Our analysis suggests that, for this particular variable annuity policy, the cumulative delta-hedging losses over this 7-week period were almost 2.0% of the underlying fund value, which is equivalent to several years' of the anticipated profit from the policy.

This analysis makes the key assumption that the hedge portfolio was re-balanced at the start of every trading day. Some firms may have been able to implement intra-day re-balancing that would have reduced these hedging losses. On the other hand, this analysis has not incorporated any allowance for trading costs or the difficulties implementing significant increases in equity short positions in these challenging market conditions.

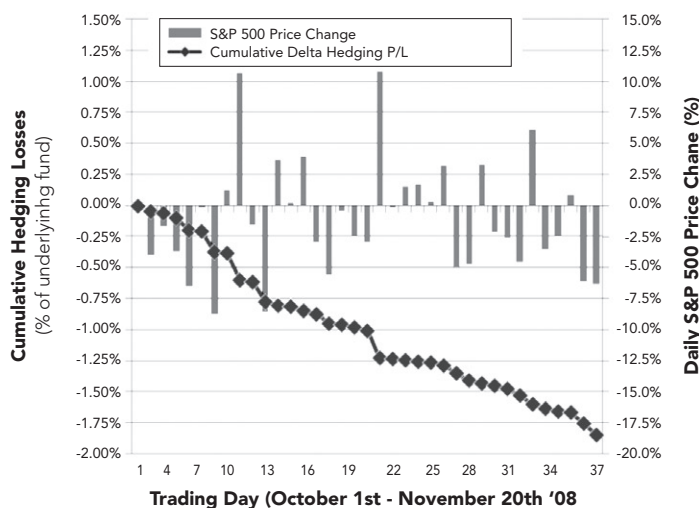
It should also be noted that this is just *one* of the sources of hedging loss that has been quantified in this analysis. The increases in option-implied volatilities over the period will also have generated a significant mark-to-market hedging loss. The size of these calculated *vega* losses will depend on how firms are extrapolating option-implied volatilities beyond the liquid parts of the market. Also, unlike the above *gamma* losses, there is more opportunity to make *vega* gains as option-implied volatilities revert back to more normal levels in the future. However, we expect *vega* losses over the above measurement period to be at least comparable to the above *gamma* losses. Finally, falls in interest rates will have further exacerbated hedging losses.

Given that there is over \$200bn of VA funds in-force in the US with attaching GMxBs, we anticipate that total hedging losses over this period will total many billions of dollars. These losses will be visible in Q4 2008 US GAAP earnings statements.

### LOOKING AHEAD

You may have read the above case study and asked yourself 'where's the news?'. After all, recognition that a delta-hedging strategy leaves *gamma* risk behind hardly represents a new breakthrough in option pricing theory. And equity markets

Exhibit 2: Equity returns and delta-hedging losses



# // ...THE VOLATILE FINANCIAL MARKET ENVIRONMENT HAS EXPOSED THE LIMITATIONS OF SOME COMPANIES' STRATEGIES. ... //

have produced a number of similar periods of high short-term volatility over the last twenty years. *Delta hedgers have lost money in a volatile market – so what?*

Well, insurance companies have not been in the dynamic hedging business for very long. This is the greatest period of financial market volatility that has been experienced since VA hedging programs were put in place. Senior managers, regulators and investment analysts may not have fully appreciated the possible scale of the ‘residual’ risks that sophisticated hedging strategies can leave behind. This experience may re-shape the sector’s approach to product pricing and product design, and dial back the levels of tolerance for having these risks on insurance company balance sheets. It is very likely to lead to more scrutiny in the implementation of internal hedging strategies. In particular, we expect that there will be a number of key themes that will consistently arise in the development of more robust hedging analytics and strategies for 2009. Three of these are discussed below.

*Hedge projection and evaluation:* Recent experience will naturally lead to greater scrutiny of projected hedge performance and the quantification of the risks left behind. There is likely to be more stress test analysis of hedging strategies (both for internal and external purposes). There is also likely to be more interest in sophisticated stochastic equity models that can generate daily scenarios similar to those experienced in these market environments. Such models can help to estimate how frequently such environments can occur, and the probability of experiencing similar or greater losses in future periods. Using a stochastic model as well as historical stress tests has the additional benefit that it becomes harder to design a strategy that merely ‘data-mines’, i.e. that is designed to work very well in a particular historical scenario that will not specifically occur again.

*Model risk in hedge analytics:* The greeks of VA guarantees are assessed using (market-consistent) stochastic asset models – they are too complex to be found in a textbook or on a Bloomberg screen. At B+H we are clearly big fans of stochastic asset models. But we also know that a model is

always an approximation. The art of developing and applying stochastic models lies in judging which approximations are unlikely to have a material impact on the results of interest, and which could have a big impact. This isn’t always obvious, and sometimes the best way to quantify this model risk is to re-calculate results using more than one (reasonable) model. If the results are largely invariant to the model choice, the hedger can sleep more easily at night. We anticipate that greater scrutiny around hedge implementation risk will result in a more work being done in the area of *model* risk, and firms will be less reliant on a single model to provide them with the ‘right answer’.

*Allowing for credit risk in underlying VA funds:* Historically high levels of credit spreads are resulting in greater investment of VA underlying funds in credit-risky bond funds that are offering attractive yields. The high level of credit spread volatility also means that exposure to credit risk in the underlying funds will have a greater impact on market-consistent guarantee valuations than previously. To date, few firms have fully incorporated allowance for credit risk in underlying funds into the assessment of the market-consistent costs of guarantees. The B+H VA Hedging ESG provides this capability, and we estimate that *making allowance for credit risk will increase market-consistent GMWB costs by 10%-25% for a product with a 50%/50% equity/bond allocation.*

## CONCLUDING THOUGHTS

Recent months have clearly represented a challenging period for the global economy in general and the financial services sector in particular. The insurance sector has not been immune from such malaise. In particular, the volatile financial market environment has exposed the limitations of some companies’ strategies for managing the market risk exposures created by the provision of significant long-term guarantees in VA products. We expect this will result in the sector incurring hedging losses of the order of many billions of dollars in Q4 2008, representing several years of the expected profit stream from these VA product lines.

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We also anticipate that this experience may trigger a significant evolution in the sector's approach to the pricing, design, risk management and (perhaps) regulation of the guarantees embedded in VA products. This experience may highlight - as similar experiences have highlighted in other markets around the globe - that, over the long life of such products, seemingly insignificant and residual market risks have a habit of emerging to impact significantly on insurance company balance sheets, and that the impact tends to be in one direction only. Whether in the US, Taiwan, UK or Continental Europe; and whether it be equity returns, equity volatility or long-term interest rate levels, over the last seven years global life insurance sectors have had to learn the hard way that apparently innocuous long-term market risk exposures demand very rigorous scrutiny and management.

We anticipate that the impact on the US sector will be similar to that experienced elsewhere around the globe during similar periods: a move to a more disciplined market-consistent approach to product pricing; consequently, less significant investment guarantees in products; more (truly) principle-based approaches to regulatory capital assessment; and more market risk hedging and risk management scrutiny. US VA hedging activity already represents the most sophisticated market risk management program in the global insurance sector, but there are still significant risks left behind that, over a 20-year product horizon, are going to cost a lot of money. 2009 will see better recognition, measurement and management of those risks, and B+H looks forward to supporting the sector in implementing these improvements. ☛

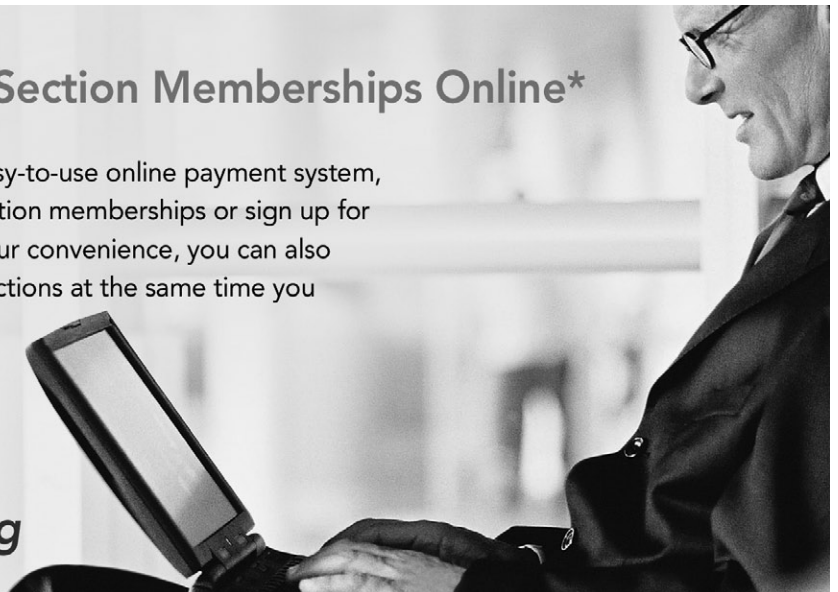
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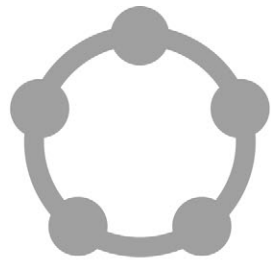
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