

Managing your LVR to accommodate changes in volatility

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Key points

- **Extreme volatility will significantly increase the probability of receiving a margin call.**
- **During periods of extreme volatility it is essential that investors pre-emptively adjust their LVRs to reduce their chance of receiving a margin call.**
- **We consider the idea that if investors had some benchmark LVR a few years ago at which they were comfortable, what this LVR might be now given current volatility assumptions.**

Executive Summary

If there is one thing investors have learned from the current bear market is that there is much truth behind the statement “gearing amplifies risk as well as returns”. Not just because the market has gone down but because of the speed at times at which it has done so.

Even if we allow for zero or positive underlying growth in market prices, volatility in markets can cause a margin call. The greater the volatility, the greater the probability of a margin call. And the current financial crisis has seen extreme levels of volatility in most markets around the world.

As the portfolio value falls, the Loan to Value ratio (LVR) goes up making the starting point for a margin call that much closer. This fall combined with extreme volatility makes a dangerous cocktail. Therefore, during such times it is important that investors pre-emptively adjust their LVRs to reduce their chance of receiving a margin call.

Most seasoned geared investors would have had some notion of the LVR at which they were relaxed before the current crisis began and another higher LVR at which they would have become alarmed and felt it time to take action – either by selling down part of the portfolio or by adding more security. Having such reference LVRs in mind can lead to less stress and less risk.

The question we pose in this paper is, if investors had these benchmark LVRs a few years ago, what are the corresponding LVRs today? To answer this question we need to understand how volatility has changed in recent times, the statistical distribution of stock market returns and the time horizon for managing an LVR.

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Section 1: How volatility has changed

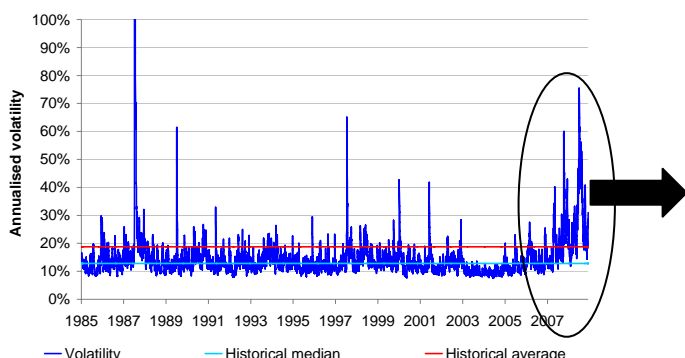
When geared, the level of volatility in the market and more importantly an investor’s portfolio will have a significant impact on the probability of receiving a margin call. Therefore, it is important to understand how market volatility has changed in recent times and what this may mean for portfolio volatility. Depending on the degree of diversification, the volatility of an investor’s portfolio may not be the same as the market. For example, portfolios of only a few stocks or those which are highly concentrated in just a few sectors will typically have much higher volatility than the market or that of a well-diversified portfolio of blue chip stocks or index-tracking managed funds. It is essential that this fact is taken into account when setting and thinking about LVRs.

Since all investors are likely to have a slightly different portfolio, each with a different volatility, we look at the volatility of the S&P/ASX 200 index in order to provide a benchmark from which to work. Investors can then deduce what this market volatility means for their portfolio.

The tricky thing with volatility is that unlike calculating a return of which there is only one way to do so – what is the price now versus what was the price before – they are many ways to estimate volatility. These different ways, such as rolling standard deviations or volatility models (such as GARCH) combined with the various options in terms of frequency of data used (eg daily, weekly), will all give rise to different estimates of volatility. Therefore, when someone quotes a volatility number it is important to know how it has been calculated. But what’s more important is that if comparing the current level of volatility to some level in the past then the volatilities have been consistently calculated. Therefore, for the purpose of this analysis we use a GARCH model applied to daily data to estimate volatility which we show in Figures 1 and 2.

With the onset of the Global Financial Crisis mid way through 2007 extreme volatility hit markets around the world and Australia was not immune. Volatility spiked to levels previously unseen since the days just after the 1987 stock market crash. The typical long-run level of 12% – 18% vanished as levels of 20% – 40% became the norm with short-run extremes of 60% and 70%. In recent months volatility has been subsiding but continues to remain elevated at levels between 20% – 30%.

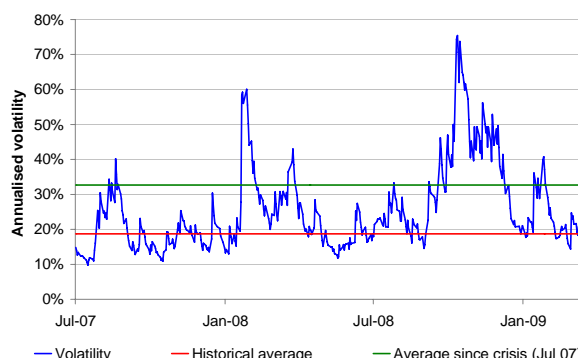
Figure 1: S&P/ASX 200 volatility since 1985



Source: Investment Research, IRESS

Note: Scale has been truncated at 100% (volatility in 1987 reached 215%)

Figure 2: S&P/ASX 200 volatility since July 2007



Source: Investment Research, IRESS

Section 2: Managing LVRs

Extreme volatility can significantly increase the probability of a margin call – but by how much? Once we know this we can then consider how one might adjust their LVR in order to ensure that the probability they now face is the same as what they were previously comfortable with or is at least somewhat reduced.

The level of volatility is not the only influence on the probability of a margin call. Along with other factors such as the assumption of the statistical distribution of stock market returns, the time frame over which the probability is assessed is also an important factor. Therefore, when an investor takes out a margin loan, he or she should consider the time interval in which they will be able to respond in order to prevent a margin call or adjust their LVR to a more comfortable level. For professionals, this interval might be a day but for many investors, a week, two weeks or a month is likely to be more reasonable and prevent undue “lack of sleep”. The longer this time frame the lower the LVR needs to be.

While in the long-run markets display a trend, over short periods such as a week or month, this trend is almost completely dominated by day-to-day fluctuations (volatility). Accordingly when estimating the probability of a margin call we use a simulation approach based on independent (uncorrelated) draws from a distribution with zero-mean (i.e. no trend) and various volatility assumptions. By changing these volatility assumptions we can assess the impact of how extreme levels of volatility influence these probabilities. However, rather than dwell on the technical details, these concepts can be easily demonstrated in a simple example.

Let’s assume an investor has a geared portfolio with a maximum LVR of 70% and a 10% buffer. We also assume that this investor “used to be” content with gearing to a level of 50% and would typically become concerned – and usually take action in terms of adding more security or selling some stock – when their LVR reached 65%. By “used to be” we mean before the current crisis (Jul 2007) when market volatility averaged, say, 15%. We assume the investor has a portfolio with the same volatility as the market.

At their comfort LVR (50%) the investor can take a 38% fall in the value of their portfolio before receiving a margin call. While at their alarm LVR (65%) the portfolio can fall 19% before a margin call will be made.

Unfortunately, the bear market has dragged the investor’s portfolio significantly lower. Their actual LVR is now at 68% – a level above their comfort LVR and their alarm LVR. This means that if the investor does not take any action a further fall of 15% would trigger a margin call.

While it’s relatively simple to work out the fall required for a margin call at various LVRs, what’s less straight forward is assessing the likelihood that such a fall will occur and therefore the probability of a margin call. This is where simulation and distributional assumptions come in to play. Firstly, we estimate these probabilities assuming ‘normal’ volatility that is, the 15% pa which was typical for the investor’s portfolio before the crisis. We then estimate these probabilities under ‘extreme’ volatility. We make the assumption that during the crisis the investor’s portfolio is displaying extreme volatility of about 30% pa. These probabilities are shown in Table 1.

Two key trends emerge. Firstly, as the time interval over which the probability is assessed is increased the probability also increases. This result occurs as with more time available there is greater chance the portfolio will

decline sufficiently to trigger a margin call. Secondly, when volatility is greater so is the probability. For example, at the investor's current LVR of 68%, if volatility was 'normal' at 15%, the probability of receiving a margin call within a month is 2.3%. However, with extreme volatility of 30% this probability jumps to 20% – a level which is hopefully much too high for nearly all investors to tolerate!

Table 1: Investor's probability of a margin call under normal and extreme volatility

<i>Under Normal volatility assumption of 15% pa</i>		<i>Under Extreme volatility assumption of 30% pa</i>	
Probability of margin call when geared at <u>current LVR</u> within a:		Probability of margin call when geared at <u>current LVR</u> within a:	
Week	0.2%	Week	1.9%
Fortnight	0.4%	Fortnight	5.4%
Month	2.3%	Month	20.0%
Probability of a margin call if geared at <u>comfort LVR</u> within a:		Probability of a margin call if geared at <u>comfort LVR</u> within a:	
Week	0.0%	Week	0.1%
Fortnight	0.0%	Fortnight	0.1%
Month	0.0%	Month	0.4%
Probability of a margin call if geared at <u>alarm LVR</u> within a:		Probability of a margin call if geared at <u>alarm LVR</u> within a:	
Week	0.1%	Week	0.7%
Fortnight	0.2%	Fortnight	2.4%
Month	0.8%	Month	11.1%

Note: Current LVR = 68%, Comfort LVR = 50% and Alarm LVR = 65%
Source: Investment Research

Now that we know how the investor's probability of a margin call increases under extreme volatility the next question to ask is how might they adjust their comfort and alarm LVRs to compensate. The aim of this process is to ensure that when volatility is extreme, the investor is facing the same probabilities at these benchmark levels that they were under normal volatility. Therefore, to work out these adjustments we take the probabilities estimated for normal volatility and match them to those LVRs which give the same probabilities under extreme volatility. And to be conservative we work on the assumption that the investor has a time frame of one month in which they can manage their LVR. We show the results in Table 2.

Table 2: How the investor might adjust their benchmark LVRs under extreme volatility

	<i>Under Normal volatility assumption of 15% pa</i>	<i>Under Extreme volatility assumption of 30% pa</i>
Comfort LVR	50%	30%
Alarm LVR	65%	52%

Source: Investment Research

For this investor the probability of a margin call that they were previously comfortable with (LVR of 50%) implies that under extreme volatility this same level of comfort will be experienced at an LVR of 30%. Meanwhile, the probability of a margin call at which they were previously alarmed (LVR of 65%) implies that under current volatility the same level of alarm should be felt at an LVR of 52%.

Of course, this is only one example with one set of assumptions. The relationship between this example and how investors might adjust their LVRs under different assumptions is not straight forward. For this reason, almost all situations are unique. However, it is our intention that this case study provides some intuition behind the thinking.

A final factor to consider is the effect of including cash as part of your portfolio. Doing so has the effect of increasing the fall which can be taken by a portfolio before a margin call is made – effectively slowing down the probability that a margin call is made. This effect occurs as the cash portion of the portfolio is not re-valued daily in the same way as are stocks and managed funds. While this can be a great benefit in times of extreme volatility, including cash does increase the complexity of the analysis when thinking about how comfort and alarm LVRs might need to be adjusted. When cash is involved and the value of the portfolio falls, the maximum portfolio LVR actually increases as cash is generally assigned a higher LVR than stocks or managed funds and the proportion of cash in the portfolio higher. Therefore, this effect and its impact on the probability of a margin call also need to be considered.

Section 3: Ten of the top questions for geared investors

The case study above illustrates that a geared investment strategy requires much thought and careful management. Here are ten of the top questions we think that geared investors not only need to ask themselves but also be able to answer! If you hesitate in answering any of these questions or others that are similar, perhaps now is the time to sit down, make a plan and do something about it.

1. What if your portfolio value fell by, say, 10%, would you get a margin call?
2. Could you recover from a margin call?
3. Could you pre-empt a margin call (either by selling stock or adding more cash) if the market starts moving against you?
4. Which stocks or funds would you sell first?
5. What impact would such sales have on the volatility of the remaining portfolio?
6. What if you lose your job – will you be forced to sell stock at possibly a bad time?
7. What if interest rates suddenly went up – could you still afford your loan?
8. What if a company pays a lower than expected dividend?
9. What if your lender reduces the maximum LVR on one or more stocks?
10. In higher volatility regimes, what is your 'comfort' LVR?

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