The Role of Leverage in STIR's Risk Procedures

STIR Capital Internal Note

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1 Leverage and Risk

Leverage and risk are different–but frequently conflated–concepts. Risk is concerned with the liklihood of the value of a balance sheet's *assets* declining by a certain amount. Leverage, on the other hand, measures the decline of the value of an *equity* stake given a decline in the value of assets.

From a risk management perspective, leverage is an important property of a fund because the extent to which the fund's portfolio is leveraged is a good proxy for the likelihood of an involuntary liquidation of positions. Such forced de-leveraging destroys value in the fund's balance sheet and is something a prudent manager works to ensure never happens.

The problem, however, is that traditional balance sheet measures of leverage are at best misleading for a fund that trades in largely off-balance sheet contracts. The financial markets crises of 1998 has created fresh interest in extending the concept of leverage to include off-balance sheet vehicles.

One increasingly popular approach involves using a VaR framework. For example, writing after the LTCM debacle in 1998, the President's Working Group on Financial Markets [1] proposed as a measure of leverage using the Value-at-Risk of a fund's asset portfolio, VaR(A), relative to its equity, E:

$$l = \frac{VaR(A)}{E}$$

This ratio basically tells you how much capital is availiable to finance losses that have such-and-such probability of occuring. While clearly superior to an accounting-based measure, this definition fails to analyse the equity risk into its risk and leverage components.[2]

2 The liquidity measure

At STIR we use a liquidity-based leverage measure, cash C plus borrowing capacity[3] B over monthly VaR:

$$l' = \frac{(C+B)}{VaR(A)}$$

A reading of 2, for example, would mean that funds availiable to finance losing positions are twice the size of our monthly VaR.

This measure is clearly superior to the previous one in that it describes the fund's ability to not only finance losses, but finance losses without liquidating any positions.

We aim to have cash and availiable credit of at least 4-times our monthly VaR (i.e., l' ¿= 4).

3 VaR

The VaR figure is derived from a Monte Carlo simulation done by GlobeOp, STIR's risk management firm. We calculate a 1-day VaR at 99% confidence.

The VaR figure in the liquidity measure should be based on a horizon equal to the amount of time that the manager could reasonably expect to raise cash

[1] *Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management*, Report of The President's Working Group on Financial Markets, April 1999

[2] *Measuring Off-Balance-Sheet Leverage*, Peter Breuer, IMF Working Paper, December 2000

[3] Borrowing capacity includes credit lines, repo, and excess margin.

through the liquidation of positions during ordinary trading conditions. In the case of the STIR G10 fund, this is a month, as redemptions are permitted at month-end. The monthly figure is simply the product of the daily VaR and the factor $\sqrt{20}$.

4 Description of Spreadsheet

The attached spreadsheet is a dummy portfolio of swaps, options, futures, and cash bonds. While the positions do not necessarily express the opinions of STIR, they are reflective of the type of positions that STIR will be putting on.

The portfolio is funded on 12 June 2002 and all of the positions shown are purchased on that same day. The columns LongCash1, MgnCash1, and ShortCash1 show the *changes* to the settlement-day cash balances as of the end of the day on 12 June. Below these columns are the settlement-day cash *balances* as of the end of the day on 12 June.

The portfolio is marked-to-market as of the end of the day on 28 June 2002 and the columns LongCash2, MgnCash2, and ShortCash2 show the changes in the cash balances between the end of the day on 12 June and the end of the day on 28 June. We assume that no positions were opened or closed during this period, variation margin is paid out of long cash, and excess margin is credited back to long cash. The only source of borrowing capacity is repo against the long cash bond position (assuming a 2% haircut).

As would be expected, the liquidity (shown under the cash balance figures) of the fund deteriorates slightly due to the period's negative PNL, but the liquidity measure is still safely within STIR's parameters.