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Is there a case for a less severe equity stress test following 2008 returns?

Modern capital adequacy regimes require firms to set aside sufficient capital to survive extreme market and non-market events in order that they can meet their obligations with a high level of confidence. The assessment of these extreme possibilities is an inherently difficult task. In setting stress tests for capital assessment, regulators have taken care to avoid 'pro-cyclicality'. From the authorities' perspective, pro-cyclicality carries two major downside risks.

Firstly, the possibility that a firm will breach its capital requirements in a downturn as a result of a required increase in risk capital at a time when it is unwilling (typically because of the high cost) and/or unable to raise additional capital. Secondly, that actions taken by individual firms to reduce their risk (e.g. by cutting equity exposure) will make further market falls more likely. This could cause problems for the economy as a whole, as well as policyholder security.

The primary challenge for regulators in thinking about pro-cyclicality is how to strike a balance between capital requirements that are sensitive to firms' changing risk exposures, and capital requirements that are relatively stable over the time without undermining the confidence of policyholders and other stakeholders.

In our analysis of the magnitude of equity stress tests we have drawn a clear distinction between a test which is consistent with very long-term estimated frequencies for extreme events ('through-the-cycle', TTC) and a stress test which takes account of current market conditions ('point-in-time', PIT). We have argued that, during periods of market stress, a more severe test is likely to be appropriate if you wish to make a conditional, PIT estimate. However, following the extraordinary negative equity returns of 2008, a number of analysts have asked whether it is reasonable to weaken this stress test for the year-ahead equity stress¹.

One possible argument in favour of a less severe test is that equity returns follow a '*mean reversion*' process. In other words, below-average returns are likely to be followed by above-average returns. Although regulators (and many financial economists) are deeply uncomfortable with strong views on mean reversion, if you believe that equity risk premia (confidence, fear, greed, 'animal spirits') vary through time, it is not an unreasonable idea given the current elevated levels of market volatility.

1. To be even asking the question does look a bit strange if you have already decided that your test should be long-term/unconditional /through-the-cycle. Then again, if your CEO or pro-cyclicality-fearing regulator is looking for any possible way of avoiding bad news, perhaps not.

There are a number of ways we could set about trying to judge the reasonableness of this approach. However, in this note we will present one (fairly basic) piece of analysis in order to give insight into this question. Let us examine the worst returns delivered by equity markets and analyse the returns delivered *in the following year*. We will look at both the average of the year-2 returns and the distribution of these returns.

Some analysis

In the table and chart presented below the equity returns in excess of cash for 16 large equity markets collated by the researchers Dimson, Marsh and Staunton² (DMS) for the period 1900 to 2000 are analysed then extended by our own analysts using broad market index data. You can see – from the first line of the table – that the arithmetic mean annual excess return over all countries and all years is +6%. As an aside, note that – for the reasons DMS articulate – our forward-looking assumption for the global equity risk premium is a little lower than this at around 4.5%. Now consider the bottom line of the table. It shows analysis of the worst 100 annual returns (out of the total sample of approximately 1700) and excess returns in the following 'year 2'. For the worst 100 observations the mean excess return was -31%, rather less severe than equity returns suffered in 2008 but certainly comparable. In the second column we have shown the mean across all the year-2 excess returns of +9%. So, at least for this sample, average returns are a little higher. What is more, this apparent increase in the year-2 delivered risk premium is markedly higher for the most extreme downside returns. The mean excess returns for the worst 10, 25 and 50 years are also shown at +39%, +19% and +15%.

Table 1: Analysis of DMS /Barrie & Hibbert Excess equity returns for various selected periods

<i>Sample period</i>	<i>Mean XS return</i>	<i>Mean XS return in following year</i>	<i>Worst year 2</i>	<i>95th percentile</i>	<i>99th percentile</i>
All years (1900-2003)	+6	+6		-25	-35
worst 10	-45	+39	-19		
worst 25	-39	+19	-39	-33	
worst 50	-35	+15	-55	-37	
worst 100	-31	+9	-55	-31	-45

So, does the data suggest that there could be a case for a reduced stress given that mean year-2 returns look higher than the long-term average? However, there is a catch here and we need to take a step back. Let's remember that we are not mainly interested in the *average*. What we really care about is the tail. Even if the mean of the year-2 distribution is higher, what can we say about the tail? This isn't easy of course because we do not have very many year-2 observations available. All the same, take a look at the last three columns of table 1. They show the worst year-2 returns for each selected sample and 95th and 99th percentiles. You can see – in the last line of the table and in chart 1 – that the 99th percentile of returns in the year following the worst 100 annual returns in the DMS data set was -45%. Notice that this is rather more severe than the 99th percentile over all periods of -35%.

² See "Triumph of the Optimists" Dimson, Marsh, and Staunton. 2002. Note this excludes returns from Germany from 1914 to 1926.

Chart 1: Cumulative distribution of DMS Excess equity returns (all periods & year following worst 100 annual returns)

What we really care about is the tail. You can see that the 99th percentile of returns following the worst 100 annual returns is 10 percentage points worse than the returns for all periods.

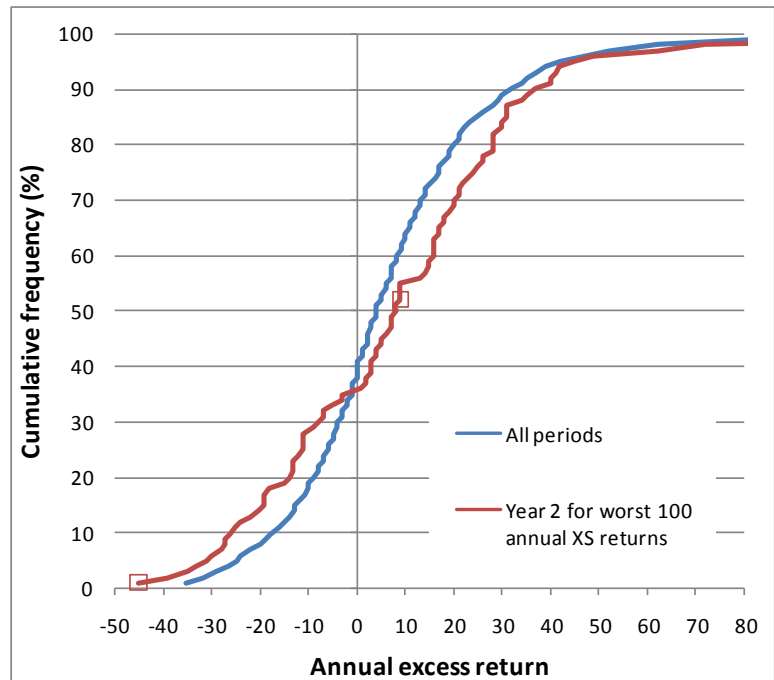


Chart 1 compares the cumulative frequency distribution across all years and for the worst 100 annual returns in the DMS data set (excluding Germany 1914-26). The average return and 99th percentile tail observations are highlighted with boxes. It is apparent that - although the mean is higher than for the full sample - the tail has shifted downwards.

Conclusion

As we observed, there are many ways one could set about answering the question posed: *"Is there a case for a reduced equity stress given that equity markets fell so far in 2008?"* However, if we simply look to past data for support for a weakened equity stress test, it simply is not there. We have done nothing here to test the statistical robustness of results, but the message from the empirical data is quite intuitive (to us at least). Following periods of extreme equity stress, equity risk premia *do* rise so it's not surprising that the average equity returns observed are higher. However, the heightened volatility associated with equity dislocation also persists with the result that a conditional (PIT) view of the stress would result in a *more* severe stress (not less) as we have argued in the past.

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