



Department of Decision Sciences

Statistics Seminar

## The impact of traditional risk measurement on the pro-cyclicality

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### Abstract

There is an accepted idea that risk measurements are pro-cyclical: in times of crisis, they overestimate the future risk, while they underestimate it in quiet times. We have developed a method to quantify this pro-cyclicality, defining a new indicator based on the Sample Quantile Process (SQP - a generalization of the Value at Risk (VaR) calculated on a rolling sample) and the realized volatility. Named the look-forward SQP ratio, it quantifies the difference between the historically predicted risk (via the SQP) and the estimated realized future risk (measured *ex-post* by the VaR realized one year later). We conditionate the SQP ratio to the realized volatility, as the latter is shown to be a good proxy to qualify the market state. Then, looking for explanations, we show that pro-cyclicality can be explained by two factors: (i) the very way risk is measured, and (ii) the clustering and return-to-the-mean of volatility. To do so, we introduce simple models to isolate the effects. To reveal the first factor (i), we consider iid random variables, showing both empirically and theoretically that there is a negative correlation between the logarithm of the SQP ratio and the volatility. This will be the main focus in this talk. Then we use a GARCH model to explore and show that the volatility clustering present in the data is an additional source of pro-cyclical behaviors. The results are based on two studies developed with Marcel Bräutigam and Michel Dacorogna.