

Backtesting Marginal Expected Shortfall and Related Systemic Risk Measures

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Abstract

This paper proposes two backtesting tests to assess the validity of the systemic risk measure forecasts. This new tool meets the need of financial regulators of evaluating the quality of systemic risk measures generally used to identify the financial institutions contributing the most to the total risk of the financial system (SIFIs). The tests are based on the concept of cumulative joint violation process and it is built up in analogy with the recent backtesting procedure proposed for the ES (Expected Shortfall). First, we introduce two backtests that apply for the case of the MES (Marginal Expected Shortfall) forecasts. The backtesting methodology is then generalised to MES-based systemic risk measures (SES, SRISK) and to the ΔCoVaR . Second, we study the asymptotic properties of the tests in presence of estimation risk and we investigate their finite sample performances via Monte Carlo simulations. Finally, we use our backtests to assess the validity of the MES, SRISK and ΔCoVaR forecasts on a panel of EU financial institutions.

Keywords: Systemic risk, Backtesting, Marginal Expected Shortfall, SRISK, ΔCoVaR

1 Introduction

Many systemic risk measures have been proposed in the academic literature over the past years (see Benoit et al. 2016, for a survey), the most well-known being the Marginal Expected Shortfall (MES) and the Systemic Expected Shortfall (SES) of Acharya et al. (2010), the Systemic Risk Measure (SRISK) of Acharya et al. (2012) and Brownlees and Engle (2015), and the Delta Conditional Value-at-Risk (ΔCoVaR) of Adrian and Brunnermeier (2016). These measures are designed to summarize the systemic risk contribution of each financial institution into a single figure, in order to identify the so-called systemically important financial institutions (SIFIs), *i.e.*, the firms whose failure might trigger a crisis in the whole financial system. The identification of the SIFIs is crucial for the systemic risk regulation, whatever the regulation tools considered (higher capital requirements, specific regulation, systemic risk tax, etc.). As a consequence, regulators and other

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