
Anastasios Petropoulos, Vasilis Siakoulis, Nikolaos Vlachogiannakis, Evaggelos Stavroulakis, "Deep-Stress: A deep learning approach for dynamic balance sheet stress testing"

Views and conclusions expressed in the presentation are those of the presenter and do not necessarily represent those of Danmarks Nationalbank.
Brief recap of the paper

• **Background:**
  • Recent financial crises revealed a need for improved stress tests.

• **General research question:**
  • Can big data and machine learning techniques add value in stress testing frameworks?

• **Approach:**

• **Key findings:**
  • Significantly lower prediction error of the Capital Adequacy Ratio under the deep learning approach compared to other stress testing approaches.
Overall assessment

- Addresses a topic of **high relevance** for the main topic of the workshop.
  - Should be of great interest for regulators, central banks and other actors involved in stress testing of the banking system.
- The paper is **well written** and presents the results of a **well-conducted** empirical study.
- The paper **adds to the literature** by illustrating how big data and machine learning techniques might be used in relation to stress tests.
“Observations regarding failed banks are excluded from the analysis since stress testing is performed on healthy financial entities.” (page 6)

- Might seem somewhat surprising to many readers.
- Contagion channels (interbank exposures vis-a-vis failed banks and fire sales of assets by failing banks) can be important during financial stress.
- Furthermore, non-linearities might have been most important for the failed banks.
- Why is the information contained in observations for failed banks not of importance for estimating a good model? Please elaborate for the benefit of the reader.
The out-of-sample period 2014-2015 is located after the financial crisis (cf. page 13).

It would - as acknowledged by the authors in the concluding section - strengthen the paper if it was explored how well the deep learning approach performs relative to other approaches if it was fitted on pre-crisis data and used to forecast Capital Adequacy Ratios in 2008-2009.

If the necessary data are not available for the US, it could be an interesting exercise to do the experiment on data from other countries.
• Why is the Deep Learning approach superior to the other approached studied?
  • Better estimation technique (for instance better at taking non-linearities into account)?
  • Utilise more data (more variables)?

• How important is dynamic balance sheet modelling compared to constant balance sheets for a given estimation method? Can we quantify this issues?
Summing up

• Great paper!
• Innovative use of data and machine learning techniques.
• Very timely: Address the opportunities of using big datasets within the areas of stress tests to assess the resilience of the banking system.
• I look forward to the future research mentioned in the conclusion involving pre-crisis data and evaluation of the ability of the deep leaning approach to predict bank failures during the crisis.