

# Review report group 11

**Reviewed by Group 4:**

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# Summary paper

## Paper examines:

- Reverse Stress testing for five macroeconomic variables by simulating economic scenarios within a stress testing horizon of 3 years
- NIBC Bank N.V.: Dutch bank that offers corporate and retail banking products, Euronext EUR 7.00/share, AUM EUR 22 MIO

## Background:

- Regulators require financial institutions to assess the strength of their capital position - reverse stress testing:  
Step 1: Assess under which economic scenarios the bank would become insolvent → macro variables and simulation methods  
Step 2: find plausible economic scenarios and narrative to these scenarios

## Research questions:

1. What models can be implemented to simulated successive quarterly changes in GDP, HPI, WTI crude oil price, SMX index and AScX index within a 3-year timespan?  
→ **Conclusion:** Geometric Brownian Motion and Ornstein Uhlenbeck, and Merton Jump Diusion successfully simulate scenarios
2. Can these models be implemented to simulate the risk drivers simultaneously and take into account their correlations?  
→ **Conclusion:** Cholesky decomposition method is appropriate to capture dependence when going from univariate to the multivariate world
3. How to evaluate the performance of the model?  
→ Compare tails of the simulated distribution with the historical probability distribution as reference – VAR & Expected shortfall  
→ **Conclusion:** Performance of simulation model depends on macro variable



# Introduction

- **Relevance research:** It not states what institutions and what legislation requires stress testing  
→ **Suggestion:** Add relevant EU regulation to highlight relevance of research: “Basel III capital requirements”, “European Banking authority”
- **Relevance methodology:**  
*“This is the first study and the literature relating to the testing of simulating macroeconomic variables so there were some limitations which also provide potential areas for future research.”*  
→ **Suggestion:** Clarify and explain why simulation of macro variables is specifically relevant, and why it has not been done before
- **Contribution to academics:**  
→ **Suggestion:** How and why does this research contributes to academics
- Explain in the paper why the horizon is set at 3 years  
→ **Suggestion:** e.g based upon certain regulation/literature etc.



# Methodology and Data

- **Winsorizing economic variables**

→ Simulated GDP is winsorized, but other simulations are not. It is not clear to the reader why this decision is made.

- **Removing outliers - possible events of economic distress**

→ It is identified that removing outliers leads to lower simulated kurtosis in GDP and affects the results. Since the goal of the research is stress testing, winsorizing outliers might be problematic. Tail GDP events might be just the events that lead to distress at banks like NIBC. This may indicate questionable validity of this particular model.

	Historical	GBM	OU	MJD	GBM-KF	OU-KF
Mean	0.0550	0.0604	0.0878	0.0707	-0.0456	-0.0476
Variance	0.0012	0.0003	0.0004	0.0003	0.0003	0.0004
Skewness	-1.0134	0.0512	-0.0021	0.0465	0.0533	-0.0047
Kurtosis	2.9337	0.0036	0.0006	-0.0141	0.0005	0.0029
VaR (95)	-0.0101	0.0315	0.0543	0.0432	-0.0715	-0.0811
ES (95)	-0.0283	0.0244	0.0458	0.0364	-0.0780	-0.0897
VaR (99.9)	-0.0934	0.0071	0.0251	0.0199	-0.0937	-0.1105
ES (99.9)	-0.1035	0.0025	0.0196	0.0154	-0.0979	-0.1163
KS stat	0.0000	0.1885	0.4924	0.2861	0.9573	0.9364
KS p-value	1.0000	0.0004	0.0000	0.0000	0.0000	0.0000
Score	0.0000	9.7333	9.6508	9.8331	9.7577	9.6266

Table 3: Performance measures for GDP time series



# Conclusion

*“Cholesky decomposition method is appropriate to capture dependence when going from univariate to the multivariate world”*

→ **Suggestions:** this is first mentioned in the conclusion, you could give reader more context of what this entails

- **Limitations**

→ **Suggestion:** It is stated that there were limitations, but they were not identified. Identifying these would give the reader a better context.

- **Practical applicability of research and results**

→ **Suggestion:** think of ways how will the findings of the results will be applicable in practice



# Strong points & General feedback

## Strong Points

1. Clear structure and layout
  2. Examine multiple simulation models makes research more robust
  3. Elaborate methodology makes it transparent how the results are found
- **Stand alone:** Currently, figures and tables are not easy to interpret without reading the text.  
→ **Suggestion:** Making tables and figures stand alone would make the value of the paper more visible and help researches more quickly if your paper is what they look for
  - **Frontpage:** A good frontpage title for the paper would make it clear immediately what the research is about.
  - **Context:** Paper at times provides little context for non-econometricians.  
→ **Suggestion:** Assess whether target audience can use the paper

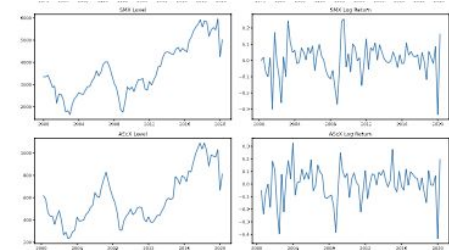


Figure 1: Levels and Log Return of modeled macroeconomic variables



Figure 7. Upper panel presents the out-of-sample forecast with power outage data, the lower panel presents the out-of-sample forecast without power outage data. Both models are the random forest type model. Time period ranges from 01/12/2020 to 01/01/2021, and observations are hourly.

