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A comment on “Optimal Deposit Insurance”^{*}

Julia Chahine, Matthew DeHaven,
Moritz Greiwe, Hyeonseo Lee, Zhuorong Mao

April 19, 2024

Abstract

[Dávila and Goldstein \(2023\)](#) examine the optimal determination of deposit insurance in the case where bank runs are possible. They provide a small set of sufficient statistics to determine welfare impacts of changes in deposit insurance coverage, and apply their framework using US data from 2008. In our replication, we focus on the quantitative application of the paper. First, we are trying to computationally reproduce table 1, section IV, that is used to estimate the marginal effect of changing deposit coverage. We can calculate sufficient statistics analogously to the ones of table 1 for 2011, but could not access data for the specific time period of the paper. However, our calculations produce values close to the average implied default probability for the post-financial crises period from 2012-2014 calculated by the authors. Second, we replicate the simulation results used to determine the optimal level of coverage, as well as conduct robustness checks for their calibration. We ran a sensitivity analysis on how the changes in the sunspot probability and bank’s riskiness parameters affect the optimal insurance coverage, and obtained the same results as in the paper.

^{*}The present report was prepared for the Institute for Replication (Brodeur et al., 2024).
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1 Introduction

The study by Davila and Goldstein 2023 presents four primary findings. First, it underscores the significant welfare benefits associated with having deposit insurance. Second, the researchers determine an optimal coverage level through their specific assumptions and calculations. Third, they elucidate the inverse correlation between coverage levels and the riskiness of bank investments. Fourth, they observe that while raising coverage levels generally enhances the welfare of many depositors, this effect is not universal.

Overview:

1. **Data Sources:** The paper uses Personal Consumption Expenditures (PCE) data from the Federal Reserve Bank of St. Louis, DPCERD3A086NBEA, from 1929 to 2018. In conjunction with the PCE data, the paper uses a dataset containing debt insurance limits by year. There is no reference to how this data are obtained.

The analysis also invokes data on the number of Failures and Assistance Transactions from the Federal Deposit Insurance Corporation (FDIC), Table BF02, in the United States from 1934 to 2014. Similarly, data on the monetary value (in thousands) of Failures and Assistance Transactions from the FDIC, Table BF01, from 1934-2014.

The last set of raw data used in the paper was taken from the WRDS database (Markit Credit Default Swap (markit_cds)). It was not included in the replication file, and the data are not publicly available; we were able to obtain a sample of the dataset through WRDS.

2. **Methods:** The authors write a structural model of bank deposits with heterogeneous depositors and bank runs. They use this model to study the optimal level of government provided deposit insurance. They produce a set of approximately sufficient statistics to use to estimate the welfare effects of deposit insurance changes and to calibrate the model.

3. **Policy/Treatment/Time Period:** The paper studies 2008 as a period both of financial distress (higher number of bank failures) and a year when the FDIC changed deposit insurance from \$ 100,000 to \$ 250,000. They use the implied default probabilities of 2008 to calibrate the default probability in their model. In their results, they find an optimal deposit insurance level of \$381,000 for this time period.

2 Computational Reproducibility

We used the replication package [here](#). We successfully computationally reproduced Figures 1, 6, and 7 in the original paper. We were not able to replicate Table 1 of sufficient statistics in the original paper due to unavailable data and missing data cleaning scripts. See Table 1 for details.

Table 1: Replication Package Contents and Reproducibility

Replication Package Item	Fully	Partial	No
Raw data provided		✓	
Cleaning code provided		✓	
Analysis code provided	✓		
Reproducible from raw data			✓
Reproducible from analysis data	✓		

3 Robustness, Reproduction and Replication

CDS data from the WRDS Database was not available in the replication file. We could not successfully obtain the dataset, however, a sample of the dataset was obtained. The sample data set only contains data from 2011. When compared, it became clear that the dataset used for the paper was cleaned externally – and the code for this was not included in the replication. After cleaning the sample dataset, we were able to get an estimate for the implied probability of default as 1.9% in 2011. This estimate is reasonable when compared to the results in the paper, where

they estimate the implied probability of default to be 6.67% during the peak of the financial crises in 2008 and 1.58% post-financial crises period from 2012-2014.

There were two sensitivity analyses that the authors did not report graph or table results for, so we changed the parameters and checked if we obtained the same results. Firstly, we examined whether an increase in the probability of sunspots (π) is associated with a higher optimal coverage limit. This relationship arises because lower confidence in banks increases the likelihood of a bank run. By changing π from 0.3 to 0.5, we found that the marginal benefit of increasing coverage was greater than the baseline results, implying a higher optimal coverage limit (Figure 4).

Secondly, we investigated whether the higher riskiness of banks' investments (σ_s) is linked to lower optimal coverage limits. This relationship stems from the differing effects on taxpayers and depositors. Taxpayers incur losses from the high riskiness of banks, whereas depositors suffer losses from the high riskiness of banks when coverage is low, but they benefit when coverage is high. By changing σ_s from 0.033 to 0.066, we discovered that the optimal coverage limit level decreased (Figure 5).

These sensitivity checks are in line with what the authors describe in the paper. We take our results here as another sign that we are able to replicate the paper results, even though there were not explicit results to compare to for the sensitivity analyses.

4 Conclusion

Despite the lack of raw data in the replication file, the authors' code runs without error and the results are reproducible when appropriate data are available. Although better documentation of FDIC debt insurance limits and CDS data would add to the reproducibility of the paper, it is expected that non-publicly available data sources will be insurmountable in ensuring perfect reproducibility of any paper.

References

Brodeur et al.: 2024, Mass reproducibility and replicability: A new hope, *I4R Discussion Paper Series* **107**.

Dávila, E. and Goldstein, I.: 2023, Optimal deposit insurance, *Journal of Political Economy* **131**(7), 1676–1730.

URL: <https://doi.org/10.1086/723633>

5 Figures

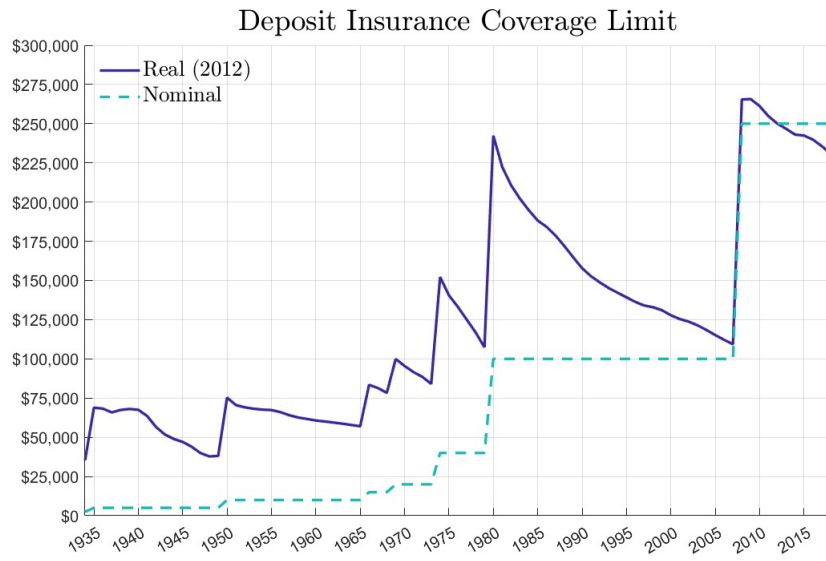


Figure 1: Replication of Fig. 1 (p. 1678)

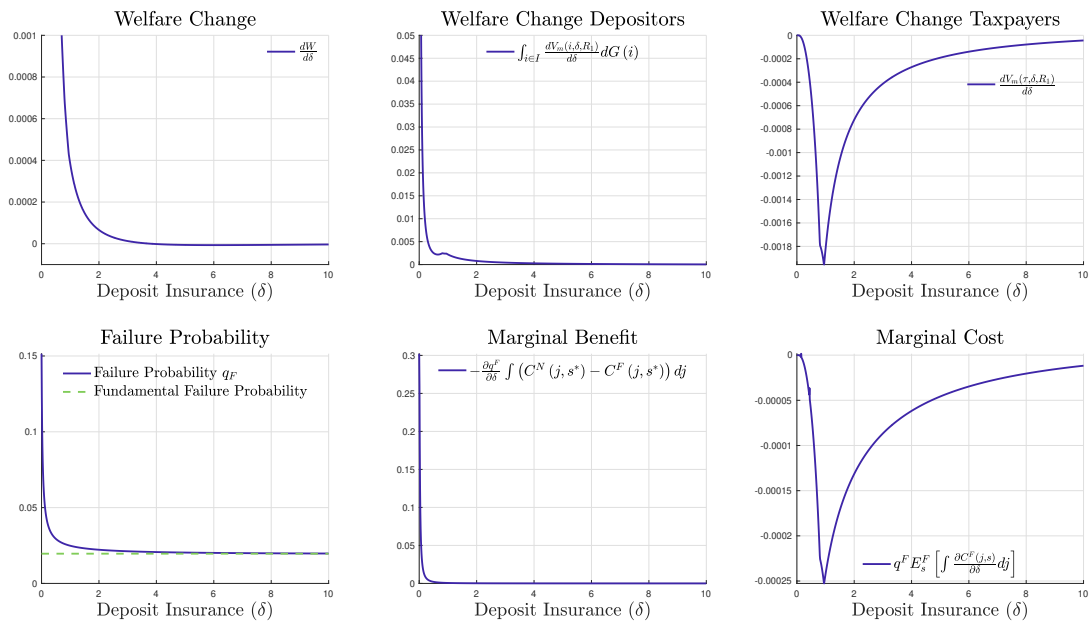


Figure 2: Replication of Fig. 6 (p. 1721)

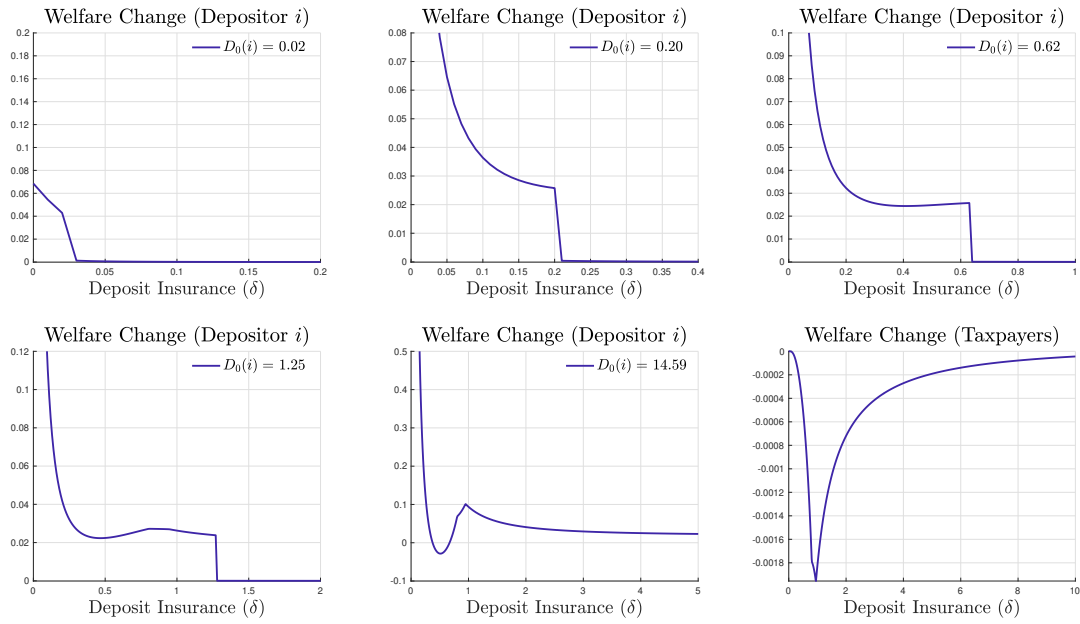
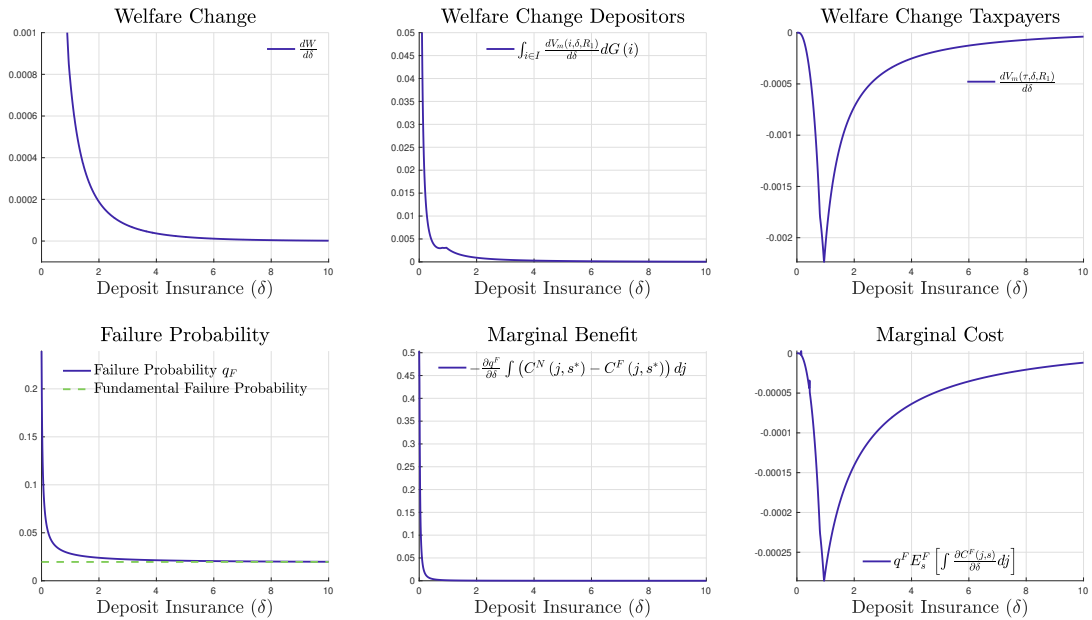


Figure 3: Replication of Fig. 7 (p. 1723)

Figure 4: Replication of Fig. 6 with $\pi = 0.5$ (instead of 0.3) (p. 1723)

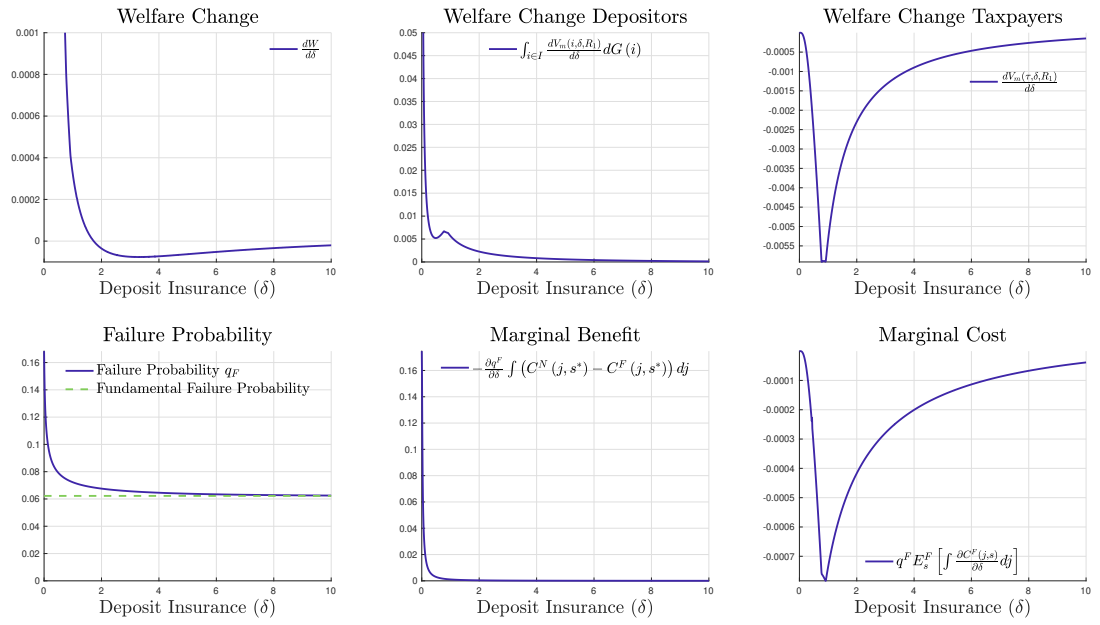


Figure 5: Replication of Fig. 6 with $\sigma_s = 0.66$ (instead of 0.33) (p. 1723)