Replication package for "Nonbank Lending and the Transmission of Monetary Policy" *

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Scope of replication materials: This replication package generates all tables and figures appearing in the main body of the paper and in Appendix sections A-E. Code to replicate results in the Online Appendix (sections F-H) is available upon request from the authors.

1 Data

1.1 Data availability

Data accessed via Statistics Denmark. The main datasets are administrative microdata from Danish government agencies, provided by Statistics Denmark (DST). Data is stored on DST servers and accessible only through secure remote access by approved researchers—no data transfer outside this environment is permitted. Access requires written application to DST's standard "Forskningsservice" program, described at www.dst.dk/en/TilSalg/Forskningsservice. Applicants must be affiliated with DST-approved Danish institutions or collaborate with researchers at such institutions. Non-Danish researchers may obtain access through authorization from approved Danish institutions, though few currently grant access to non-EU researchers due to GDPR and other legal constraints. Administrative registers are periodically corrected for minor errors, meaning raw data may change over time. While this could affect exact coefficient replication, results typically remain accurate to the second

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decimal place. Program files are written for data available as of August 2023. Constructing the full dataset from raw sources requires comprehensive folder setup and extensive data access. To facilitate replication, researchers with DST project folder access can obtain copies of the two final analytical datasets that serve as the basis for our analysis: one on corporate lending (URTEVIRK_FIRE_FIRM-03-18.dta) and one on lending to households by banks and nonbanks (urtepers_panel_ALL.dta). These datasets are constructed by merging multiple raw DST registers, see details below. Please contact the authors at dc@nationalbanken.dk to obtain these datasets. This may involve DST copying and re-anonymization costs. Fixed copies will be stored for at least three years post-publication in The Review of Financial Studies.

Experian company data. In addition to the administrative microdata from DST, we utilize a dataset with comprehensive financial data (balance sheets, income statements, and key ratios) for all Danish limited companies from 2003-2015, provided by the commercial data provider Experian. This dataset includes financial institutions not covered by Statistics Denmark's firm surveys and is used to obtain balance sheet information for banks and nonbanks in our analysis. Researchers seeking to replicate our analysis who have obtained DST access rights and our final lending datasets can purchase the Experian data independently and arrange for DST to upload it to their servers. DST will charge for both the data upload and for anonymizing the company identifiers in a manner that enables merging with the lending datasets within the DST environment.

Publicly available data. Beyond the DST administrative registers and Experian financial data, we incorporate several publicly available datasets including macroeconomic time series (e.g. Danish real GDP growth and CPI inflation) and monetary policy shock measures from the academic literature. These datasets are included in this replication package and are already merged into the two final analytical datasets available on the DST server.

1.2 Details on each data source

Most datasets that are available through "Forskningsservice" are documented by DST. We refer to the documentation for these datasets on Denmark Statistics' website

(link). The links are also included in the full citation in the references at the end of this document.

Data accessed via Statistics Denmark

- **URTEVIRK** (Statistics Denmark, 2022d): This dataset covers loan accounts from Danish financial institutions to Danish firms. The data is collected by the Danish tax agency SKAT and provided by DST Forskningsservice.
- **URTEPERS** (Statistics Denmark, 2022c): This dataset covers loan accounts from Danish financial institutions to individuals. The data is collected by the Danish tax agency SKAT and provided by DST Forskningsservice.
- **FIRM** (Statistics Denmark, 2022b): This dataset is based on the Danish firm register and contains firm identifiers and basic firm characteristics. The dataset is created based on various administrative sources by DST Forskningsservice.
- **FIRE** (Statistics Denmark, 2022a) : This dataset covers the Danish accounting statistics with detailed balance sheet information on Danish firms. The dataset is created based on various administrative sources by DST Forskningsservice.
- **FAMILIEDATA** : This dataset contains information on all households in Denmark. It covers both sociodemographic characteristics as well as detailed information on wealth and income. The dataset is created by merging several administrative datasets on individuals by DST Forskningsservice at the household level.
  - AKM, BEF, BOL, EJER, FAIK, FAM, FIDA, FORMAND, FORMBIL, FORMEJER, IDAN, IDAP, IND, INHP, INPI, LON, SYHB, REAL, UDDA From these datasets a family level dataset is produced in SAS and transferred to Stata format. (see variable lists and documentation here - in Danish) www.statistikbanken.dk

Supporting data: Experian Company Data

- **Experian Company Data** (Experian A/S, 2015): This dataset contains comprehensive administrative data on Danish companies including balance sheet and income statement information for all active, dormant, inactive, and dissolved A/S (public limited companies) and ApS (private limited companies), as

well as other companies that have filed financial statements. The dataset covers basic company information (names, addresses, legal form, industry codes, bank connections) and detailed financial data including revenue, assets, liabilities, equity, and key financial ratios. Data includes both individual company accounts and consolidated group accounts. All financial figures are reported in thousands of the original currency. The data is provided by Experian A/S and accessed through Danmarks Nationalbank. The dataset covers the period 2003-2015, and can be purchased from Experian A/S. The data is used to obtain information on banks' and nonbanks' balance sheets, which are not observed in Statistics Denmarks' survey of firm balance sheets, as it does not cover all financial institutions.

Supporting aggregate data

- CBOE Volatility Index (VIX) data (Board of Governors of the Federal Reserve System (US), 2021a)
- Real Gross Domestic Product for Denmark (Board of Governors of the Federal Reserve System (US), 2021c)
- GDP growth rate, 1-year ahead forecast for Denmark (International Monetary Fund, 2021)
- CPI inflation rate for Denmark (Board of Governors of the Federal Reserve System (US), 2021b)
- Jarociński and Karadi (2020) monetary policy shocks , extracted from the replication package of their paper
- Altavilla et al. (2019) monetary policy shocks , extracted from Luca Brugnolini's webpage
- Eurostat (2019) local administrative units (LAU) shapefiles used to create maps in the online appendix

1.3 Details on important intermediate datasets

The raw datasets described above are merged to create several intermediate datasets used in our analysis. The most important datasets for replicating our core results are:

- **URTEVIRK_FIRE_FIRM-03-18.dta**: Annual panel of corporate lending by banks and nonbanks to non-financial companies in Denmark, 2003-2018. This dataset merges loan data from URTEVIRK with lender and borrower characteristics from FIRM and balance sheet information on borrowers from FIRE, applies the sample restrictions outlined in Section 1.1 of the paper, and incorporates publicly available macroeconomic data. A list of selected variables is provided in Table 1 to facilitate interpreting the codes.

- **urtepers_panel_ALL.dta**: Annual panel of lending by banks and nonbanks to Danish households, 2003-2018. This dataset aggregates URTEPERS loan data to the household level and augments it with lender information from FIRM, household characteristics from FAMILIEDATA, and publicly available macroeconomic data. A list of selected variables is provided in Table 2 to facilitate interpreting the codes.

- **final_Experian.dta**: Annual panel of Danish banks' and nonbanks' funding structure, 2003-2015. This dataset merges raw Experian data with the list of all lenders active in our corporate and household lending datasets, focusing on consolidated financial statements at the group level. Reports issued in the first quarter are assigned to the previous year, while reports issued in the second through fourth quarters are assigned to the current year. When firms issue multiple statements within a year (typically due to changing their accounting period), we retain the later observation. Balance sheet items are deflated to 2015 DKK, and the sample is restricted to lenders with at least DKK 750,000 (EUR 100,000) in assets. Publicly available macroeconomic data is included. A list of selected variables is provided in Table 3 to facilitate interpreting the codes.

2 Description of programs/code

The replication package consists of Stata do-files organized in a modular structure. All code can be executed by running `master.do`, which calls all necessary programs in the correct sequence.

2.1 Replication files to be executed on DST server

- `master.do`: Master file that executes all do-files in order.
  - Sets global paths for the project. Users must edit line 4 to specify their project directory path.
  - Runs data generation (`01_gen_*.do`), descriptive statistics (`02_descr_*.do`), and regression analyses (`03_reg_*.do`) in sequence.

2.2 Data Generation Files

- `01_gen_0_all.do`: Master data generation file that executes all data preparation scripts in correct order.
- `01_gen_1_prepare_macrovars.do`:
  - Merges macroeconomic variables and monetary policy shocks
  - Output: `macro_data.dta`
- `01_gen_2_firms.do`:
  - Creates the main corporate credit dataset
  - Merges loan data with firm and lender characteristics from FIRM and FIRE
  - Applies sample restrictions, computes loan rates and classifies banks vs. nonbanks
  - Output: `URTEVIRK_FIRE_FIRM_03-18.dta`
- `01_gen_3_individuals.do`:
  - Creates the main consumer credit dataset

  - Aggregates individual loans to household level and merges with household characteristics and lender information from FIRM
  - Applies sample restrictions, computes loan rates and classifies banks vs. nonbanks
  - Output: `urtepers_panel_ALL.dta`

- `01_gen_4_funding.do`:
  - Creates dataset on lenders' funding composition
  - Merges Experian balance sheet data with active lenders list
  - Computes funding growth rates and funding-to-asset ratios
  - Output: `final_Experian.dta`

2.3 Descriptive Statistics Files

- `02_descr_0_all.do`: Master file for generating all descriptive statistics.
- `02_descr_1_individuals.do`:
  - Generates Figure 1.b (nonbank debt share over time in consumer credit)
  - Generates Table 1.a (summary statistics for households)
  - Generates Figure E.1.b (largest nonbank lender industries)
  - Generates Figure E.3.b (map of nonbank debt share by municipality)
  - Generates Figure E.4.b (heterogeneity in borrowing patterns by income)
- `02_descr_2_firms.do`:
  - Generates Figure 1.a (nonbank debt share over time in corporate credit)
  - Generates Table 1.b (summary statistics for firms)
  - Generates Figure E.1.a (largest nonbank lender industries)
  - Generates Figure E.2 (sectoral allocation of bank vs. nonbank credit)
  - Generates Figure E.3.a (map of nonbank debt share by municipality)
  - Generates Figure E.4.a (heterogeneity in borrowing patterns by firm size)

- `02_descr_3_LenderFunding.do`: Generates Table 2 (summary statistics of lenders' balance sheets).
- `02_descr_4_borrowers_by_nonbanktype.do`: Generates Table E.4 (descriptive statistics by nonbank type).

2.4 Regression Analysis Files

- `03_reg_0_all.do`: Master file that executes all regression analyses.
- `03_reg_1_baseline.do`:
  - Generates Table 3 (baseline lending regression for corporate credit)
  - Generates Table 4 (baseline lending regression for consumer credit)
  - Generates Table 5 (extensive margin effects)
  - Generates Tables E.2 and E.3 (nonbank heterogeneity in consumer and corporaet lending)
- `03_reg_2_LenderFunding.do`:
  - Generates Table 6 (lenders' funding growth response to monetary policy)
  - Generates Table 7 (interaction of nonbank lending with funding structure)
- `03_reg_3_realeffects.do`:
  - Generates Table 8 (financial outcomes at borrower level)
  - Generates Table 9 (real outcomes for firms)
  - Generates Table 10 (real outcomes for households)
  - Generates Tables E.1a and E.1b (heterogeneity analysis)
- `03_reg_4_spillovers.do`:
  - Generates Table E.5 (industry-level spillover effects)
  - Generates Table E.6 (municipality-level spillover effects)
- `03_reg_5_risktaking.do`:
  - Generates Table E.7 (risk-taking in corporate credit)

  - Generates Table E.8 (risk-taking in consumer credit)
  - Generates Table E.9 (future loan delinquencies)

2.5 Replication files to be executed outside the DST environment

- `99_generate_maps.do`:
  - Generates Figure E.2
  - Uses shape files (not available on DST server) to plot maps of the nonbank lending share across municipalities

3 Computational requirements

- **STATA**: The main analysis was conducted with Stata (version 19) on the servers of Statistics Denmark. We use the following STATA packages that are installed from SSC: reghdfe, gtools, distinct, winsor2, estout, tsspell, and spmap

Approximate time needed to reproduce the analyses: about 72 hours on DST servers.

4 Instructions to Replicators

1. Apply for access to Danmarks Statistics Forskningsservice, including all adminstrative datasets described in this document.
2. Purchase the balance sheet and accounting data from Experian, and upload it to the DST server. Ensure that company identifiers (cvrnrs) are anonymized using the same key as the existing firm identifiers on the DST server.
3. Transfer the replication package to the DST server. Make sure globals in "master.do" are set to the right locations.
4. Store raw macroeconomic data and Experian data in the $rawfiles subfolder.

5. All programs described above on the DST server are executed in correct order by running "master.do".

6. To create maps (Figure E.2): export "nonbankshare_HHs_bymunicipality.dta" and "nonbankshare_firms_bymunicipality.dta" from DST server, save locally and run "99_generate_maps.do".

Table 1: Structure of URTEVIRK_FIRE_FIRM_03-18.dta: Corporate lending panel

Identifiers			**Loan Characteristics**		**Firm Characteristics**			**Lender Characteristics**	**Macro Variables**
id_borrower	id_lender	id_borrowerlender	year	REST_GAELD_BLB (DKK)	intrate	GF_AT (DKK)	GF_OMS (DKK)	nonbank_lender (0/1)	JK_mpshocksign (std.)
42851	127	98234	2009	250,000	0.042	1,850,000	1,230,000	0	-0.85
42851	127	98234	2010	285,000	0.045	1,920,000	1,310,000	0	0.42
42851	127	98234	2011	265,000	0.048	1,980,000	1,350,000	0	1.23
42851	892	98235	2009	120,000	0.058	1,850,000	1,230,000	1	-0.85
42851	892	98235	2010	110,000	0.061	1,920,000	1,310,000	1	0.42
42851	892	98235	2011	95,000	0.065	1,980,000	1,350,000	1	1.23
67234	127	156789	2009	875,000	0.038	4,560,000	3,890,000	0	-0.85
67234	127	156789	2010	920,000	0.039	4,730,000	4,120,000	0	0.42
67234	127	156789	2011	50,000	0.041	4,810,000	4,250,000	0	1.23

Selected additional variables in dataset (not shown):
Lender characteristics: cvrnr_lender, JUR_HOVED_BRA_DB07_lender (6-digit NACE)
Firm characteristics: cvrnr_borrower, industry_borrower_coarse (2-digit NACE), JUR_BEL_KOM_KODE (municipality), GF_EGUL (equity), debt_to_equity
Loan characteristics: delinquency indicator, lndebt = log(REST_GAELD_BLB)
Fixed effects: ILST_FE (industry-location-size-time)
Macro controls: DK_real_gdp_grate, DK_gdp_growth_forecast, DK_inflation_rate, vix

Notes: Panel structure at borrower-lender-year level. REST_GAELD_BLB represents outstanding loan balance in DKK. The variable intrate is computed as annual interest payments divided by average loan balance, expressed as a decimal ($0.05 = 5\%$ interest rate). The nonbank_lender indicator equals 1 for lenders with NACE codes 6420-6700 (excluding 6419 which are traditional banks). JK_mpshocksign is the standardized monetary policy shock from Jarociński and Karadi (2020).

Table 2: Structure of URTEPERS_PANEL_ALL.dta: Household lending panel

Identifiers			**Loan Characteristics**			**Household Characteristics**		**Lender Characteristics**	**Macro**
id_borrower	id_lender	id_borrowerlender	year	REST_GAELD_BLB (DKK)	intrate	famdispon_13 (DKK)	famalder (years)	nonbank_lender (0/1)	JK_mpshocksign (std.)
100234	450	235789	2009	350,000	0.051	420,000	52	0	-0.85
100234	450	235789	2010	375,000	0.053	435,000	53	0	0.42
100234	781	235790	2009	120,000	0.067	420,000	52	1	-0.85
100234	781	235790	2010	115,000	0.070	435,000	53	1	0.42
201567	912	346891	2011	210,000	0.044	620,000	47	0	1.23
201567	912	346891	2012	198,000	0.046	645,000	48	0	-0.65
201567	333	346892	2011	95,000	0.072	620,000	47	1	1.23
201567	333	346892	2012	88,000	0.074	645,000	48	1	-0.65

Selected additional variables in dataset (not shown):
Lender characteristics: cvrnr_lender, JUR_HOVED_BRA_DB07_lender (6-digit NACE)
Household characteristics: familie_id, municipality, household size, education composition, other demographic indicators
Loan characteristics: delinquency indicator, lndebt = log(REST_GAELD_BLB), RNT_BLB (annual interest payments)
Fixed effects: household-level or municipality-year FE (analogous to ILST_FE)
Macro controls: DK_real_gdp_grate, DK_gdp_growth_forecast, DK_inflation_rate, vix

Notes: Panel structure at borrower-lender-year level. REST_GAELD_BLB represents outstanding loan balance in DKK. The variable intrate is computed as annual interest payments divided by average loan balance, expressed as a decimal ($0.05 = 5\%$ interest rate). The nonbank_lender indicator equals 1 for lenders with NACE codes 6420-6700 (excluding 6419 which are traditional banks). JK_mpshocksign is the standardized monetary policy shock from Jarociński and Karadi (2020).

Table 3: Structure of final_Experian.dta: Funding structure of Danish lenders

Identifiers			**Funding Structure (1000 DKK)**					**Ratios to Total Assets**			
cvrnr_lender	year	nonbank_lender (0/1)	TotalAssets (1000 DKK)	TotalEquity (1000 DKK)	ShortTermDebt (1000 DKK)	LongTermDebt (1000 DKK)	LTfunding (1000 DKK)	Equity/TA (dec.)	ST-Debt/TA (dec.)	LT-Debt/TA (dec.)	LTfund/TA (dec.)
101234	2009	0	22,500,000	1,400,000	16,500,000	3,200,000	4,000,000	0.062	0.733	0.142	0.178
101234	2010	0	23,800,000	1,480,000	17,300,000	3,400,000	4,200,000	0.062	0.727	0.143	0.176
101234	2011	0	24,500,000	1,520,000	17,600,000	3,600,000	4,400,000	0.062	0.718	0.147	0.180
208765	2009	1	4,200,000	380,000	2,600,000	750,000	950,000	0.090	0.619	0.179	0.226
208765	2010	1	4,600,000	420,000	2,800,000	800,000	1,000,000	0.091	0.609	0.174	0.217
208765	2011	1	5,000,000	450,000	3,100,000	850,000	1,100,000	0.090	0.620	0.170	0.220

Selected additional variables in dataset (not shown):
Lender characteristics: NACE industry codes (6-digit)
Macro controls: DK_real_gdp_grate, DK_gdp_growth_forecast, DK_inflation_rate, vix, JK_mpshocksign

Notes: Panel structure at lender-year level. All balance sheet items are taken from Experian financial statements and deflated to 2015 DKK. Values are reported in 1,000 DKK. Reports filed in the first quarter are assigned to the previous year, while reports filed in quarters two to four are assigned to the current year. If multiple statements exist in the same year, the later observation is retained. Ratios are expressed as decimals relative to TotalAssets.

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