

README

“Crisis Credit, Employment Protection, Indebtedness, and Risk”

Huneus, Kaboski, Larrain, Schmukler, and Vera (2026)

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1 Overview

This replication package reproduces the tables and figures in “Crisis Credit, Employment Protection, Indebtedness, and Risk” (Huneus, Kaboski, Larrain, Schmukler, and Vera, forthcoming, *American Economic Journal: Macroeconomics*; an earlier version of the paper was titled “The Distribution of Crisis Credit: Effects on Firm Indebtedness and Aggregate Risk”). The paper studies how Chile’s COVID-19 credit guarantee program (FOGAPE-COVID) and employment protection program (Ley de Protección del Empleo) interacted in supporting firms during the pandemic, combining transaction-level administrative data on the universe of formal Chilean firms with a static, partial-equilibrium quantitative model of firm borrowing and endogenous default.

The empirical analysis uses confidential firm-level microdata from three sources: (i) financial and administrative registries held by the Central Bank of Chile (Banco Central de Chile, BCCCh), (ii) supervisory reports on bank credit and credit-guarantee applications held by the Comisión para el Mercado Financiero (CMF, Chile’s financial supervisor), and (iii) the firm registry of the Servicio de Impuestos Internos (SII, Chile’s tax authority), accessed through the CMF. None of these microdata can be redistributed (Section 2). Because of this, the code is designed to run in three environments, controlled by a single Stata global (`{user}`) set automatically from the computer’s username in `Codes/0.Master.do`:

- **Outside:** a public/simulated environment that any reader can run on their own computer. It builds all public data from scratch, and uses simulated placeholder data (Section 2) in place of the confidential BCCCh microdata, so that the entire code base can be executed end to end and checked for correctness. It also runs the MATLAB quantitative model and produces Table 10.
- **BCCCh:** run on the Central Bank of Chile’s secure server, with access to the real confidential microdata. Produces every table and figure in the paper except Table 4, Appendix Table 16, Appendix Table 17, and Table 10.
- **CMF:** run on the CMF’s secure server, with access to the confidential CMF/SII microdata. Produces Table 4, Appendix Table 16, and Appendix Table 17 only. Documented separately in `Readme/README_CMF.tex` (Section 1.1).

The code is written in Stata and MATLAB. Two Stata programs (`Codes/1.Databases_raw.do/1.Databases_raw_simulation.do`, and `Codes/1.Databases_publicly_available.do`) construct the raw and public input databases; `Codes/1.5.Databases_worked.do` builds every analysis (“worked”) dataset; `Codes/2.Tables.do`, `Codes/2.Tables_CMF.do`, and `Codes/2.Figures.do` produce the tables and figures of the main empirical analysis; and a MATLAB quantitative model, run separately (Section 1.1), together with `Codes/2.Tables_Quantitative_Model.do`,

produces Table 10 and Appendix Figure 6. `Codes/0.Master.do` is the master script: it installs Stata package dependencies, sets all directory globals, and calls every other Stata program in the correct order for whichever environment it is run in.

The provided code reproduces all tables and figures in the paper and its appendix, subject to the three-environment split described above: a replicator without access to the confidential BCCh and CMF microdata can run the **Outside** environment to verify that the entire code base executes correctly end to end (using simulated data in place of the confidential BCCh inputs), but the resulting numbers will not match the published tables and figures for any output that depends on confidential microdata. Table 10 and Appendix Figure 6, which depend only on the calibrated quantitative model and not on any confidential microdata, are fully reproducible by any replicator running the Outside environment together with the MATLAB scripts in `Model/`.

This README documents the package as a whole. Two companion documents, in this same “Readme” folder and in “Model”, go into further detail on the two most specialized parts of the pipeline (Section 1.1), and two data dictionaries plus an output dictionary (Section 1.2) document every input database and every table/figure file in full. Readers looking for more detail on any specific point are encouraged to consult these companion documents rather than this README, which focuses on the package as a whole.

1.1 Companion documents

- `Readme/README_CMF.tex` (and its compiled `README_CMF.pdf`): documents the CMF-server segment of the pipeline in full — every public and confidential input it requires, the two programs that run on it, and how Table 4, Appendix Table 16, and Appendix Table 17 are built.
- `Model/README_QUANTITATIVE_MODEL.tex` (and `README_QUANTITATIVE_MODEL.pdf`): documents the quantitative model in full — the calibration procedure, every MATLAB script, the numerical-methods library in `Model/Tools/`, and how Table 10 and Appendix Figure 6 are built.

1.2 Data and output pointers

- `Readme/Data_Dictionary_BCCh_Outside.xlsx`: a variable-by-variable dictionary of every database built or used in the Outside and BCCh environments (one worksheet per database; see Section 2.3).
- `Readme/Data_Dictionary_CMF.xlsx`: the same, for every database used inside the CMF server.
- `Readme/Output_Dictionary.xlsx`: maps every table and figure in the paper and appendix to the exact file that reproduces it and the environment (`Outside/BCCh/CMF`) it must be run in (Section 6).

2 Data Availability and Provenance Statements

2.1 Statement about Rights

We certify that the authors of the manuscript have legitimate access to and permission to use the confidential data used in this manuscript, obtained through their institutional affiliations with, and research agreements with, the Banco Central de Chile and the Comisión para el Mercado Financiero. The authors do not have permission to redistribute the confidential microdata described in Section 2.3 below; this is documented in the Summary of Availability (Section 2.2).

2.2 Summary of Availability

Some data cannot be made publicly available. The public data described above, and the simulated placeholder data described in Section 2.3, are provided as part of this package. The confidential BCCh, CMF, and SII microdata described in Section 2.3 are not provided, and cannot be made publicly available; the authors will retain the code needed to construct them from the original confidential sources and will assist with reasonable replication attempts for at least five years following publication, in accordance with journal policies.

2.3 Details on each Data Source

Confidential BCCh microdata

The **BCCh** environment (`Codes/1.Databases_raw.do`) builds the raw analysis panel from confidential microdata accessed by the authors through the Banco Central de Chile’s secure computing environment: firm-level commercial credit flows, credit-guarantee applications and disbursements, and credit-registry/arrears extracts (CMF supervisory reports D32, D58, D10/D03/C11, and E20, obtained by the BCCh for macro-financial research purposes), matched to the SII’s firm registry (tax form F29 sales and employer information) and to bank-level parameters (interest-rate caps, capital). None of these confidential extracts can be redistributed as part of this, or any, replication package; researchers seeking comparable access must apply directly to the Banco Central de Chile and to the CMF/SII, respectively, following each institution’s own procedures for research access, which grant access only within a secure computing environment controlled by the institution. A one-paragraph description and the full variable list of every such database is provided in `Readme/Data_Dictionary_BCCh_Outside.xlsx` (Overview sheet, “Confidential (Simulated)” classification, “Raw” column).

Confidential CMF/SII microdata

The **CMF** environment uses a separate, non-overlapping set of confidential CMF supervisory extracts and one confidential SII firm-registry extract, obtained directly on the CMF’s own secure server (rather than by the BCCh), because these specific extracts and the municipality-level lockdown-timing design underlying Table 4, Appendix Table 16, and Appendix Table 17 require geocoded firm addresses that only exist inside the CMF. This data source, its seven confidential inputs, and its six public inputs (transferred from the Outside environment) are documented in full in `Readme/README_CMF.tex` and `Readme/Data_Dictionary_CMF.xlsx`.

In addition to the CMF-server-only extracts above, three panels of Figure 2 (“Credit Granted and Outstanding Corporate Debt”) rely on monthly aggregate statistics computed on confidential CMF microdata: the CMF’s C11 report (commercial-portfolio credit balances by RUT, matched to the SII’s legal-entity registry to classify firms as *Mega Empresas* or not) and its C50 report (FOGAPE-COVID guaranteed credit balances by RUT). Unlike Table 4, Appendix Table 16, and Appendix Table 17, these are not run on the CMF server as part of this package: because the underlying computation collapses to twelve monthly aggregate figures per series rather than firm-level microdata, co-author Mario Vera computed them directly on the CMF’s confidential systems, and the resulting aggregates are hardcoded in `Codes/1.5.Databases_worked.do` (see the **Source** and **Description** comments immediately above the Figure 2 blocks in that file). This lets any user, in the Outside or BCCh environment, reproduce Figure 2 exactly as published without CMF server access, while the underlying RUT-level C11/C50 extracts themselves remain confidential and cannot be redistributed as part of this, or any, replication package.

Public data

Source	Used for	Access
Biblioteca del Congreso Nacional (BCN)	Municipal and populated-area shapefiles (municipality crosswalk, lockdown-boundary geography)	https://www.bcn.cl/siit/mapas_vectoriales
Dirección del Trabajo	Employment Protection Law take-up (contract suspensions, hours reductions)	https://www.dt.gob.cl
Ministerio de Ciencia, Tecnología, Conocimiento e Innovación	COVID-19 municipal lockdown decrees (“Producto 29”; original source no longer online, see note below)	GitHub / open-data repository
Banco Central de Chile	2020 average USD/CLP exchange rate; 2019 GDP (current prices)	https://si3.bcentral.cl
Comisión para el Mercado Financiero (CMF)	Total credit-program disbursements; 2020 bank capital (aggregate, public statistics)	https://www.cmfchile.cl

Note on lockdown data: `Data/Worked/data_cuarentenas.dta` was downloaded ready-to-use directly from the Ministry of Science’s COVID-19 open-data repository before that repository went offline (see the note in `Codes/1.Databases_publicly_available.do`); it is included as-is, since it can no longer be re-downloaded from the original source.

Confidential (Simulated) placeholder data

Because the confidential BCCh microdata (Section 2.3) cannot be redistributed, the **Outside** environment (`Codes/1.Databases_raw_simulation.do`) generates a simulated placeholder version of every such database, with the same variable names, types, and general structure as the real (confidential) data, for 50,000 simulated firms (`{nsf}` in `Codes/0.Master.do`). This allows any reader to run the entire code base end to end and confirm that it executes without error, and to inspect the logic of every downstream program, without requiring access to the confidential microdata. Because the simulated data do not reproduce the actual joint distribution of firm characteristics, **tables and figures produced under the Outside environment will not numerically match the published results** for any output that depends on the BCCh or CMF confidential microdata (all of `Codes/2.Tables.do` and `Codes/2.Figures.do` except where noted in `Readme/Output_Dictionary.xlsx`); this is standard practice for confidential-microdata replication packages and is noted throughout as “simulated data are provided for code-testing purposes only.”

2.4 Dataset list

The table below summarizes every database in the Outside/BCCh pipeline (`Readme/Data_Dictionary_BCCh_Outside.xlsx`, 60 databases, 61 worksheets) and in the CMF pipeline (`Readme/Data_Dictionary_CMF.xlsx`, 13 databases, 14 worksheets), by classification and by whether the database is a raw input or a worked (constructed) dataset. **Full variable-by-variable documentation for every database is in these two files**, not reproduced here.

Pipeline	Public	Confidential (Simulated)	Confidential
Outside/BCCh (Raw)	11	15	—
Outside/BCCh (Worked)	20	14	—
CMF (all inputs)	6	—	7

In the Outside/BCCh dictionary, “Confidential (Simulated)” denotes a database that is confidential in the BCCh/CMF environments but is provided here in simulated form, generated as described in Section 2.3; no database in that pipeline is both confidential and unsimulated, since the package is meant to be run Outside. In the CMF dictionary, the seven “Confidential” databases have no simulated counterpart and are not provided at all (Section 2.3).

3 Computational Requirements

3.1 Software Requirements

- **Stata** (the code sets `version 13.0` for backward compatibility in `Codes/0.Master.do`; developed and tested with a current Stata release). `Codes/0.Master.do` installs every package dependency automatically at the start of a run:
 - Via `ssc install`: `asgen`, `winsor2`, `scheme-burd`, `spmap`, `shp2dta`, `geoinpoly`, `texdoc`, `reghdfe`, `ftools`, `carryforward`, `distinct`, `require`.
 - Via `net install` directly from the package’s GitHub repository (not `ssc`, to ensure the current maintained version): `rdrobust`.
- **MATLAB**, for the quantitative model (`Model/`), using `fmincon` from the Optimization Toolbox. See `Model/README_QUANTITATIVE_MODEL.tex` for the complete software and toolbox requirements specific to the model.

No setup/installation script beyond `Codes/0.Master.do` itself is required: running it (see Section 5) creates the full `Data/` and `Output/` directory structure and installs all Stata package dependencies before running any analysis code. The only manual configuration needed is (i) confirming that the `maindir` path for the relevant environment, in the “`**Directories`” block of `Codes/0.Master.do`, points to the folder where this package was unzipped, and (ii), for the BCCh environment only, replacing the placeholder SQL Server password on the line marked `YOUR_BCCH_PASSWORD_HERE` with the credential provided by the Banco Central de Chile.

3.2 Controlled Randomness

- Two Stata seeds are set once, in `Codes/0.Master.do` (`global sseed=98034` and `global sseed2=10842`), and used exclusively by `Codes/1.Databases_raw_simulation.do` (multiple `set seed ${sseed}/${sseed2}` calls) to generate the simulated placeholder data described in Section 2.3. These do not affect any output built from real (BCCh or CMF) microdata.
- `Codes/2.Tables.do` uses Stata’s `bootstrap` command (1,000 replications, clustered) in thirteen separate regressions, each with a fixed `seed(123456789)`.
- No pseudo-random generator is used anywhere in the MATLAB quantitative model: the calibration (`fmincon`) and the firm-level static solver (`fzero`) are deterministic, so their output depends only on the hard-coded starting values and tolerances in `Model/runcalibrate_TFP_v2.m` (see `Model/README_QUANTITATIVE_MODEL.tex`).

3.3 Memory, Runtime, Storage Requirements

Summary. The full replication package takes approximately **36 hours in total** to run end to end, across all three environments and the quantitative model:

- **BCCh:** approximately **30 hours** in total for `Codes/1.Databases_raw.do`, `1.5.Databases_worked.do`, `2.Tables.do`, `2.Figures.do`, and `3_Empirical_Moments_Quantitative_Model.do`. This is by far the longest-running component, because the confidential BCCh microdata (Section 2.3) are very large; the thirteen 1,000-replication clustered bootstraps in `2.Tables.do` are the most time-consuming individual step.
- **Outside:** approximately **30 minutes** in total for the same Stata programs as the BCCh environment above, run instead on the much smaller simulated placeholder data (Section 2.3).
- **CMF:** approximately **4 hours** in total for `Codes/1.Databases_CMF.do` and `Codes/2.Tables_CMF.do` (see `Readme/README_CMF.tex`).
- **Quantitative model** (MATLAB, Section 1.1): approximately **30 minutes** in total for the calibration and both post-processing scripts, once the empirical moments have been transcribed (see `Model/README_QUANTITATIVE_MODEL.tex`); does not include the manual, by-hand formatting and saving of Appendix Figure 6.

Hardware used. To reproduce the analysis with the public data, the Outside environment, the quantitative model, and the simulations, the authors used a machine with the following specifications: approximately **1.5 GB** of free storage; **16 GB** of RAM; and a CPU with **8 or more threads** running at **2.4 GHz or higher**. The corresponding software versions are **Stata 13 or higher** and, for the quantitative model, **MATLAB R2019a or higher** (Section 1.1).

The hardware specifications of the BCCh and CMF secure servers, on which the BCCh and CMF environments above are run, are confidential and are not reported in this package; they are accessible, on request, to BCCh and CMF staff, respectively, with access to those servers.

4 Description of Programs/Code

- `Codes/0.Master.do`: the master script. Installs all Stata package dependencies, sets the `{user}` environment (Outside/BCCh/CMF) from the computer’s username, defines every directory global, and calls every other Stata program listed below, in order, conditional on the environment.
- `Codes/1.Databases_publicly_available.do` (Outside only): builds every public database (Section 2.3).
- `Codes/1.Databases_raw_simulation.do` (Outside only) / `Codes/1.Databases_raw.do` (BCCh only): build the simulated placeholder, respectively the real, confidential BCCh raw databases.
- `Codes/1.Databases_CMF.do` (CMF only): builds the confidential CMF analysis panel. Documented in `Readme/README_CMF.tex`.
- `Codes/1.5.Databases_worked.do` (Outside and BCCh): builds every analysis (“worked”) dataset from the raw and public databases.
- `Codes/2.Tables.do` (Outside and BCCh): produces every table in the paper and appendix except Table 4, Appendix Table 16, Appendix Table 17, and Table 10.
- `Codes/2.Tables_CMF.do` (CMF only): produces Table 4, Appendix Table 16, and Appendix Table 17. Documented in `Readme/README_CMF.tex`.
- `Codes/2.Figures.do` (Outside and BCCh): produces every figure in the paper and appendix except Appendix Figure 6.

- `Codes/3_Empirical_Moments_Quantitative_Model.do` (Outside and BCCh; BCCh required for the moments used in the paper): computes the 22 empirical moments used to calibrate the quantitative model.
- `Model/` (MATLAB, run by hand outside `0.Master.do`; Outside only): the quantitative model. Produces Table 10 and Appendix Figure 6. Documented in full in `Model/README_QUANTITATIVE_MODEL.tex`.
- `Codes/2.Tables_Quantitative_Model.do` (Outside only): imports the MATLAB model output and produces Table 10.

5 Instructions to Replicators

1. Unzip the replication package, and, in `Codes/0.Master.do`, confirm that the `$_{maindir}` path for your environment (Outside/BCCh/CMF, set automatically from your username) points to the folder where the package was unzipped.
2. **BCCh users only:** replace the placeholder SQL Server password (`YOUR_BCCH_PASSWORD_HERE`) in `Codes/0.Master.do` with the credential provided by the Banco Central de Chile.
3. **CMF users only:** follow the separate instructions in `Readme/README_CMF.tex` to place the required public and confidential inputs at the paths expected by `Codes/1.Databases_CMF.do`, then skip to step 6.
4. Run `Codes/0.Master.do`. This installs all Stata package dependencies, creates the `Data/` and `Output/` directory structure, and runs every Stata program appropriate to your environment (Outside or BCCh), in order, through `Codes/3_Empirical_Moments_Quantitative_Model.do`.
5. **Outside users only, to reproduce Table 10 and Appendix Figure 6:** follow the separate instructions in `Model/README_QUANTITATIVE_MODEL.tex` to run the MATLAB quantitative model by hand, then run `Codes/2.Tables_Quantitative_Model.do`.
6. Copy the resulting files from `Output/Tables/` and `Output/Figures/` to `Paper/tables/` and `Paper/figures/` to match the `\input/\includegraphics` paths used in the paper's L^AT_EX source, as needed.

6 List of Tables and Programs

The provided code reproduces all tables and figures in the paper and its appendix. `Readme/Output_Dictionary.xlsx` gives the complete mapping, for every table (T1–T10, AT1–AT29) and figure (F1–F5, AF1–AF6), from its number in the paper to the exact output file and the environment (`outside/bcch/cmf`) that produces it; the table below summarizes it by section and required environment.

Section	Count	Environment(s) required
Main tables (T1–T10)	10	<code>bcch</code> (8), <code>cmf</code> (T4), <code>outside</code> (T10, quantitative model)
Main figures (F1–F5)	5 (11 panels)	<code>bcch</code> (3), <code>outside</code> (2)
Appendix tables (AT1–AT29)	29	<code>bcch</code> (27), <code>cmf</code> (AT16, AT17)
Appendix figures (AF1–AF6)	6 (11 panels)	<code>bcch</code> (5), <code>outside</code> (1, AF4; AF6 requires the quantitative model)

Program(s) that produce each section: `Codes/2.Tables.do` (main and appendix tables except T4, T10, AT16, AT17), `Codes/2.Tables_CMF.do` (T4, AT16, AT17), `Codes/2.Tables_Quantitative_Model.do` (T10), `Codes/2.Figures.do` (all figures except AF6), and the MATLAB quantitative model in `Model/` (AF6).

References

- Banco Central de Chile. Confidential firm-level credit and administrative microdata; public statistics on exchange rates and national accounts. <https://si3.bcentral.cl>
- Comisión para el Mercado Financiero (CMF). Confidential supervisory reports D03, D10, D32, D58, C11, and E20; public statistics on the credit-guarantee program and bank capital. <https://www.cmfchile.cl>
- Servicio de Impuestos Internos (SII). Confidential firm registry (Personas Jurídicas) and tax form F29, obtained through the Banco Central de Chile and the CMF.
- Dirección del Trabajo. Employment Protection Law statistics. <https://www.dt.gob.cl>
- Biblioteca del Congreso Nacional de Chile (BCN). Municipal and populated-area shapefiles. https://www.bcn.cl/siit/mapas_vectoriales
- Ministerio de Ciencia, Tecnología, Conocimiento e Innovación. COVID-19 open data repository (municipal lockdown decrees).
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- Miranda, M. J. and P. L. Fackler (2004). *Applied Computational Economics and Finance*. MIT Press. (CompEcon toolbox, <https://github.com/PaulFackler/CompEcon>.)