The Statistical Database on Household Credit

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Summary

As part of the lessons learned from the Global Financial Crisis of 2008 and the transition to macroprudential policy, the Bank of Israel and other central banks began collecting and maintaining itemized databases, including the Credit Data Register that contains itemized information on loans to households from all lenders. This Register was established under the Credit Data Law 5776–2016, as one of a series of measures to promote competition in Israel's credit market, expand access to credit, and reduce discrimination in credit provision.

The Bank of Israel's Information and Statistics Department, which is in charge of the collection, production, and accessibility of the economy's financial statistics, manages the anonymized database that is based on the Credit Data Register. The Statistical Credit Database is used by the Bank of Israel to perform its functions.

This study describes the contents of the Statistical Credit Database, describes the data anonymization process and its diverse uses, and notes the challenges and issues that arose in the process of developing the database.

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1. Background, motivation, and aims of the study

In response to the Global Financial Crisis of 2008, many central banks around the world, including the Bank of Israel, began to conduct a macroprudential policy that emphasized an analysis of the links between the economy's industries. This policy is based on macroaggregate data and on individual sector data, and it aims to identify systemic risks as they emerge, to promote measures to prevent these risks, and to limit their impact on the economy's financial stability.

These changes underscored the need to collect and develop itemized databases that support research and analyses that assist in obtaining, at a greater frequency, a more detailed picture of the economy's stability and the strength and of the links between the participants in the economy and financial and real economic developments. This analysis is also significant in the design of regulatory policy to monitor and assess policy effects.

As technological developments enabled the storage and processing of increasingly large amounts of information, the Bank of Israel expanded its use of itemized databases and began to collect and manage huge databases such as the Credit Data Register[2] , which includes itemized information on loans to households from all lenders, similar to many countries in the world that manage and maintain central credit registers, with the aim of supporting a competitive credit market and protecting the economy's financial stability.

The Credit Data Register in Israel was established under the Credit Data Law, 5776–2016[3] ("the Law"), and was one of a series of measures implemented to promote competition in Israel's credit market, expand access to credit, and reduce discrimination in credit provision.
As the Law requires, the itemized system is managed by the Supervisor of Credit Data Sharing, and it contains detailed information on credit granted to individuals and aspects of repayment of this credit. The system receives reports from all the entities involved in credit provision, as well as other public authorities. Data are received on a monthly basis and are used to calculate a customer's credit score, which allows credit providers to assess a customer's risk and allows the customers to obtain and examine credit offers from multiple credit providers.

According to the Law, the system's itemized and non-anonymized information is managed in an environment separate from all other Bank of Israel databases, and is under the responsibility of the Supervisor of Credit Data Sharing. It is on the basis of the non-anonymized system data that the Bank of Israel generates a database that is anonymized, rendering the data unidentifiable. The itemized database enables the Bank of Israel to expand and broaden its analyses of Israel's credit market, and to monitor the trends and emerging threats in this market.

The Bank of Israel's Information and Statistics Department, which is responsible for collecting, producing, and making available the economy's financial statistics, manages the anonymized database ("the Statistical Credit Database") that the Bank of Israel uses to perform its functions. This study describes the scope of the Statistical Credit Database, the information anonymization process, and its diverse uses, notes the challenges and issues that emerged in the process of developing the database, and reviews similar databases around the world.

[2] For additional information see the Credit Data Register's website at https://www.creditdata.org.il.

2. The aims of the Statistical Credit Database for the Bank of Israel's Uses

A. Compliance with the requirements of the Credit Data Law 5776–2016

On the basis of the data collected in the Statistical Credit Database, the Governor of the Bank of Israel reports annually to the Knesset Economics Committee, as required by the Law. The report includes information on implementation of the Law, as well as the stages of the research on the database's contribution to achievement of the Law's objectives and monitoring the developments and changes in the retail credit market and its scope.

B. Monitoring the economy's financial stability

One of the Bank of Israel's main functions is to maintain financial stability. A stable financial system is important in itself and also because a decline in financial stability has widespread effects on other economic sectors. Furthermore, the stability of the financial system is important for the efficient management of monetary policy.

The Statistical Credit Database, which contains data on the sources and availability of household credit, the degree of competition in this market, and other information, is designed to assist the Bank of Israel in performing this function. These data allow policymakers at the Bank to monitor developments in the credit market and develop necessary policy measures.

C. Conducting research that supports policymaking

The Statistical Credit Database is designed to support research activities, including studies that examine whether discrimination exists in the provision of credit, and the determination of policy measures to reduce such discrimination. The data in the Statistical Credit Database also support analyses of the public's financial conduct and help identify issues that should be emphasized in public financial education programs[4].

D. Improving financial statistics

The Statistical Credit Database also assists the Bank of Israel in performing its function as the economy's official source of financial statistics. The Database data are used to enrich the information on household credit that currently exists in the Bank's databases, and support new segmentations that were not before possible, such as borrowers' attributes, purposes of the credit, and information on nonbank credit.

3. Contents of the Statistical Credit Database

The Statistical Credit Database contains itemized information on all the credit transactions that are reported by the credit providers. Reports to the database include all new transactions made since 2016 and all outstanding transactions that year. The data are reported at a monthly frequency and include information on the credit transaction amounts, credit history, and the public's demonstrated responsibility in repaying its loans, and cover three key dimensions: the party to the transaction, details of the transaction, and the collateral.

[4] To conduct research on these topics, additional information is needed on borrowers, such as income and demographics, which currently are not included in the Statistical Credit Database. Such research is supported by cross-checking existing data with data in other databases, subject to the constraints defined by the Law.

The structure of the data reported to the Statistical Credit Database makes it possible to identify many-to-many links between these dimensions. That is to say, a single transaction may be linked to multiple borrowers and lenders, and multiple collateral: A single borrower may be reported in a number of transactions, a single collateral may be reported in several transactions, and credit providers may be involved in more than one transaction as lenders. These links affect the data modeling process and how the data are made accessible to users.
The following is detailed information on the three dimensions that are used to characterize the transactions reported to the Database:

A. The participating entity in the transaction

This dimension includes fields that refer to all the entities when the credit transaction is created:

The Lender - The entities and institutions that provide credit to households. These include commercial banks, credit card companies, and nonbank credit providers, including institutional investors and other financial companies that are supervised by the Capital Market, Insurance, and Savings Authority.

The Borrower – An individual who is an Israeli citizen or resident who assumed credit and has a contractual obligation that carries the primary responsibility for payment, that is, the debtor in the transaction. According to the definition in the law, the information in the database includes any adult (over age 18) who took out credit, including credit assumed within their activities as an authorized merchant; or who is a customer who has been restricted/restricted under aggravated circumstances, as defined in the Checks Without Cover Law, 5741–1981; or is in a bankruptcy proceeding or is in a executions and collections proceeding.

Guarantor – An individual who is a resident or citizen of Israel and who gave a guarantee to a Borrower who is a debtor in a credit transaction.

Reporting Information Source – Entities that report to the Credit Data Register, including the commercial banks, the credit card companies, the nonbank credit companies, and governmental entities or public authorities in which various legal proceedings related to overdue debts are administered, such as the Official Receiver, the Executions and Collections Authority, the Restricted Accounts Section at the Bank of Israel, and the Postal Bank. In most transactions reported to the Database the information source is the actual lender, but in some cases the Reporting Information Source is the entity that administers the transaction and the lender is a separate entity.
For these entities, fields including the entity's identifying information, including ID, address, name, etc., are reported. The Bank of Israel and its databases are subject to the Privacy Protection Law, and these identifying details are therefore anonymized before they are entered into the Statistical Credit Database, as described in Section 4.

B. The transaction

This dimension includes fields related to the details of the transaction, including:

Transaction type – the types of credit transactions that constitute actual debts (e.g., mortgage, consumer loans, bank overdraft) or transactions that create potential debts by granting the customer a right to receive credit (e.g., line of credit, unused credit facilities, including in current accounts). Checks and authorized debit orders are also reported to the Database.

Purpose of the credit – the purpose for which the credit was granted (e.g., car purchase, tuition, renovations, investment in the capital market).

Information on credit transactions with overdue payments (e.g., number of days in arrears, outstanding overdue balance, first nonpayment date).
Indications of debt restructuring and amount of forgiven debt.
Quantitative data including information on balances or payments.
Information on interest paid in the transaction (e.g., type of interest, interest rate).

C. Collateral

This dimension includes fields that contain details of the collateral in the transaction, including:

- **Type of collateral** – the type of asset that constitutes collateral for the transaction (e.g., pledge on residential real estate, lien on a car).
- **Value of the collateral** – the amount that is allocated to the lender in the event of default.

4. The unique nature of the Statistical Credit Database and the challenges in its development and management

Management of a Statistical Credit Database that is subject to a specific law that details how sensitive information is to be managed and used entails several challenges, including:

A. Protecting the confidentiality and personal privacy of the individuals whose information is contained in the Database:

The Bank of Israel and its databases are subject to the Privacy Protection Law, and in addition, the Statistical Credit Database is also subject to the Credit Data Law. To comply with the requirements of these laws, the Bank of Israel built a three-tier protective wall around the Database, the guiding principle of which is that authorized users should not be able to identify, with reasonable effort, any information that contains the identifying details of a customer reported to the Database.

- The statistical tier: To allow access to information while protecting its confidentiality, the Bank of Israel has designed an anonymization process to transform the nonanonymized information system that contains the identifying details of individuals into an unidentifiable database in order to protect the information and, with high probability, prevent the identification or exposure of individuals whose details appear in the Database, and specifically any sensitive or confidential information about them. In addition to deleting individuals' direct identifiers, the anonymization process also treats data that are not directly identifiable but may indirectly lead to the identification of individuals. Such treatment includes, for example, aggregation in categories, truncating amounts, and so forth. In developing and determining the anonymization methodology, the Bank of Israel takes steps to prevent the identification of the borrowing customer, while at the same time preventing loss of information resulting from anonymization, thereby balancing between data usability and privacy protection.

- The technological tier: Access to the unidentifiable ("anonymized") statistical credit database is granted to authorized users only (as explained in the procedural layer) in a separate secure and neutralized (private cloud) technological environment, which prevents the removal or copying of information from the anonymized database. Furthermore, this environment does not permit entry of information from other sources (e.g., the Internet or other databases) that might increase the risk of individuals' identification when they are used to cross-check information in the Database.

- The procedural tier: The list of Database users is restricted to a limited number of Bank of Israel employees, who undertake to comply with the specific work procedures drafted for this purpose:

    - An information confidentiality procedure, which includes but is not limited to restrictions on the use of the anonymized database, and users' personal undertaking to use the information only for the Bank of Israel's needs for performing its functions and that the user shall in no way attempt to identify the individuals in the records or to cross-check the information with the records in other databases.

    - A print-out control procedure – In their work, users of the anonymized database may be required to present their findings to decision makers that are not included in the narrow list of authorized users. Therefore it is imperative to verify that the print-outs, which are produced in a separate technological environment, do not disclose information that might lead to the identification of the individuals whose details are reported to the Database. The print-out control procedure includes, but is not limited to, rules concerning the calculations and tests required before print-outs may be produced and presented to other parties that are not included in the narrow group of authorized users.

B. Analysis of Big Data

One of the primary challenges of managing Big Data is related to the storage, analysis, and accessibility of large quantities of information. The Statistical Credit Database receives tens of millions of records every month[5], which are added to the records that were already reported in previous months[6]. The records are received in a format that contains a large number of tables that are linked using keys. The structure of the data is a function of the business ties among the records (Many-to-Many ties, as described in Section 3).

Every month millions of records are reported to the Credit Data Register. For example, in September 2020, 35 credit providers reported to the system[7]. These included 10 banks, 4 credit card companies, 5 institutional investors, and 16 nonbank credit companies. These credit providers reported approximately 23 million records, of which 3 percent were new records that were not reported in previous months.

The extent of information received each month created a need to customize the existing systems and use tools specifically designed for Big Data management and analysis that are appropriate for the size of the database and the frequency of its updates. These tools facilitate classification, filtering, and analysis of the data, as well as identification of patterns and trends that create a more accurate picture of the state of household credit.

Alongside the use of these special-purpose tools, it is also necessary to acquire skills in statistical analyses that can be used to extract macro-level insights from micro-level data. Such analyses assist policymakers in identifying patterns in specific population groups.

[5] The records include outstanding transactions, new transactions, details of collateral, and details of the entities participating in the transaction.

[6] According to the Credit Data Law, 5776–2016, the Bank of Israel may store historical data in the Statistical Credit Database for up to 10 years.

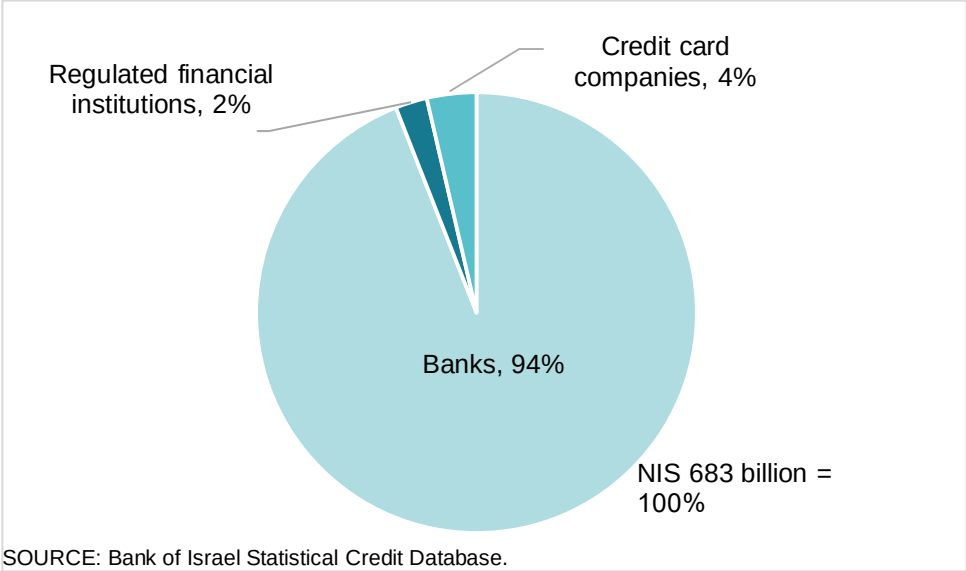
[7] In addition, records from governmental entities or public authorities that administer various legal proceedings related to unpaid debts are also reported to the Database.

5. Sampling the use of data using selected products

In this section we illustrate several uses of the data calculated from the Statistical Credit Database. First, we note that the information presented in these products:

- Includes the credit granted to private individuals and to authorized merchants;
- Has undergone a printout control process as part of the efforts to protect confidentiality and privacy described in Section 4

Figure 1: Distribution of Outstanding Credit Reported to the Database by Type of Credit Supplier, Sept. 30, 2020



SOURCE: Bank of Israel Statistical Credit Database.

Figure 1 shows that the utilized credit balance (transaction types: current account overdrafts, credit card facility utilization, mortgages, and other loans) was about NIS 683 billion as of the end of September 2020. The banks provided about 94 percent of this balance, credit card companies provided about 4 percent, and other financial institutions provided about 2 percent.

The following figures assisted the Bank of Israel in understanding the decline in households' repayment ability in view of the COVID-19 crisis, which began in Israel in February 2020:

Figure 2: Transactions with a Balance in Arrears as a Share of Total Existing Transactions, percent

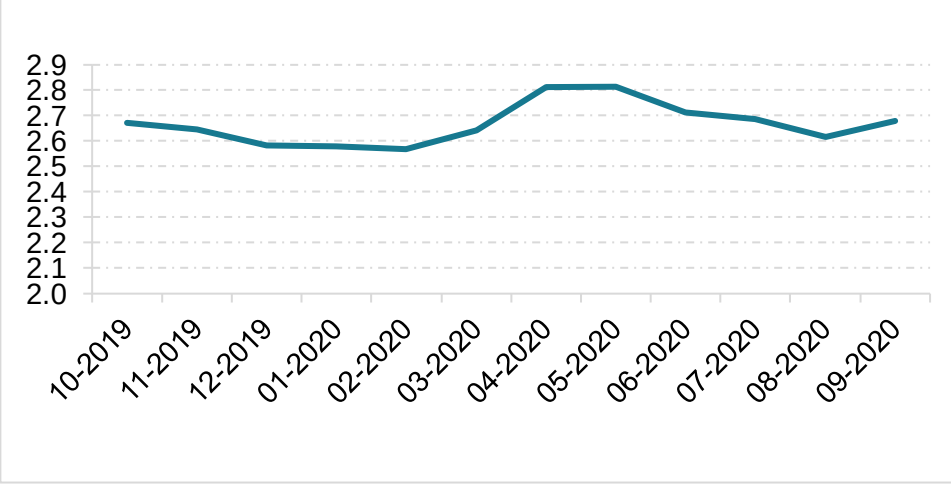


Figure 2 indicates an increase in the rate of transactions in arrears in April and September 2020, in view of the restrictions of the first and second lockdowns. The increase in the rate in these months is due to the increase in the number of transactions in arrears and a concurrent decline in the total number of existing transactions.

Figure 3: Checks Returned Due to Insufficient Cover as a Share of Total Checks Presented for Payment during the Month, percent

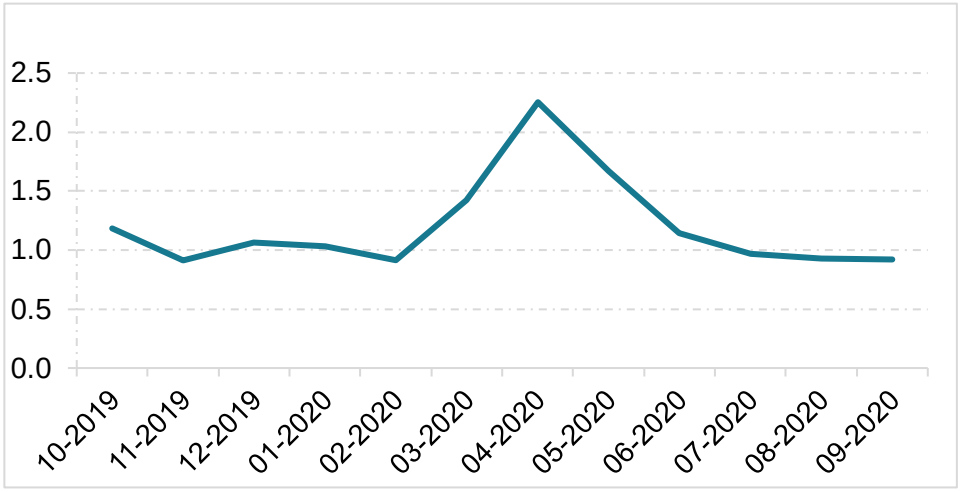


Figure 3 indicates that during the first lockdown (March–April 2020), there was an increase in checks returned due to insufficient cover as a share of the total number of checks presented for payment in each month. This proportion subsequently declined and returned to its precrisis level.

6. Global experience

Global experience shows that many countries manage and maintain central credit registers in order to support a competitive credit market and maintain their economy's financial stability.

Table 1 presents a review of two countries that collect and manage itemized data on credit transactions, compared with Israel's Central Credit Register. We chose to focus on Portugal and Ireland. Similar to Israel, the central banks of these countries maintain and manage central credit registers (CRRs), in contrast to countries such as the US and Italy, in which credit data are collected and managed by credit bureaus.

Table 1: Review of Central Credit Registers - Ireland, Portugal, and Israel

	Ireland	Portugal	Israel
Year established	2017	1978 - Only credit data of nonfinancial companies were collected. The register was expanded in 1993 to include credit data on individuals.	2016 - Storage of data by credit providers 2018 - Actual establishment
Legal framework	Credit Reporting Act of 2013	Decree-Law no. 29/96, April 11, 1996	Credit Data Law, 5776–2016
Purpose and use of the central credit register	Increasing competition in the credit market and supporting the performance of the central bank's functions	Increasing competition in the credit market, supporting the performance of the central bank's functions, and improving financial and monetary statistics	
Management of the central credit register	Central bank	Statistics department at the central bank	Credit Data Sharing Unit at the central bank
Reporting entities	Banks, credit unions, licensed lenders, and local authorities	Banks, credit card companies, nonbank credit companies, factoring companies, and financial leasing companies	Banks, credit card companies, nonbank credit companies, and government entities or public authorities that conduct legal proceedings related to unpaid debts
Borrowing entities	Companies, legal corporations, self-employed, and individuals	Nonfinancial companies and individuals	Individuals
Reporting threshold	Transactions above €500	Transactions above €50	All transactions
Frequency	Reporting frequency is mostly monthly. There are reports at a daily level.	Reporting frequency is mostly monthly. There are quarterly and annual reports.	Reporting frequency is mostly monthly. There are immediate reports at a daily level.

In view of the global COVID-19 crisis, the Central Bank of Ireland published an article that examines the change in the demand for new loans by businesses and households. This article used Central Credit Register data, which show declines in both sectors in the number of new loan applications during the first wave of the COVID-19 crisis in Ireland (Figures 4–5)

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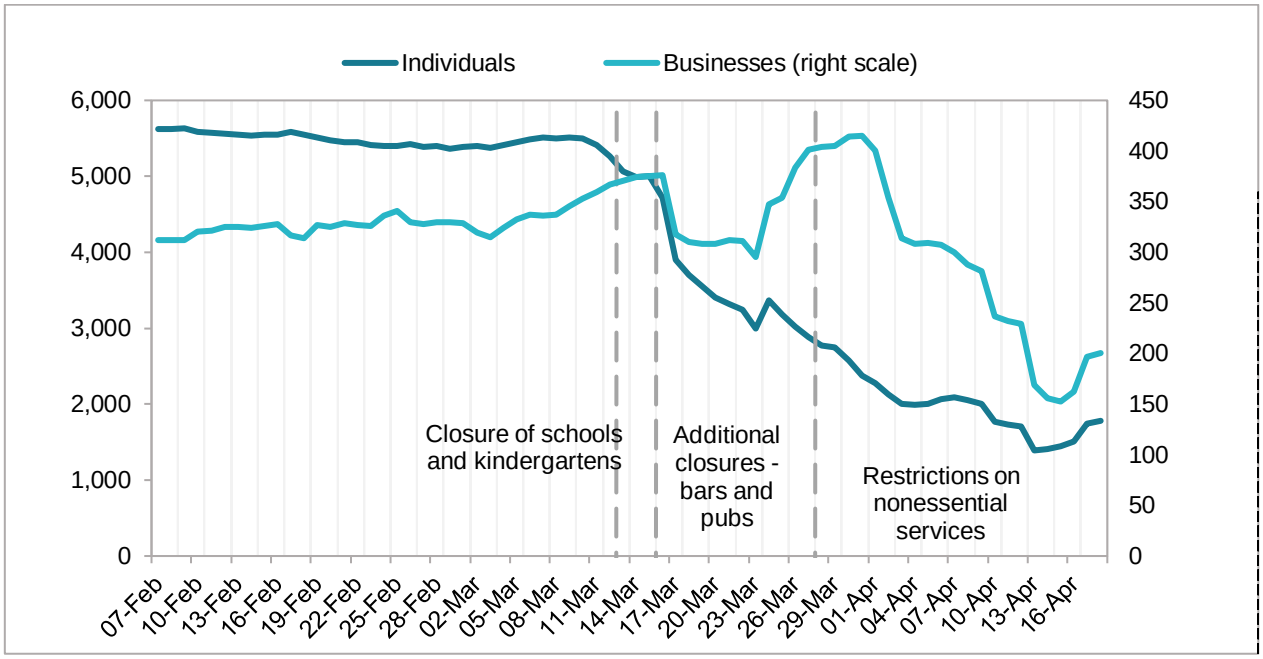
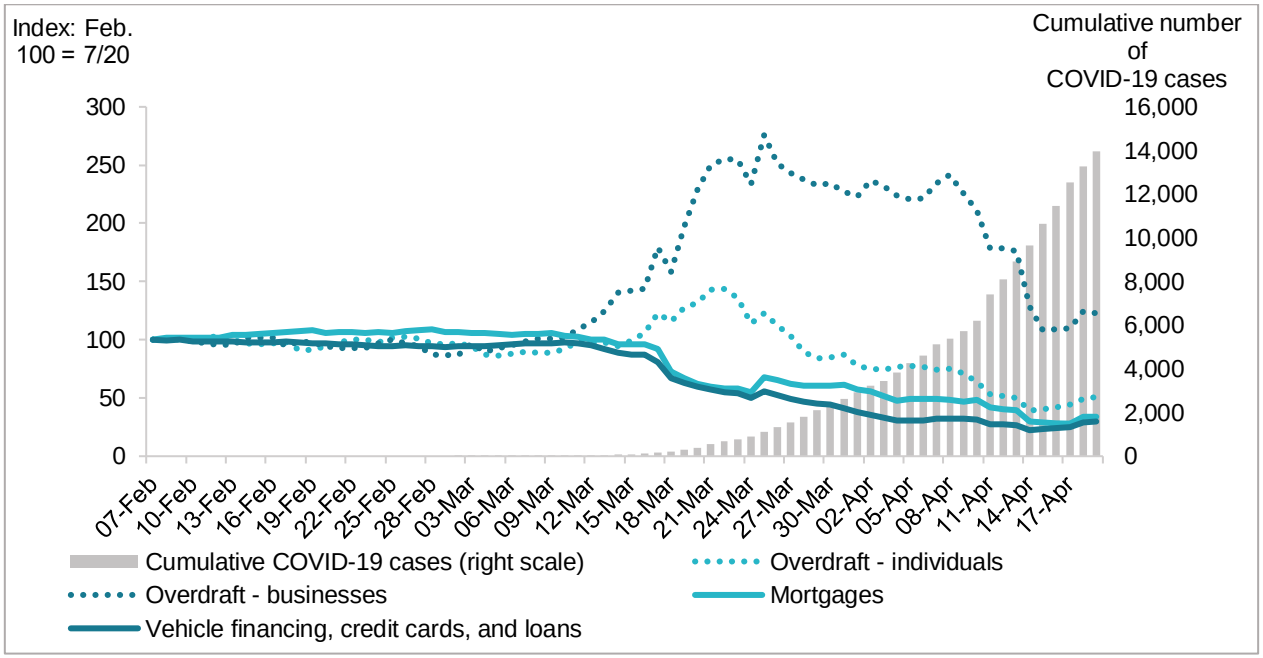
Figure 4: Decline in the Number of Requests for New Loans in Ireland



SOURCE: Central Bank of Ireland based on data from the Irish Central Credit Register
The data are 7-day average credit requests for individuals and businesses. "Individuals" includes households
And sole-proprietor merchants. Last observation was on April 18, 2020.

Figure 5: Decline in Irish Household Demand for Mortgages and Other Loans, Compared With Some Increase in Overdrafts



SOURCE: Central Bank of Ireland, based on European Center for Disease Control and Irish Central Credit Register
The data are a moving 7-day total. Loans include loans to individuals and businesses. The figure shows only the categories with
The highest number of total requests. "Individuals" includes holuseholds and sole-proprietor merchants. Last observation was on
April 18, 2020.

7. Summary

The Bank of Israel's Information and Statistics Department is responsible for the establishment, management, and accessibility of the Statistical Credit Database that is based on the Credit Data Register created at the Bank of Israel pursuant to the Credit Data Law.

This paper describes the contents and dimensions of the Statistical Credit Database, the challenges entailed in its establishment, and its primary uses in supporting the performance of the Bank of Israel's functions. This study also describes the protective wall that was designed as part of the measures to comply with the Privacy Protection Law. Finally, the study presents a brief review of two similar databases administered by central banks in other countries.