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The effect of pandemic on Central Bank of Türkiye real sector database and post-pandemic adjustments¹

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¹ This presentation was prepared for the conference. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the event.

The effect of pandemic on Central Bank of Türkiye (CBRT) real sector database and post-pandemic adjustments

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Abstract

Timely data was crucial for taking proper decisions during the effects of pandemic. This paper aims to present the process of compiling CBRT's highest frequency real sector data under pandemic conditions and post-pandemic harmonization studies. For the last four years, the CBRT has compiled detailed financial statement data (by making an amendment to its law) in currency distinction from companies with high foreign exchange liabilities. The data has been collected quarterly, however, during the pandemic period, companies delayed reporting their balance sheet data. This situation required CBRT to fully adapt the reporting system to pandemic conditions. So, CBRT has changed the reporting standard from IFRS to national accounting standards, reduced the frequency to weekly, and compiled some part of reporting from administrative records (like derivatives). Because CBRT received the data weekly, the balance sheet data could be used together with other high frequency loan and spot foreign exchange data. Weekly balance sheets are the highest frequency real sector balance sheet data CBRT can add to database so far. To move faster, IT infrastructure was developed in-house by the Statistics Department. After the pandemic conditions relaxed, CBRT changed the reporting from weekly to monthly, meanwhile it was a win to integrate company data with other high frequency databases, now researchers can work on this integrated dataset. And also after the pandemic conditions relaxed, CBRT can have time to integrate more complex reporting system to replace previous in-house infrastructure. The addition of other high frequency data such as quarterly temporary income statements and monthly VAT returns is now carried out within the scope of post-pandemic studies.

Keywords: post-pandemic, official statistics, real time data, data collection

JEL codes: C80, C81

Contents

The effect of pandemic on Central Bank of Türkiye (CBRT) real sector database and post-pandemic adjustments	1
1. The Motivation for New Datasets	3
2. The History of Dataset.....	3
3. The New Weekly Dataset.....	4
4. The Post-Pandemic Adjustments	8

1. The Motivation for New Datasets

During the pandemic period, central banks took many measures for companies to continue their activities in a healthy way. Timely monitoring of the effects of these regulations has become crucial. However, delays in company reporting did not make this possible. For this reason, some changes had to be made in frequency and structure of reporting in order to obtain timely data. This period has also been an important time for a detailed understanding of data and analysis needs. For this reason, post-pandemic statistics were adapted according to needs. With this motivation, CBRT build real time data platform as a monitoring tool with a well-established data streaming process. This process contains all necessary components to enable CBRT to integrate data for advanced analysis. High frequency raw data collected in real time from multiple data providers, cleaned, processed, matched and stored safely with other financial and non-financial CBRT data thanks to the data highway established on big data platform. Decision makers in CBRT can benefit from this enhanced data by visualization tools. These visualization tools link all the necessary information to overview market conditions via customized dashboards. Our most prominent motivation is to prove more complete, timely and granular information as a complement to traditional macroeconomic indicators. It is important to strengthen analysis for decision-making and data is valuable only if we can manage to extract value from it. To make this possible, we create data highway on big data platform and this make easier to combine different data sets and extract necessary information for decision-making.

2. The History of Dataset

CBRT decided to establish a company specific dataset where risks can be monitored in detail and a new regulatory framework of FX risk management to increase the resilience of Turkish economy against exchange rate volatility. For this purpose, Systemic Risk Monitoring System for FX assets and liabilities of non-financial companies was established by CBRT to monitor FX risk of the companies at micro level. The current databases enabled to reach information on FX liabilities of the companies at micro level but not on FX assets. The new system would collect the detailed FX assets information besides liabilities for better understanding of FX debt burden on individual companies and their capability of debt management. Non-financial firms that had FX loans USD 15 million and over were in the scope of the system, ca.2000 firms.

CBRT had made some legal arrangements to establish the system. With the amendment to article 44 of CBRT Law: " The Bank shall, in order to monitor the operations of real and legal persons which affect their foreign exchange position, be authorized to request all kinds of information and documents all kinds of information and documents from real and legal persons that it shall determine." Also, Directive on Systemic Risk Monitoring System for FX Positions of Companies published in Official Gazette on February 17, 2018. CBRT cooperated with Credit Registry Bureau of Turkey for installation of system infrastructure, software, maintenance, operation and support services. Web based reporting was designed for the reporting of FX positions.

According to the Directive, all companies except banks and financial institutions that had FX cash loans USD 15 million and over were in the scope of the system. So, the system covered all non-financial companies including public institutions like municipalities. The system required quarterly individual financial statements prepared according to international reporting standards for timely and proper understanding of the financial position and the performance of the companies. All financial statements should be under independent external auditing.

This system was the first comprehensive dataset in Turkey that contains FX assets, liabilities, derivatives, export and import information on currency and maturity (0-3, 3-6, 6-12 months and over 1 year) distinction. FX credit information included domestic loans, direct loans abroad, guaranteed loans abroad, intermediation loans abroad and FX indexed loans from banks or financial institutions. Also, this was the first database with separate derivative form on transaction basis and the inventory information based on the market value of the inventories in FX assets.

CBRT could follow the assets and liabilities in USD dollar, Euro, Turkish lira and total of other currencies. Also, companies could declare their assets and liabilities under the projection for the following 3 months, 6 months, This data set covered 83 percent of all FX credits in Turkey and 78 percent of CBRT rediscount credits. Also, the important part of total investments came from these companies although the share of the number was even less than one percent.

3. The New Weekly Dataset

From 2018 to 2020, we watched these company's data quarterly and after 2021, we changed the frequency to monthly. However, during the pandemic period in 2020, we requested **weekly position from companies from June to December to follow the covid-19 effects on FX positions. Due to the postponed financial reporting of companies within the framework of the coronavirus (Covid-19) epidemic, there were delays in the data reported to the CBRT.**

Weekly data forms were also requested in accordance with Article 44 of the Central Bank of the Republic of Turkey Law No. 1211 in order to monitor the effect of monetary policies on the balance sheets in a timelier manner. Due to the current economic conditions, it was beneficial to collect the financial statements of the companies at a higher frequency in order to effective evaluation of the financial supports applied to the real sector. Companies that were in the scope of the system, required to report the Weekly Data Form in addition to their quarterly notifications.

As a result of the evaluation made within the scope of the developments regarding the normalization process, it is expected that the companies will complete their reporting for the first quarter of 2020 until 15 June 2020 and continue in their usual schedule, and weekly reports will start to be made from 16 June 2020 in the format determined by our Bank.

Weekly reportings were made in the format determined by our institution, using the values that were the basis of the legal financial statements prepared in accordance with the Accounting System Implementation General Communiqués ("MSUGT") and the Uniform Chart of Accounts (THP) requirements published by the Ministry of

Finance. The document was sent to companies through e-mails containing the form to be filled on a weekly basis, explanations about the form and answers to frequently asked questions from companies. Companies were not expected to make any calculations other than existing accounting records.

We requested from companies to send information and notifications regarding the weekly accounting period to the official e-mail address by filling out the form, until Tuesday evening every week, starting from June 16th 2020.

In the start of the process, negative comments were made that the data form requested to be filled was technically impossible for the company, that filling out the form would require additional work and this would be a waste of time for the company. Some of the companies that commented in this way stated that they could not fill out the form, and some of them stated the biggest difficulties in filling out the form in addition to their negative comments and wanted to get opinions on how to overcome these problems. The most frequently asked questions regarding the forms were about the weekly nature of the form and therefore the difficulty of updating the inventory items on a weekly basis. Especially in the questions sent from audit firms, the authorities stated that the data to be reported would be inconsistent and incorrect due to the time inconsistency between reporting and accounting realizations, and therefore weekly reporting would cause an unhealthy data flow.

Unlike the quarterly forms, the preparation of the form was made according to the Uniform Chart of Accounts and Tax Procedure Law, not according to TFRS and BOBI FRS.

Although there were limited number of balance sheet items (mostly financial, 13 assets and 12 liabilities) in the new form, there were no items that require additional calculations such as the balance sheet main total (for example, total assets and liabilities) or subtotals (for example, total assets). For this reason, companies were not expected to prepare weekly balance sheets or trial balances. In addition, if there were items that could not be calculated (for example, inventories, trade receivables) due to timing inconsistency in the reporting week, it would be sufficient to include the most up-to-date balance of the relevant items in the form.

In the weekly data form, the current balance of the requested item as of the last day of the reporting week (01.01.2020 – last day of the reporting week) should be written, not the change amounts of the relevant week for the requested items.

Since the account balances in the form would be updated on a weekly basis, changes resulting from such timing mismatches would be reflected in the account balances in subsequent reporting. Therefore, no retrospective adjustment was required.

If companies had balance other than USD and Euro for the items requested in the weekly form, the TL equivalent of the relevant amount should be written in the "TL Equivalent of Other Foreign Currency" column in the form. Weekly forms should be sent to official e-mail address until the end of the working day on the Tuesday following the end of the reporting week.

The recording or calculation period of some transactions might exceed one week. In these cases, the most recent balance available in the relevant item as of the last day of each reporting week should be written on the form. When the relevant transaction was recorded or calculated, the relevant amount should be included in

the form of the week containing this date (the day of recording or calculation). Also, there was no need to update the previous forms.

Because certain balance sheet items were included in the weekly data form, and amounts that require additional calculations such as balance sheet main total (asset-liability total) or subtotal (asset-liability totals) were not requested. It was not necessary to prepare a weekly balance sheet or trial balance, as only the balance information for the requested items was requested.

The weekly form must be prepared within the scope of the Uniform Chart of Accounts and the Tax Procedure Law. So, no rediscoun or accrual transactions were requested for the financial items included in the form.

The weekly data sheet was not subject to independent audit. After completing the weekly data form, the reporting week information in the form was selected from the menu, the form would be saved and an e-mail would be sent to on the Tuesday following the reporting week. Based on the e-mail, tax identification number, title and reporting week was examined automatically and reporting controls was carried out. In the "Exchange Rate Value to be Used for Conversion to TL" field in the weekly data form, the USD and EUR rate valid on the last day of the reporting week should be entered. Since the last day of the reporting week is Sunday, the rates announced at 15:30 on the previous Friday should be taken into account. Companies that were liable within the scope of the Regulation based on Article 44 of the Central Bank of the Republic of Turkey Law No. 1211 will prepare the weekly data form.

It is stated in Article 68 of the aforementioned law that a judicial fine from one thousand days to two thousand days will be imposed on real persons and officials and related persons of legal persons who do not provide the information and documents required within the scope of the aforementioned article, or give falsely or in violation of the determined procedures and principles. The weekly data form was a form that was prepared on different principles from the quarterly data forms and contained limited items and aimed to provide information on the current balance sheets of companies. Due to these differences, there might be differences between other forms and tables. Since the controls in the form were a warning against incomplete and erroneous reporting, they can ignore the warning of the relevant control as long as companies were sure that the written amounts were correct.

Although some liability items could be tracked in time from administrative records, the only source of most of the data belonging to the companies is the notifications of the companies themselves. Although the Regulation is referred to as the scope of the firm, the said regulation aims to regulate the quarterly notifications. The weekly form was a complementary work with the quarterly statements of the companies. The "Current Date of Amount" field was added to the form. Thus, companies were able to enter the most up-to-date amount of the account items expected to be reported and notify us of the date.

With the weekly data form, 13 active and 12 passive items in the balance sheet of the companies were collected in USD, EUR, Other FX and TRY currencies. Data were collected via e-mails sent to official e-mail address. The data collection process was carried out in the following steps:

First of all, an excel file template to be sent weekly was sent to all companies that have a reporting obligation. The Excel template was protected with a password, and companies were only allowed to enter data in the relevant fields. Firms were

requested to fill in the form with their current account balances as of Sunday every week and send it by the following Wednesday at the latest. E-mails sent by companies were read with a developed python script, error checks are passed and tables suitable for analysis were created. The process of the Python script was as follows:

Separating the mails that had excel that we sent to the companies as an attachment to the mail that comes to the mailbox or that were categorized as data forms by the business unit.

Checking whether the excel files attached to the parsed e-mails were compatible with the template we sent. If the template was corrupted, automatic e-mail reply containing this error was returned to the relevant companies.

If the template was correct, checking the basic information in the form (TAC, Title, reporting week, writing 0 in all fields) and returning an automatic mail reply suitable for errors (for example, missing vkn or reporting for future dates).

Reading the error-free form with the python openpyxl module using the excel sheet-excel cell and the account code matches (eg Data Form-C25 = Cashier) and converting it to tabular data format

Aggregating and converting the data collected for the relevant week into a single data file after completing the previous step for all forms. Combining the single data form created for the relevant week with the single data forms created for the previous weeks. At this stage, automatic confirmation e-mails were sent to the companies in order to prevent the companies from repetitive reporting for the same dates. Updating the old data with the allowed data after the manual approval process (reading the mail content) (such as the company's request to correct the old data).

Converting the data created in wide format into a structure suitable for analysis and transferring it to the big data environment.

The following data quality studies were carried out for the weekly collected data. Similar to the reading process in these studies, python scripts were used and the business process was automated.

Significant changes in the same items between weeks. With this control, significant changes in a reporting item above a certain amount and above the average of the item were detected, and confirmation e-mails were sent to the companies regarding the accuracy of the amounts.

Not reporting foreign currency assets and liabilities. With this control, confirmation e-mails were sent to companies that did not report any active or passive balances in foreign currency regarding the accuracy of the amounts.

Inconsistency of loan balances with administrative records. With this control, confirmation e-mails regarding the accuracy of the amounts were sent to the companies whose credit balance in the form differed significantly from the credit balance in the administrative records.

In the analyzes we made on a weekly basis, we were able to monitor the change in the general currency position and the weekly course of items such as safes, banks, receivables and payables on a currency basis. We were also able to combine this weekly dataset with other high-frequency loan and market currency-trading data. In addition to the analysis, the presence of a timely data set belonging to the companies also offered the opportunity to check the data quality with other high-frequency data.

4. The Post-Pandemic Adjustments

After the pandemic conditions relaxed, CBRT changed the reporting from weekly to monthly by integrating more complex reporting system to replace previous one. Thus, we reduced the reporting obligation on our companies from weekly to monthly and established a more sustainable data infrastructure. However, **we did not want to return to quarterly reporting again, because the analyses arising from the combination of timely company data with other datasets were used extensively in upper management decisions.**

In the monthly data form, different from the weekly data form, flow variables such as monthly domestic and international sales, stock purchases, tangible and financial fixed asset purchases are also included. Thus, it has made it possible to make monthly cash flow analysis of the companies. We can also provide ease of analysis by visualizing these cash flows with sankey charts.

The new monthly reporting system, which was also developed in house within the bank, was designed as 3 phases. The first phase includes companies accessing the system by performing security checks with e-government integration and entering data into the system within data confidentiality. In the first phase, basic controls such as entering the data with negative characters, subtotal control, grouping by thousands, decimal fraction control, minimum and maximum value are performed. In the second phase, the entry and exit transactions of the companies within the scope of the regulation and the corrections of the previous period are monitored. In addition, company communication, which was previously done via e-mail, is now done through a defined management module. Thus, important notes can be followed without getting lost. The third phase is devoted to the integration of secure data entry, user identification, deactivation, sending and recording of controls, which are desired to be done in the other two phases.

The addition of other high frequency data such as quarterly temporary income statements and monthly VAT returns is now carried out within the scope of post-pandemic studies. it was a win to integrate company data with other high frequency databases, now researchers can work on this integrated dataset. Seeing the benefits of timely analysis during the pandemic period has increased the data sharing efficiency of institutions with each other.

The monthly turnover table calculated within our Directorate every month; the main table of Revenue Administration, Company notifications transferred from Turkish Statistical Institute on a monthly basis pursuant to the Revenue Administration and CBRT protocol is obtained by compiling the "declaration year" and VAT and SCT declaration tables. The workflow, in which the monthly turnover calculation is carried out, includes the declarations of companies operating in the real sector. The aforementioned monthly turnover table has been prepared with the motivation to enable real sector companies to be monitored on a monthly basis and to provide input for other studies to be carried out within our Bank.

VAT declarations declared by the taxpayers until the evening of the 24th day of each month are transferred to our Bank through Turkish Statistical Institute approximately 45 days after they are notified to the Revenue Administration. Afterwards, the monthly turnover table is created by our Bank in its most up-to-date version. If more than one valid VAT declaration of a company for the same period is

detected during the calculation process, data cleaning processes are carried out to avoid duplication in the system. The monthly turnover table, which does not interfere with administrative records in any way, has been opened to users, except for the correction of previously determined error types that may occur due to the nature of the data. In addition, it was possible to expand the analysis studies carried out by using our large data set such as monthly domestic turnover, foreign turnover, VAT discounts, calculated VAT amounts and other tables of companies.

Temporary income statements are submitted to Revenue Administration once every 3 months, until the evening of the 17th day of the 2nd month following the quarterly period. The relevant data is transferred to the Turkish Statistical Institute by the Revenue Administration within 15 days, and transferred to our Bank from the Turkish Statistical Institute on the 15th of the next month. Therefore, realizations, which can be followed up to 6 months after 31 December within the scope of Sector Balance Sheets, can be followed after approximately 75 days in 3 months, thanks to the provision and processing of temporary income statements.

Temporary income statements consist of cumulative data. 1st period data covers 0-3 months of the relevant accounting period; 2nd period data covers 0-6 months; 3rd period data covers 0-9 months; The 4th period data represents the realizations between 0-12 months. Therefore, due to the fact that the accounting records cannot be deleted, it is expected that all account items in the table will increase in the following periods. At this point, when the 1st period temporary income statement data comes in, it is left fixed as there is no possibility of comparison; however, when the 2nd period data comes in, the 1st period data is adjusted. The latest period data is always accepted as correct and the previous period data is corrected by accepting the last period as correct. Within the scope of the corrections, in companies whose data has decreased recently, it is tried to provide a cumulative increase on an item basis for each company by transferring the decrease amount to another item that has increased more than this amount. Within the scope of the corrections, in companies whose data has decreased recently, it is tried to provide a cumulative increase on an item basis for each company by transferring the decrease amount to another item that has increased more than this amount. In addition, the data of the previous period is printed for the relevant period to the companies that do not submit a period declaration as of the 2nd period. Thus, it is aimed to prevent serial deterioration caused by incomplete declaration submission.

The data of the provisional income statements, both in their raw form and with the corrections were made available to the users of our Bank in series starting from 2010. Corrections regarding the completion of the missing declarations are made on the Hive platform using SQL, and the correction of the floating data is made in Jupyter Notebooks using the Python Pandas and Numpy libraries.

Perhaps the most important contribution of the pandemic to the world of statistics was to remind us how important a role it played. As statisticians, we made an effort to bring the most timely data possible to the database and make it available to researchers. Currently, we can see the benefits of establishing a timely and integrated database when we can perform timely impact analyses. This motivation brought to us by the pandemic process has positively affected the future of our statistical studies.

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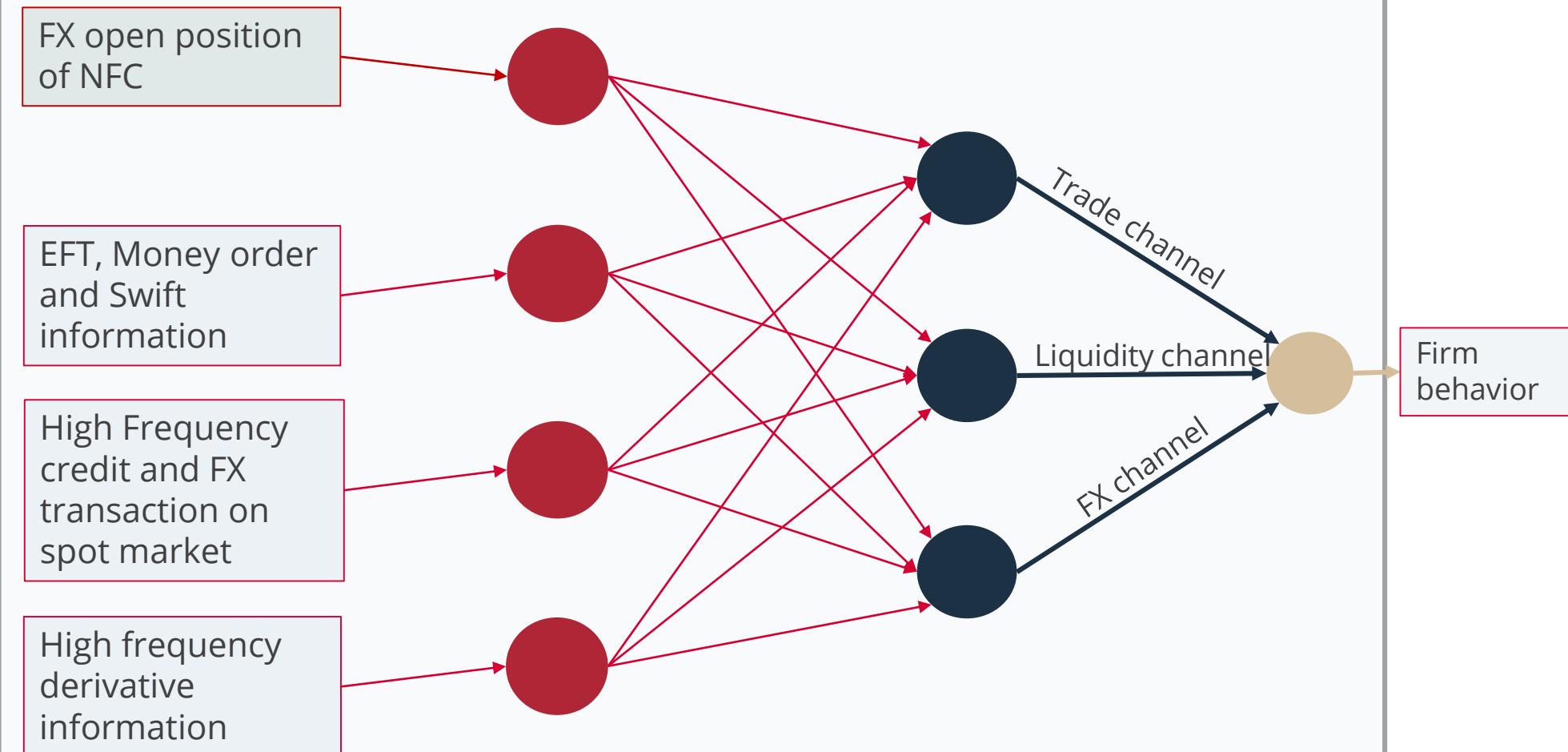
25-26 August 2022

Basel



High frequency data for financials but what about company accounts?

Big Data Platform



The Motivation for New Datasets



- Timely monitoring of the effects of the regulations has become very important. However, **delays in company reporting** did not make this possible.
- Some changes had to be made in frequency and structure of reporting in order to obtain timely
- This situation **required CBRT to fully adapt the reporting system to pandemic conditions**. So, CBRT has changed the reporting standard from **IFRS to national accounting standards, reduced the frequency to weekly, and compiled some part of reporting from administrative records (like derivatives)**
- Our most prominent motivation is to prove more complete, timely and granular information as a complement to traditional macroeconomic indicators. It is important to strengthen analysis for decision-making and data is valuable only if we can manage to extract value from it

The New Dataset

NEW

- From 2018 to 2020, we watched these company's data quarterly and after 2021, we changed the frequency to monthly. However, during the pandemic period in 2020, we requested weekly position from companies from June to December to follow the covid-19 effects on FX positions.
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- Since the account balances in the form would be updated on a weekly basis, changes resulting from such timing mismatches would be reflected in the account balances in subsequent reporting. Therefore, **no retrospective adjustment was required**.
- The weekly data sheet was not subject to independent audit.

The New Data set- In-house data process

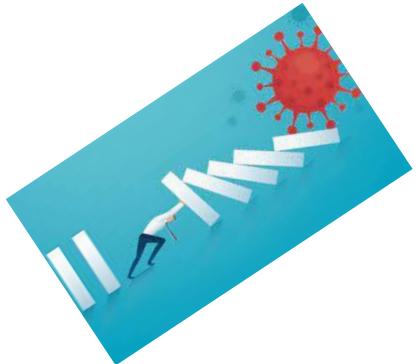
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The Post Pandemic Adjustments

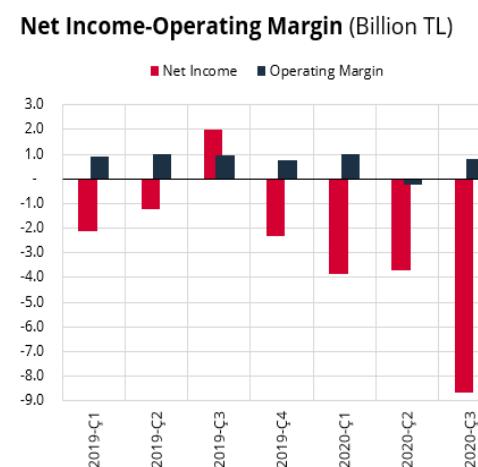
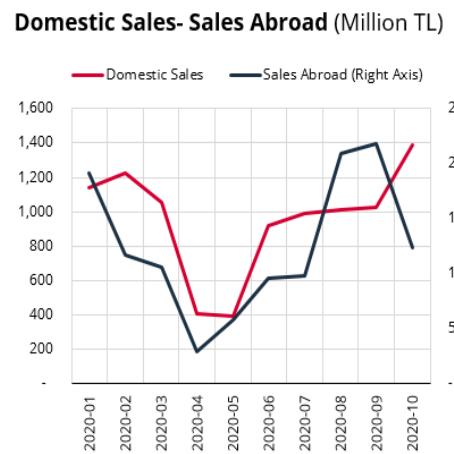


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The Post Pandemic Adjustments

- **The monthly turnover table** calculated within our Directorate every month; the main table of Revenue Administration, Company notifications transferred from Turkish Statistical Institute on a monthly basis pursuant to the Revenue Administration
- **Temporary income statements** are submitted to Revenue Administration once every 3 months, until the evening of the 17th day of the 2nd month following the quarterly period. The relevant data is transferred to the Turkish Statistical Institute by the Revenue Administration within 15 days, and transferred to our Bank from the Turkish Statistical Institute on the 15th of the next month

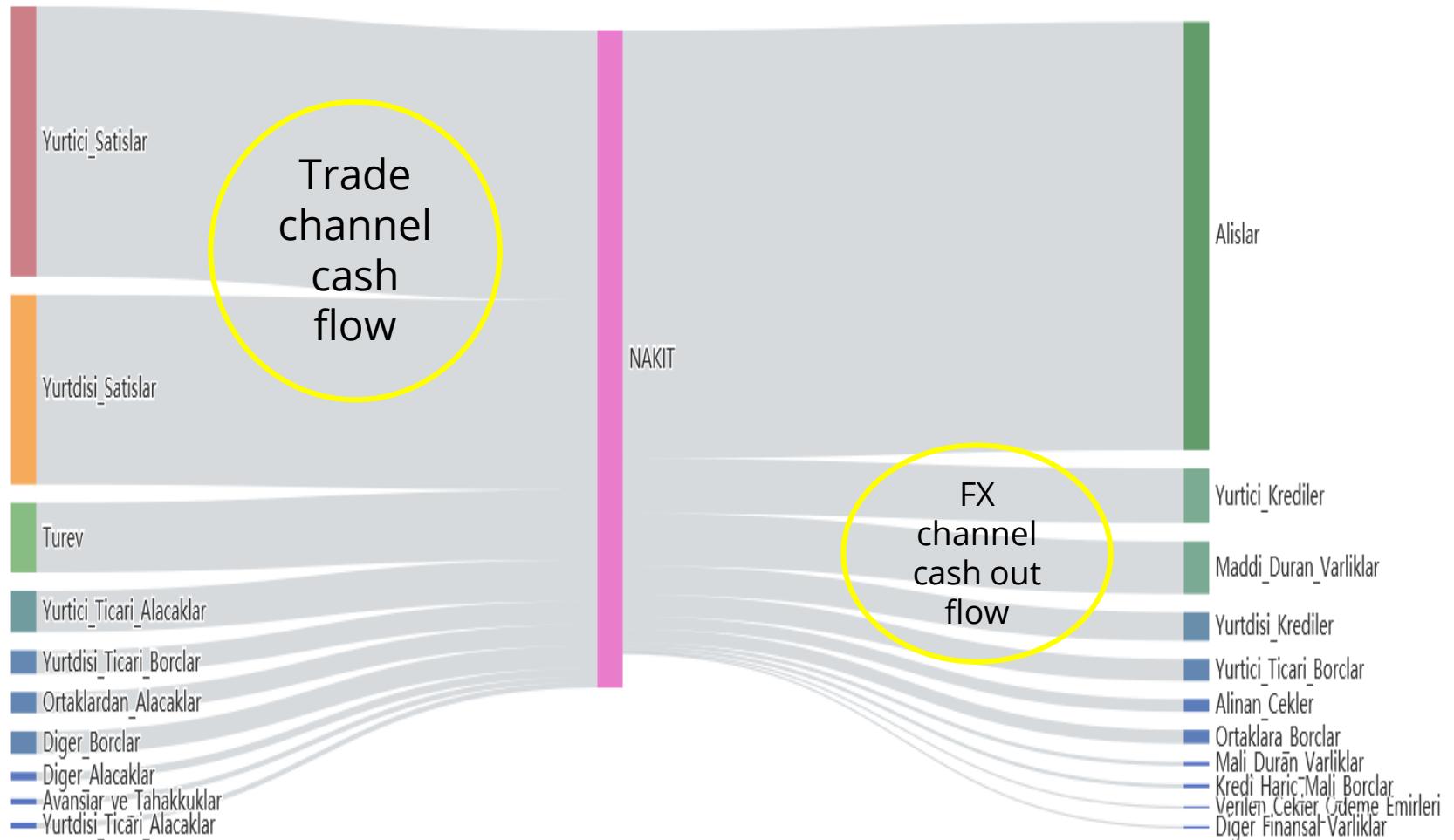
Shopping center review with VAT and quarterly income statements



Cash Flow Analysis

Firm and sector level cash flow analysis

Cash flow analysis for an sector example





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