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Real time data platform as a monitoring tool for Central Bank of Turkey¹

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



Real Time Data Platform as a Monitoring Tool for Central Bank of Turkey

ISI 63nd World Statistical Congress

July 2021

- ❑ Central Bank of Turkey 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.

- ❑ The 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, CBRT creates data highway on big data platform and this make easier to combine different data sets and extract necessary information for decision making.

Real Time Data Platform

Motivation

Providing **more complete, timely and granular** information as a complement to traditional macroeconomic indicators is important to strengthen analysis for decision-making and data is valuable **only if we can manage to extract value from it**

Data System

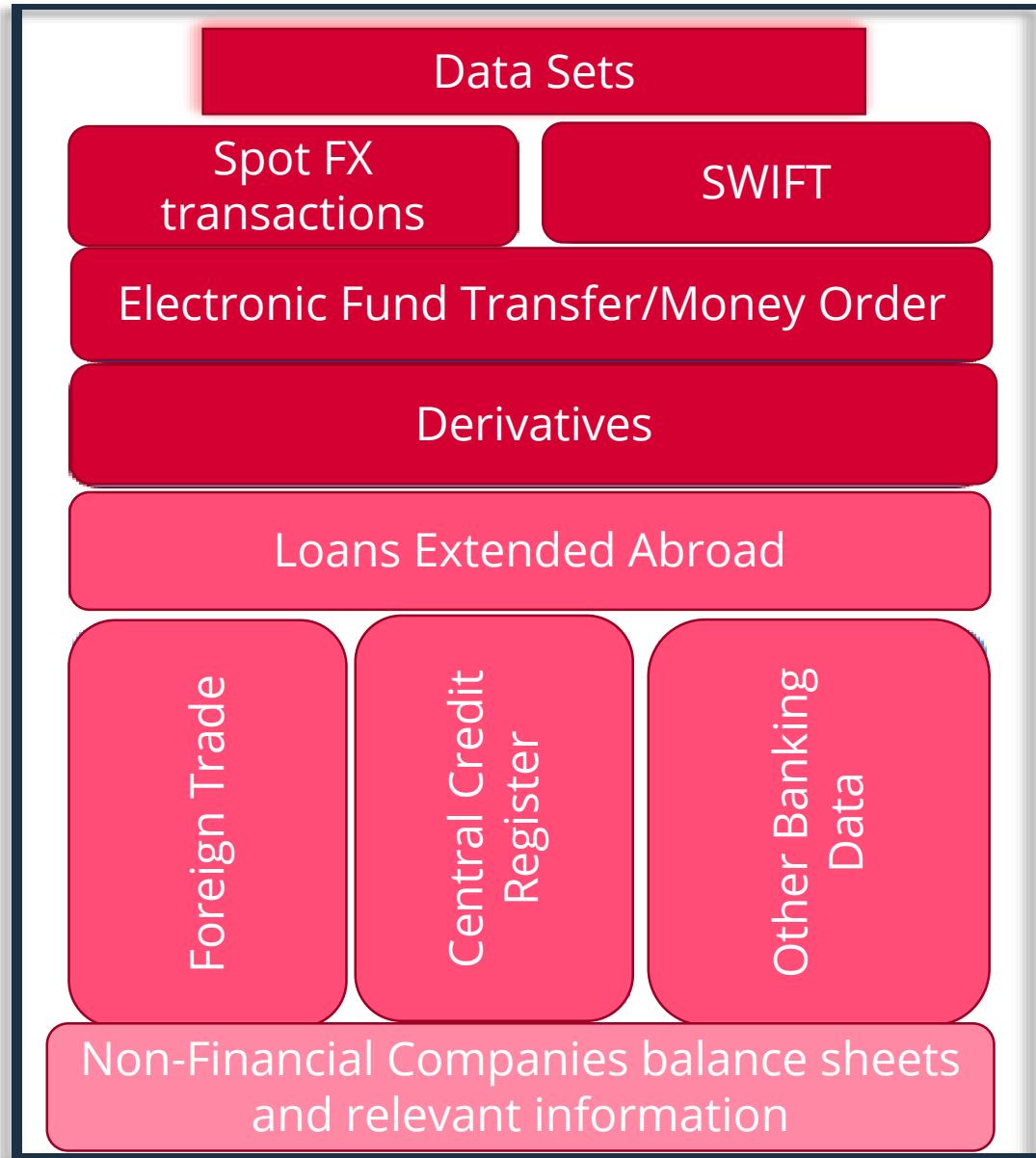
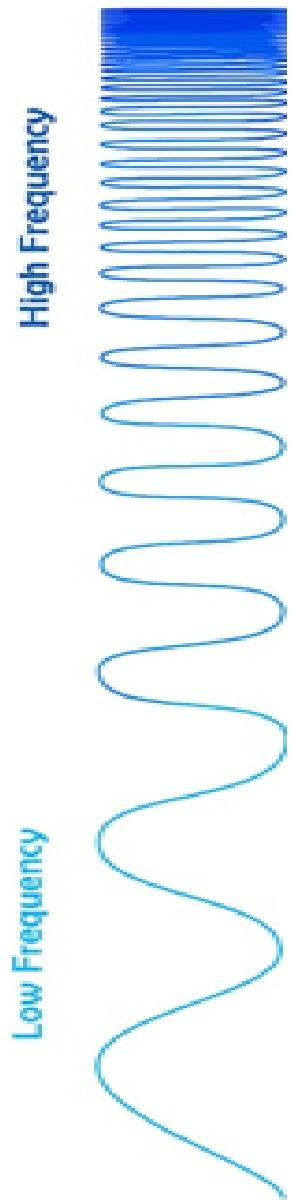
Data Highway on Big Data Platform

Usage Area

Real time alerts

- ❑ The different datasets range from high frequent to low frequent ones. The most important contribution of the new system is to integrate daily spot FX transactions, electronic fund transfers, and money orders, swift and derivative transactions to our database.
- ❑ In the new system CBRT increases the frequency of loan information from credit institutions from monthly to daily to make it possible to match with other high frequent data sets. Specific to non-financial companies, we integrate foreign trade and B2B invoice data to the system monthly from administrative records.
- ❑ CBRT starts collecting financial statements of companies monthly directly from the companies that have FX loans above the determined thresholds.
- ❑ Data is transferred from different data sources from financial institutions, ministries, other governmental bodies or from directly non-financial institutions through web service, ftp or using apache kafka for handling real time data feeds.

Data Highway on Big Data Platform



- ❑ Once the real data is taken into our system, it is transformed, cleaned and standardized to make it possible matching different datasets. The new system make it possible to make network analysis inside non-financial companies and NFCs to financial institutions.
- ❑ To provide data query and analysis, data are stored in the big data platform and analyst can use interface to query data using different program options through virtual data rooms.
- ❑ This real time data platform and related analysis are visualized through customized dashboards.

Data Highway on Big Data Platform

Data Transformation



Data
Compliation



Data Cleaning



Table
creation



Data
Recording



Periodic web
service
control



Data
processing

Data Storage

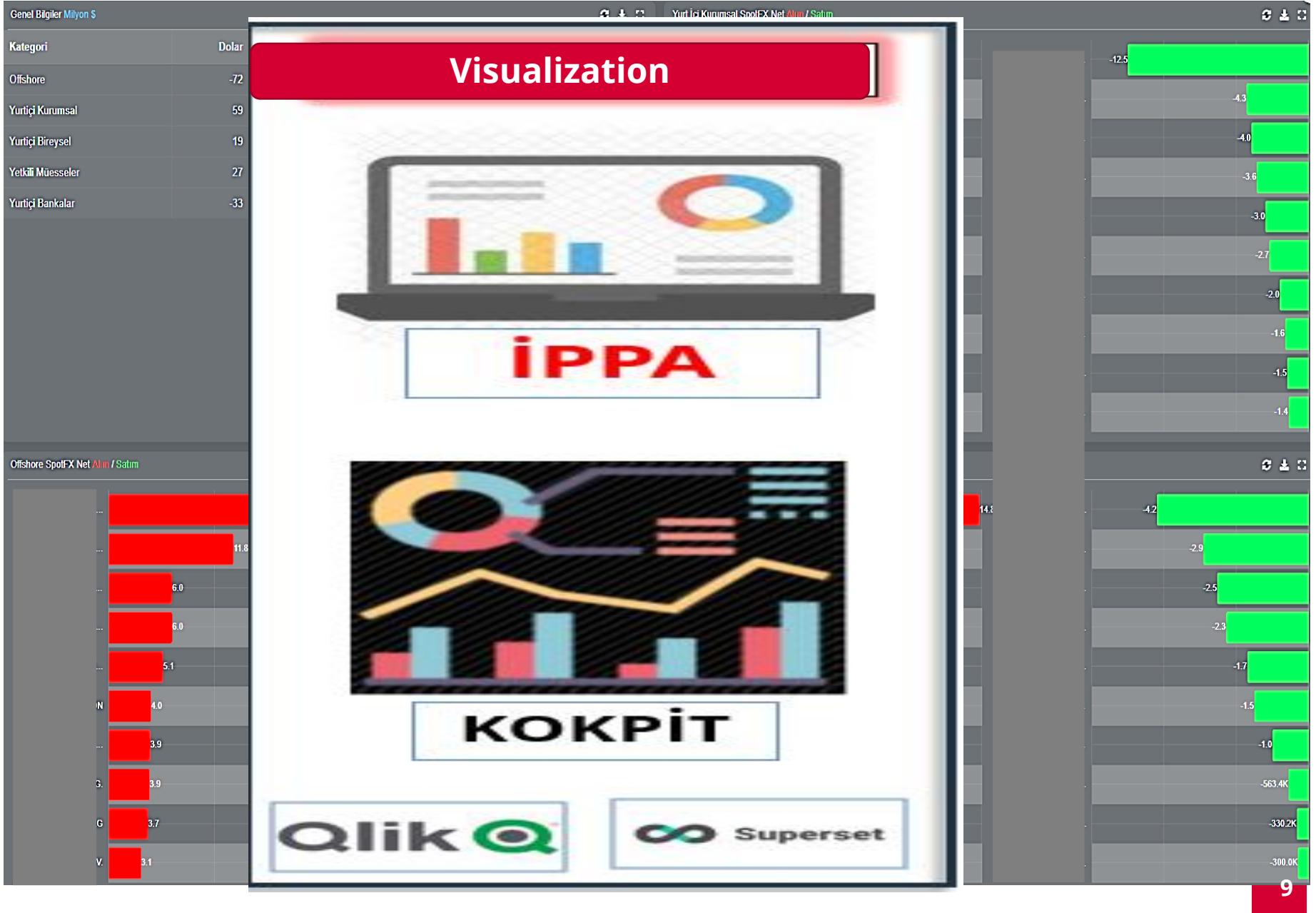


Data Analytics

Sanal Veri
Odası



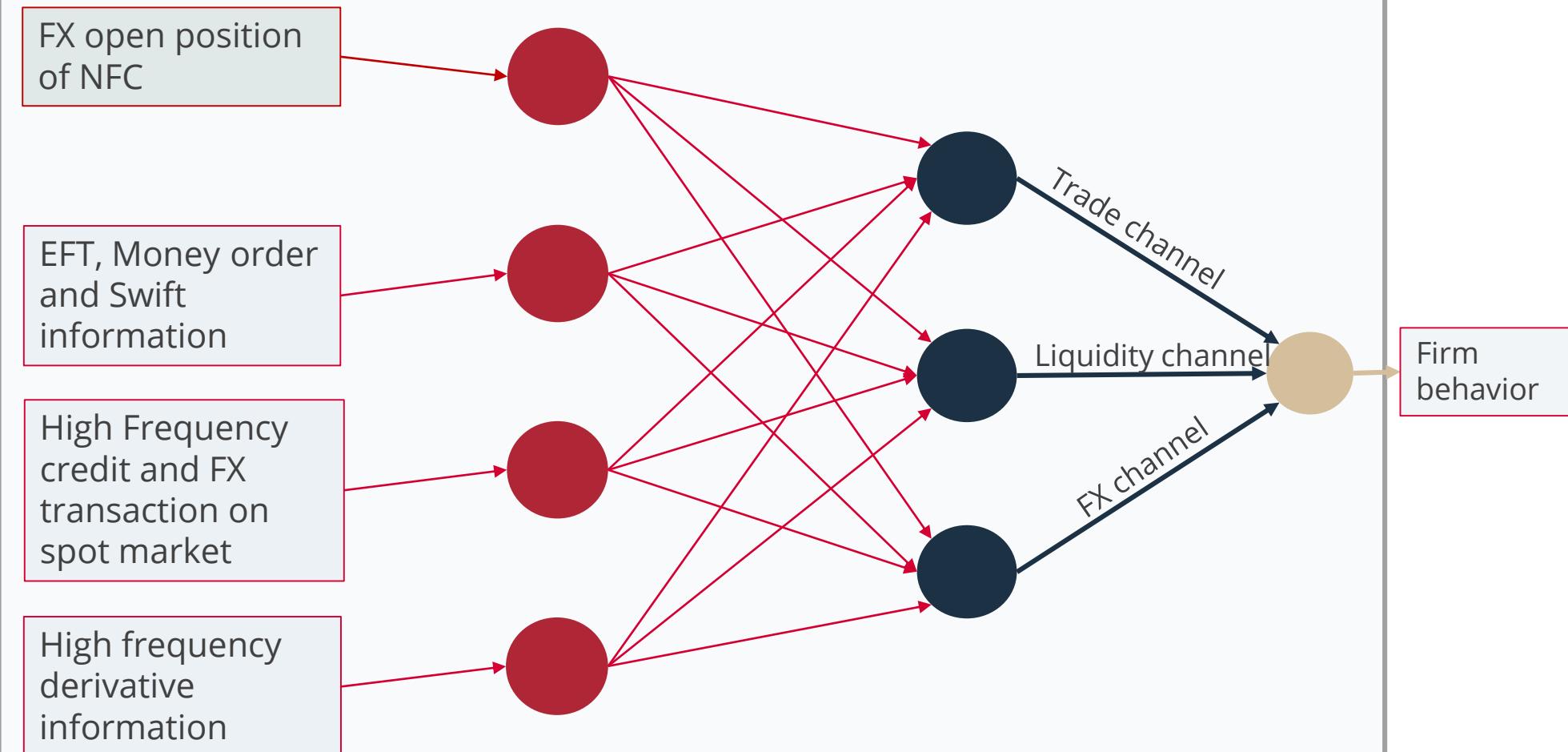
Data Highway on Big Data Platform



- ❑ The early warning system starting from the FX spot market transaction of the firm. This system connects the FX spot market transaction of the firm to the other data sets daily such as EFT, money order, swift, derivatives, credit and balance sheet information. This enables us to understand the firm behavior in the market through trade, liquidity and FX channel.
- ❑ In this early warning system firms' behaviors are scored through 1 to 20 and higher the score the more irrelevant the firm behavior in the spot market with its expected credit and other payments, export-import relations, firms' business model or size or net sales.
- ❑ Not only detecting irrelevant transactions, this system also enable us to understand the timing of the FX transaction for some sectors and their business model. For example, what time of the year the sector will need FX to buy raw materials for production.

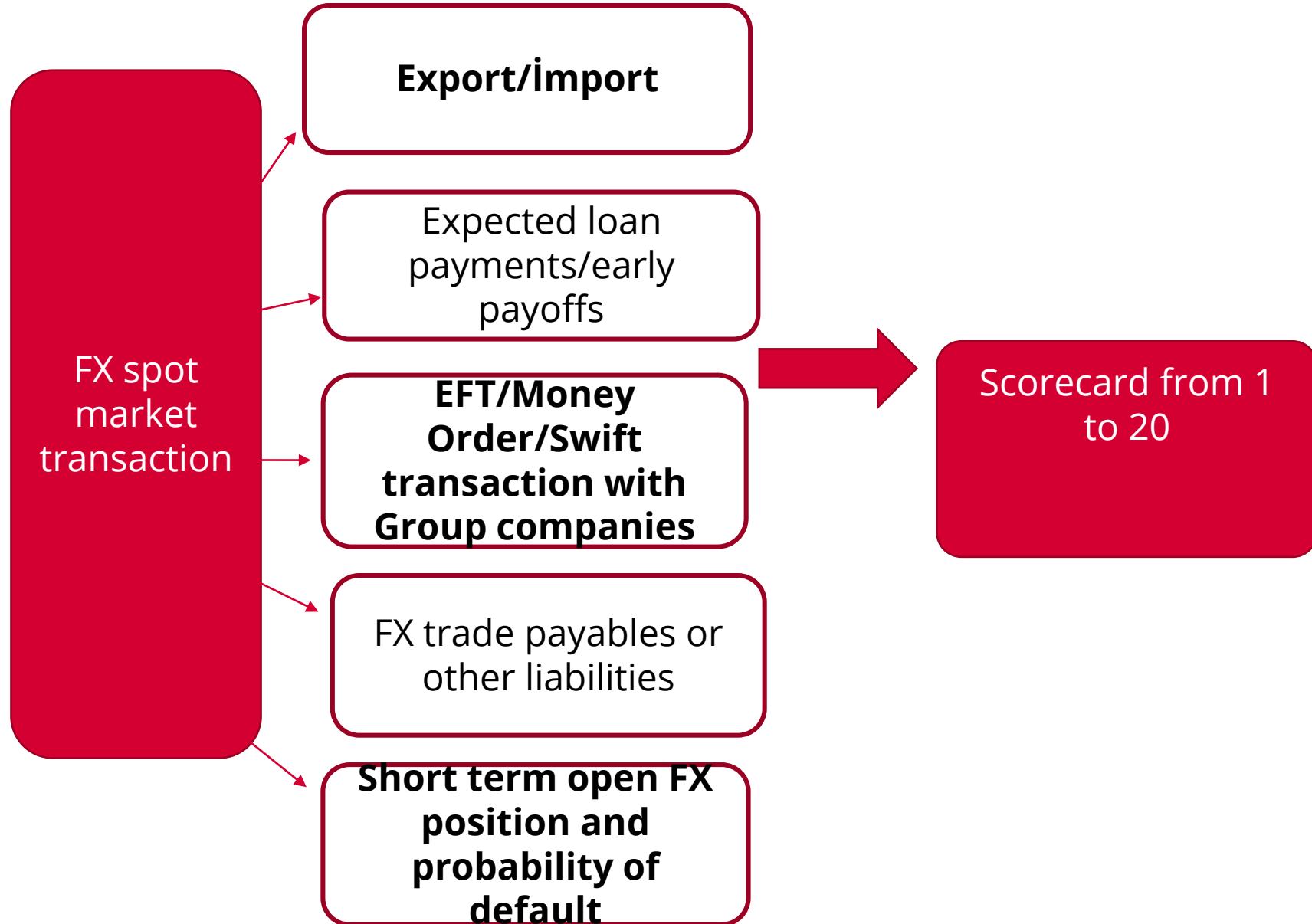
Early warning system on Big Data Platform

Big Data Platform



Early Warning System

Scorecard for Foreign Exchange Spot Market Transactions



Early Warning System Daily Report

Daily FX spot market transactions (USD Dollar)

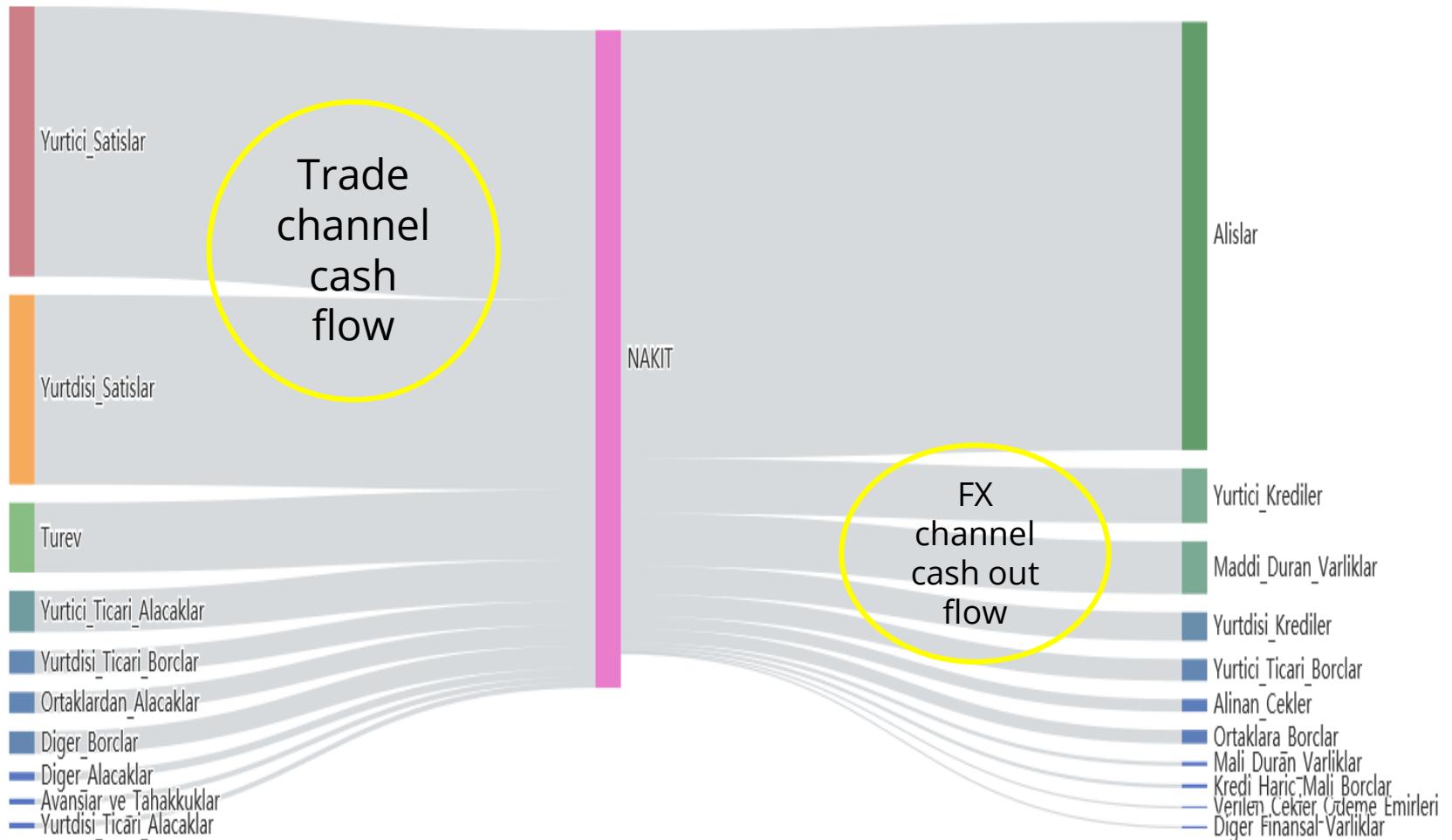
Company	FX tarsaction						Total Score
		C1	C2	C3	C4	C5	
Company 1	17,273,388.66	4	0	0	0	0	4
Company 2	10,900,000.00	2	1	0	0	5	8
Company 3	10,133,955.59	0	0	0	0	0	0
Company 4	8,761,938.72	3	5	0	0	0	8
Company 5	7,089,510.72	1	0	0	0	5	6
Company 6	7,000,000.00	1	0	0	0	0	1
Company 7	6,534,000.00	5	0	5	5	5	20
Company 8	5,950,765.66	3	0	0	0	0	3
Company 9	5,842,740.16	1	5	0	0	0	6
Company 10	5,749,608.59	5	0	0	0	5	10
Company 11	106,956.00	0	5	5	5	5	20

- ❑ Thanks to the combined real time data set, CBRT can analyze the cash flow for both company and sector level. We visualize the cash flow sources in dashboards and try to understand which channel affects the cash flow of the sector in that month. This help us to understand which sectors are in need of cash at that time of the year. If the sector is not fed from regular trade channels but mostly from credit channel, then this can be the signal for that sector's business become deteriorated.
- ❑ This combined real time data also make it possible to make anomaly detection on daily and monthly loan data. Loan data is matched with monthly balance sheet of the companies and through machine learning techniques, we try to figure out the level of the credit the company should use given balance sheet information. This study is also important to forecast expected loan level of the company for the next time and so the loan demand on financial sector.

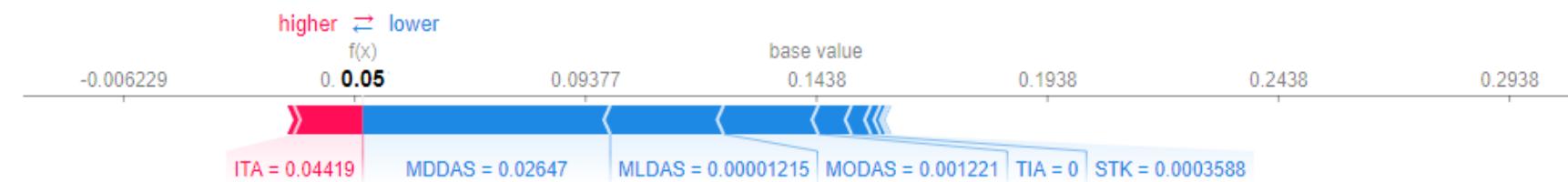
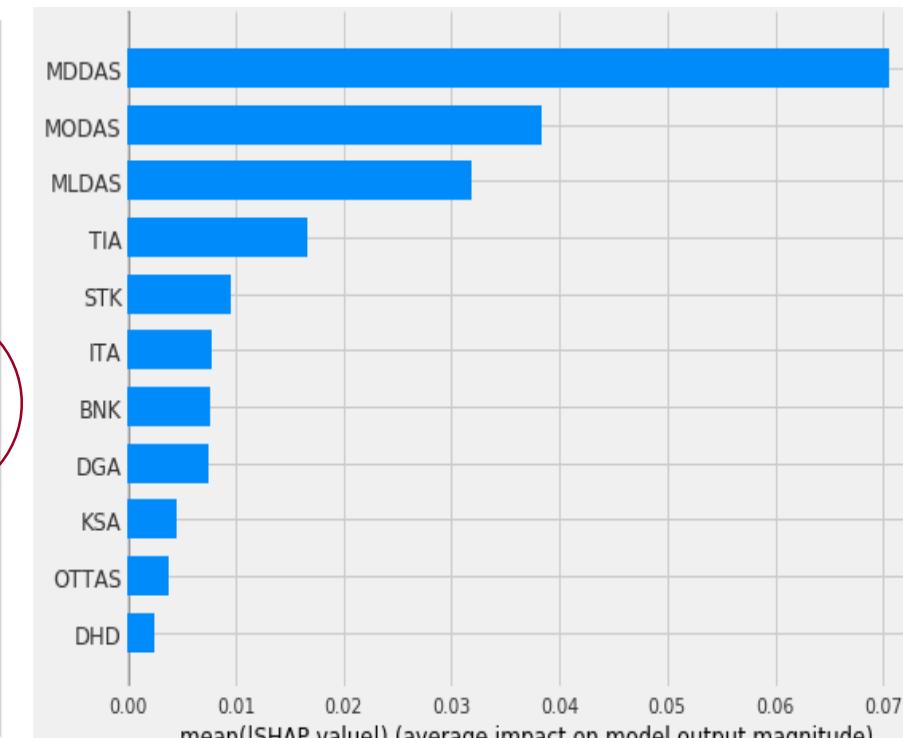
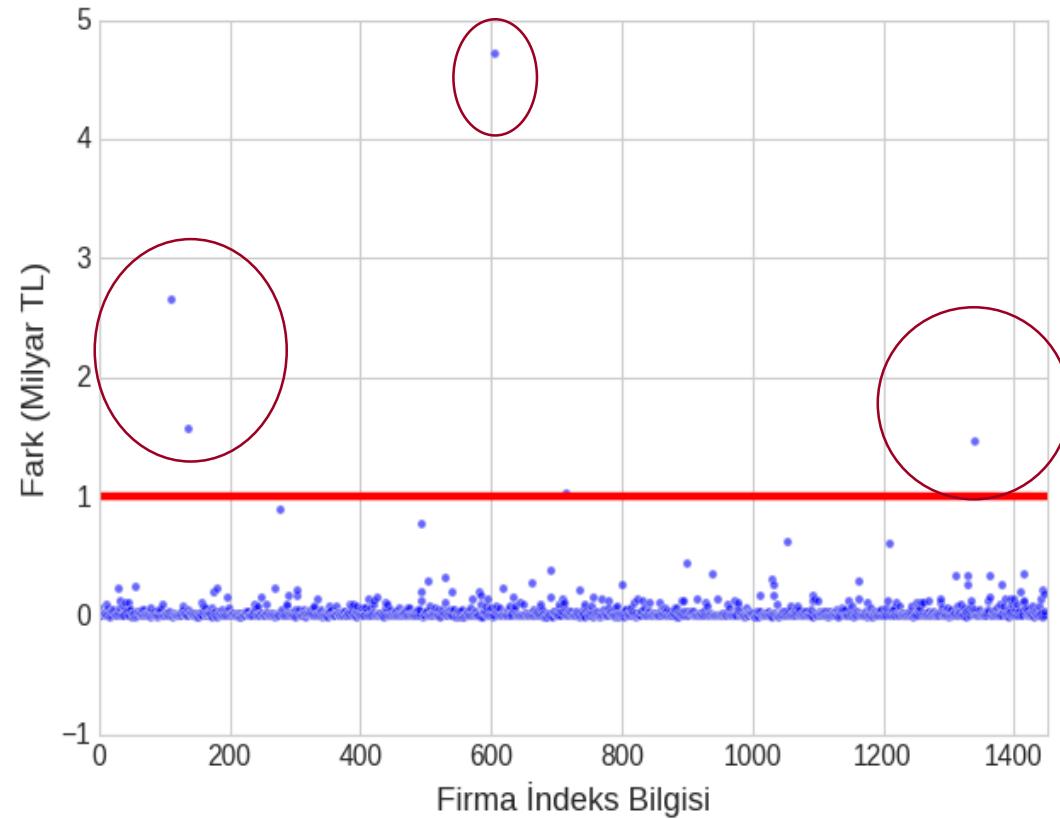
Cash Flow Analysis

Firm and sector level cash flow analysis

Cash flow analysis for an sector example



Anomaly detection for loan data with machine learning techniques



- ❑ Another areas that CBRT use this real time data system is to monitor risk analysis and export performance to help efficient allocation of credits. We can see all relevant information of the companies on the same screen from their own probability of default to their customers' weighted probability of default. One can also see asset size, profitability, own funds, current loans, default situation and the variables that affect the probability of default for this specific company from both financial statements and credit usage side. From micro level to macro, we can also aggregate the figures to the sector level. .
- ❑ Export performance surveillance system has all relevant information for the single exporter company on the same screen; the credit risk level, risk group, current credit, spot FX transaction, current balance sheet information, current export and import information.
- ❑ The companies can be scored related to the export performances with real time integrated data. Each ratios and calculations are updated with the updating data in the big data platform. This system is very useful particularly for surveillance of efficient credit allocation to exporter companies having better performance.

Company Name

Company ID

İmalat

Büyük

C

2651

Visualization of Risk Assessment



Firma Adı

Company name

Vergino

Company ID

İhracatçı Potansiyeli Sıralaması

Export rank

Ana Sektör

Sector

İkili Sektör Kodu 29

Yıl

2019

Export performance surveillance system and effective loan allocation



Eximbank Kredisi Bulunmaktadır.

