



# **Takasbank Credit Risk Stress Tests for CCP Markets**

**Central Counterparty Department**



# Agenda

- Introduction
- Takasbank- CCP Risk Stress Tests
- Takasbank Default Management Resources
- Regulation on Risk Stress Testing
  - Local Legislation
  - International Principles
    - CPMI-IOSCO
- Takasbank Stress Testing Model
- Stress Testing Results (**2019-1**)

# Introduction

- Stress Testing, is defined as all the methods employed to evaluate the fragility of a portfolio, financial institution or the financial system under shocks and extraordinary market conditions.
- Stress tests reflect the change in market price, the shifts in the yield curve and the sudden changes that may occur in the yield and shape of this curve; the conditions whereby the assumptions made in order to measure the risk lose their validity; the extreme movements experienced in the past, the effects of the crisis likely to prevail in the past and in the future and also the analysis to be made includes all financial tools and portfolios.

# Takasbank- CCP Stress Tests

- The stress tests, in the CCP services, are used to test the adequacy of the financial resources comprising of collaterals, guarantee fund contributions and other financial resources **under extreme market conditions**.
- In this framework, Takasbank has adopted the adequacy criteria under the base-case historical scenario that the ability of the margin requirements deposited by the members and the guarantee fund contributions and the capital amount allocated by Takasbank should meet the fund requirements in the event of **default of two members with the highest risks in the market**.
- **Historical base scenario** in identifying the extreme market conditions describes the scenarios based on statistical time series which represent market conditions that might happen under a higher confidence level than the one used in initial margin calculations.

# Takasbank Default Management Resources

- In case of any default in the markets to which the CCP service is provided, the resources are as follows:

1	• Initial margin of member in default
2	• Default fund contribution of the member in default
3	• Dedicated capital of Takasbank for covered risks in accordance with Article No:39
4	• Default fund contributions of non-defaulting members
5	• Commitment from remaining capital of Takasbank
6	• Additional default fund contributions of non-defaulting members

- The resources in the first 5 lines are classified as the **funded** resources which will be used immediately in case of any default and it is aimed to meet the margin requirement firstly with these resources in case of default of the largest two members with the highest exposure.
- The additional guarantee fund contribution to be requested from non-defaulted members constitute the **non-funded** default management resources.

# Local Regulation and International Regulation on Stress Testing



- Pursuant to **Article 40** of the Central Counterparty Regulation, Takasbank is obliged to;
  - Confirm the adequacy of the collaterals in the markets to which the CCP service is provided, the guarantee fund contributions and the resources it allocates and commits from its capital through stress tests,
  - Report the stress testing results quarterly to the Board of Directors and to the Capital Markets Board.
- In the CPMI-IOSCO's document of Principles for Financial Infrastructure Institutions,
  - Pursuant to the Principle No. 4.4, Central Counterparties,
    - Are obliged to demonstrate whether they can meet or not the possible losses with its **financial resources** in case that the **two members with the largest exposure** have defaulted **under rare but possible extraordinary stress conditions**.

# Takasbank Stress Testing Model 1/3

- Stress testing is based on the **uncovered risk** amounts to which the members are exposed under extreme market conditions.
- Theoretically, in identification of extreme market conditions, *statistical time series based historical scenarios* which represent the market movements that may occur under a higher confidence level than the one employed in calculation of the initial margin and *historical event scenarios* which are based on the past crisis experience are utilized.

# Takasbank Stress Testing Model 2/3

## I. Base Scenarios:

- In the base scenarios used for stress testing in the Derivatives Market and Securities Lending Market to which the CCP service is provided, the extreme market conditions are depicted by the volatility calculated statistically with the past 5 years' historical data at 99.90% confidence level. Holding periods are applied as 3 days for the Derivatives Market, 2 days for the Securities Lending Market, Borsa İstanbul Money Market and Borsa İstanbul Cash Equity.
- In the base scenarios, related parameters are applied via the Historical Simulation Value at Risk Method.
- It is observed whether total risk exposure of the two members with the highest exposure which is calculated on daily basis under stress conditions is met by the default management resources of Takasbank in case of any default.



# Takasbank Stress Testing Model 3/3

## II. Historical Event Scenarios :

- In the historical event scenarios applied in the stress testing for Derivatives Market, Securities Lending Market and Cash Equity, the highest percentage changes occurred in the stock exchange index and TRY/USD exchange between 2001 February and 2008 October have been used.
- The historical event scenarios, different from the base scenario, have been applied only to the positions as of the last days of the months in the analysis period and the assumed resource requirement arising from the default of the two members with the highest risk exposure is compared with the default management resources .



# **Credit Risk Stress Tests**

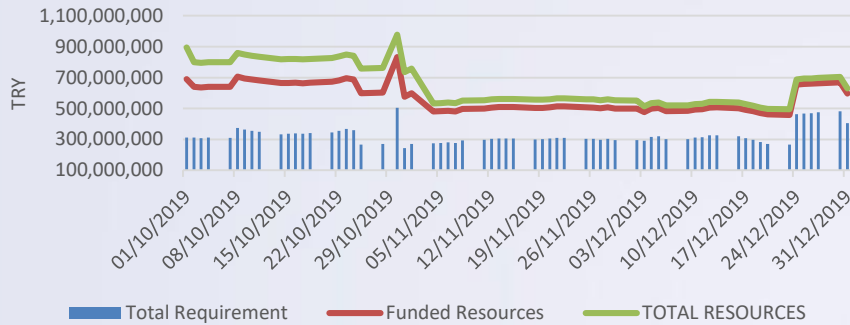
## **November-December 2019**



# Stress Tests Results

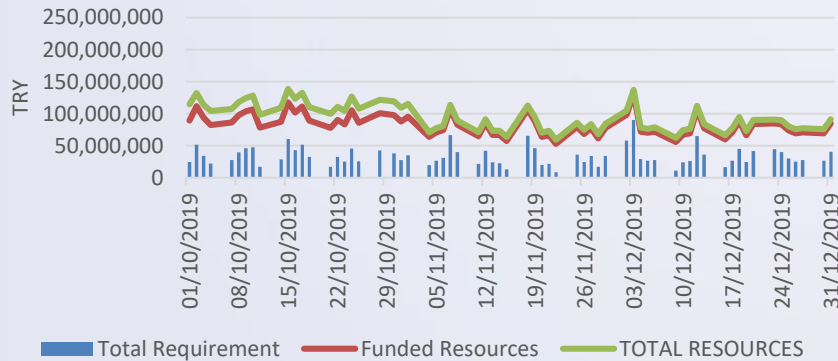
## 1.Base Scenario Stress Testing Results:

Stress Test Results: Derivatives Market



Default Management Resources	
	DER
Initial margin of member in default	293,501,192
Default fund contribution of the member in default	13,439,095
Dedicated capital of Takasbank for covered risks in accordance with Article No:39	57,264,000
Default fund contributions of non-defaulting members	84,237,174
Commitment from remaining capital of Takasbank	121,022,000
<b>Funded Resources (I)</b>	<b>569,463,461</b>
Additional default fund contributions of non-defaulting members	84,237,174
<b>Non-funded Resources (II)</b>	<b>84,237,174</b>
<b>Total Resources( I+II )</b>	<b>653,700,635</b>
<b>Average Requirement</b>	<b>326,271,735</b>

Stress Test Results: Equity Market

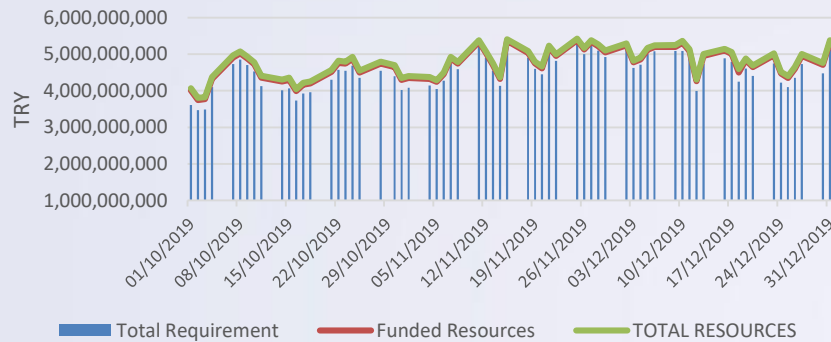


Default Management Resources	
	Equity
Initial margin of member in default	31,070,454
Default fund contribution of the member in default	1,072,477
Dedicated capital of Takasbank for covered risks in accordance with Article	12,526,000
Default fund contributions of non-defaulting members	11,755,404
Commitment from remaining capital of Takasbank	26,474,000
<b>Funded Resources (I)</b>	<b>82,898,335</b>
Additional default fund contributions of non-defaulting members	11,755,404
<b>Non-funded Resources (II)</b>	<b>11,755,404</b>
<b>Total Resources( I+II )</b>	<b>94,653,739</b>
<b>Average Requirement</b>	<b>34,152,605</b>

# Stress Tests Results

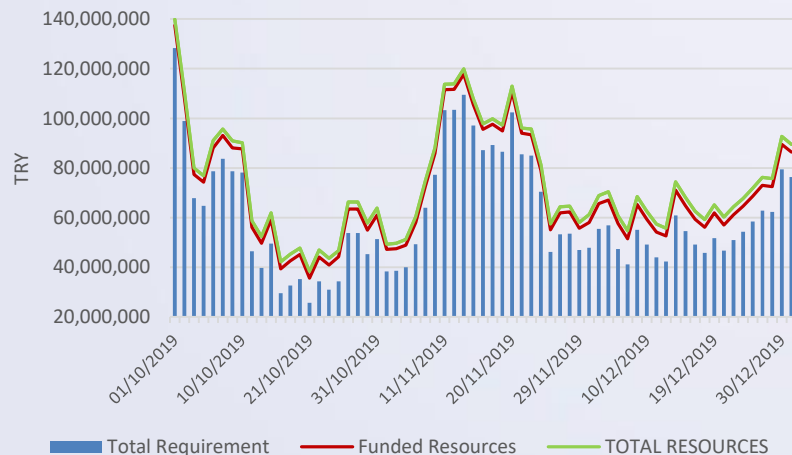
## 1.Base Scenario Stress Testing Results:

Stress Test Results: Fixed Income



Default Management Resources	
	Fixed Income
Initial margin of member in default	4,224,827,097
Default fund contribution of the member in default	242,885,278
Dedicated capital of Takasbank for covered risks in accordance with	68,001,000
Default fund contributions of non-defaulting members	51,773,719
Commitment from remaining capital of Takasbank	143,714,000
<b>Funded Resources (I)</b>	<b>4,731,201,094</b>
Additional default fund contributions of non-defaulting members	51,773,719
<b>Non-funded Resources (II)</b>	<b>51,773,719</b>
<b>Total Resources( I+II )</b>	<b>4,782,974,813</b>
<b>Average Requirement</b>	<b>4,538,065,417</b>

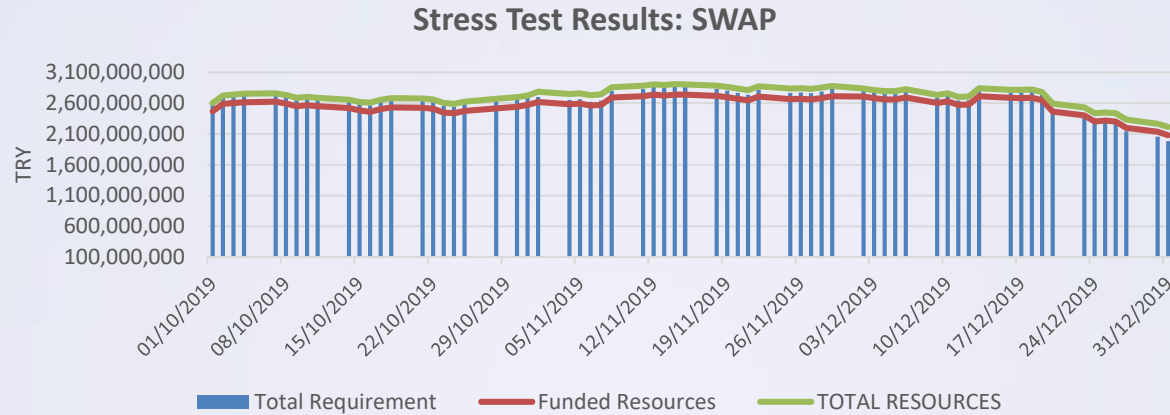
Stress Test Results: Securities Lending Market



Default Management Resources	
	Securities Lending Market
Initial margin of member in default	60,418,280
Default fund contribution of the member in default	1,705,508
Dedicated capital of Takasbank for covered risks in accordance with Article No:39	1,789,000
Default fund contributions of non-defaulting members	2,732,015
Commitment from remaining capital of Takasbank	3,782,000
<b>Funded Resources (I)</b>	<b>70,426,803</b>
Additional default fund contributions of non-defaulting members	2,732,015
<b>Non-funded Resources (II)</b>	<b>2,732,015</b>
<b>Total Resources( I+II )</b>	<b>73,158,819</b>
<b>Average Requirement</b>	<b>60,940,862</b>

# Stress Tests Results

## 1.Base Scenario Stress Testing Results:

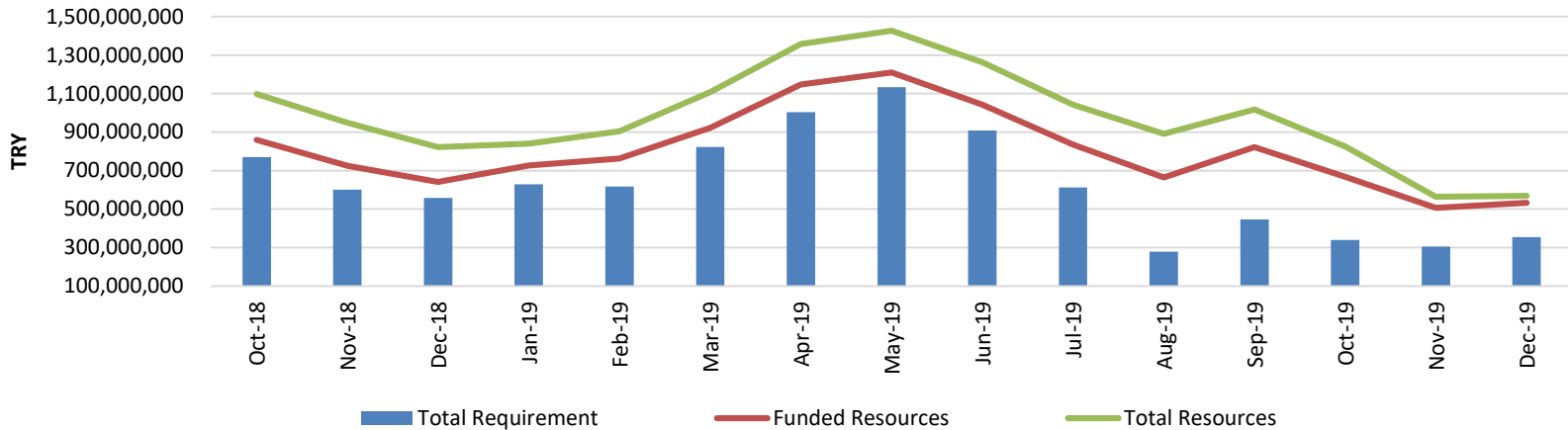


Default Management Resources	
	SWAP
Initial margin of member in default	1,976,912,516
Default fund contribution of the member in default	328,069,979
Dedicated capital of Takasbank for covered risks in accordance with	38,564,000
Default fund contributions of non-defaulting members	147,593,025
Commitment from remaining capital of Takasbank	81,501,000
Funded Resources (I)	2,572,640,521
Additional default fund contributions of non-defaulting members	147,593,025
Non-funded Resources (II)	147,593,025
Total Resources( I+II )	2,720,233,546
Average Requirement	2,668,831,897

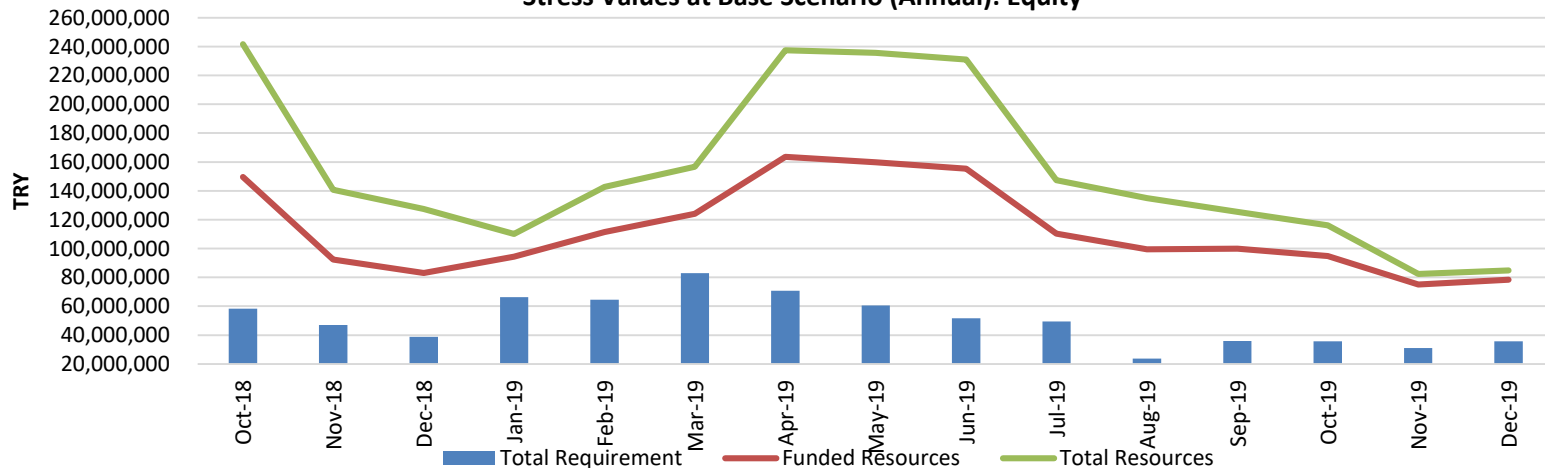
# Stress Tests Results

## 2. Historical Event Scenarios Stress Testing Results:

Stress Values at Base Scenario (Annual): Derivatives Market



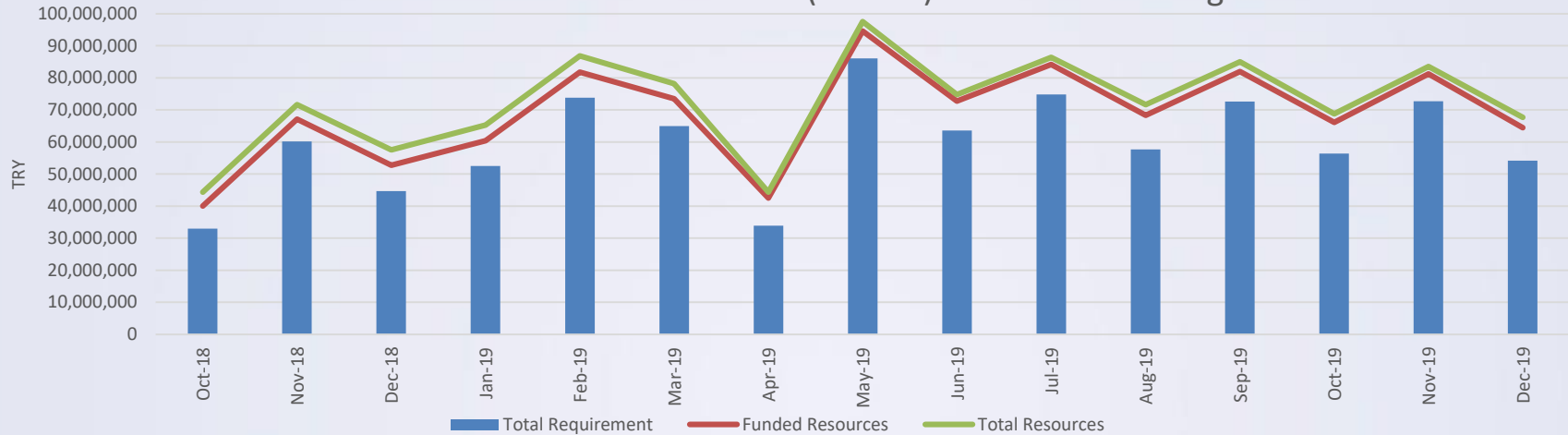
Stress Values at Base Scenario (Annual): Equity



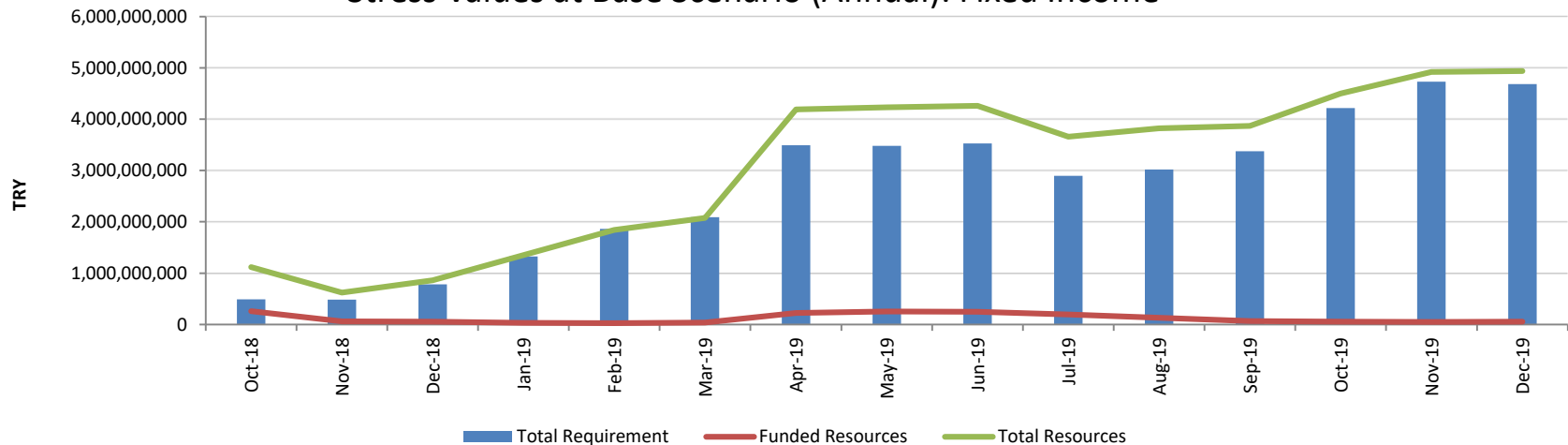
# Stress Tests Results

## 2. Historical Event Scenarios Stress Testing Results:

Stress Values at Base Scenario (Annual): Securities Lending Market



Stress Values at Base Scenario (Annual): Fixed Income



# Stress Testing Results

## 3. Reverse Stress Test Results :

Number of Members Covered by Default Waterfall

Number of Members Covered by Default Waterfall (Exc.  
Additional DF Requirement)

Market	Derivatives	Equity	SLM	FI	SWAP		Derivatives	Equity	SLM	FI	SWAP
2001 Crises	1	2	5	-	1		1	1	4	-	1
2008 Crises	2	2	6	-	1		1	2	5	-	1
Base Scenario	2	2	5	1	1		1	2	4	1	1



# Sensitivity Analysis

MARKET	Total Resources	Total Requirement	Adequacy Ratio	Total Requirement with Uncovered Risks	Adequacy Ratio With Uncovered Risks
Derivatives	629,434,195.00	377,260,997.00	167%	405,469,847.00	155%
Equity	91,305,391.00	38,720,305.00	236%	40,764,396.00	224%
SLM	89,559,240.00	75,693,240.00	118%	76,350,035.00	117%
Fixed Income	5,376,568,599.00	4,848,283,071.00	111%	5,123,064,745.00	105%
SWAP	2,212,444,027.35	1,467,360,167.35	151%	1,980,936,225.92	112%

□ The effect of 40 bp increase in confidence levels for Derivatives, Equity, Fixed Income and Securities Lending Market together with 50 bp in Swap Market have been analyzed in the context of sensitivity analysis. Total requirements of first 2 members with highest risks are compared with total resources by taking the uncovered risks into account. These adequacy controls are conducted by the end of each quarter.



# Thanks



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