

# FSA Analytical Notes

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May 2025



# Attempt to effectively utilize text data by applying AI technologies

## (Summary)

**This paper applies AI technologies, including large language models (LLMs), to analyze textual data from financial institutions' disclosure publications. By extracting texts related to designated themes from large volumes of text, the analysis identifies institution-type-specific characteristics and time-series trends. Focusing on real estate and housing loans, the results reveal that key terms and descriptive patterns differ across institution types. The proposed approach is expected to offer more efficient information gathering and the early detection of emerging signals. Future efforts will continue to incorporate text data analysis into monitoring frameworks, while carefully considering the specific risks associated with AI.**

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## I. Introduction

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In recent years, the rapid advancement of AI technologies—particularly in the field of text analysis—has accelerated the development and widespread application of natural language processing tools. The FSA has been working to enhance data utilization to better understand the management conditions of individual financial institutions, vulnerabilities and resilience of the financial system, and broader market trends. Such insights can be drawn not only from quantitative data—such as loan-level data and equity transaction data—but also from unstructured text data, including various reports and publications related to financial services. Leveraging AI for text analysis is expected to enhance the effectiveness of information gathering and facilitate the identification of new analytical perspectives, thereby strengthening FSA's monitoring capabilities.

This paper attempts to apply text analysis techniques, including large language models (LLMs<sup>1</sup>; see Box 1), to extract and analyze targeted information from financial institutions' disclosure publications<sup>2</sup>. Specifically, the analysis focuses on identifying institution-type-specific characteristics and tracking time-series trends in descriptions related to selected themes using LLM-based methods.

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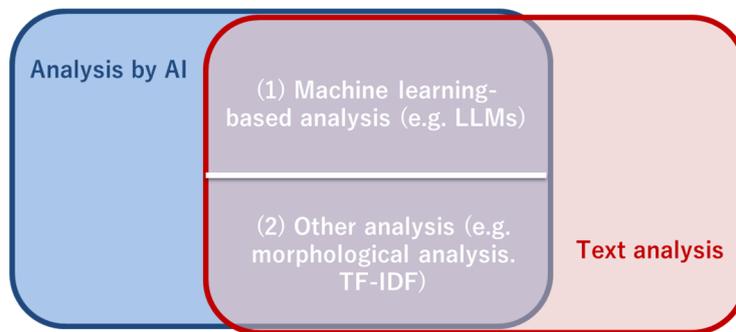
<sup>1</sup> LLM is natural language processing models built using deep learning techniques trained on large volumes of text data.

<sup>2</sup> In this paper, "disclosure publications" refer to the sections of annual reports and integrated reports that describe business activities and related information, excluding detailed financial data (e.g., "Data Section") and accompanying technical notes. When both types of documents are published, the integrated report is used in principle.

**BOX 1: Classification of text analysis**

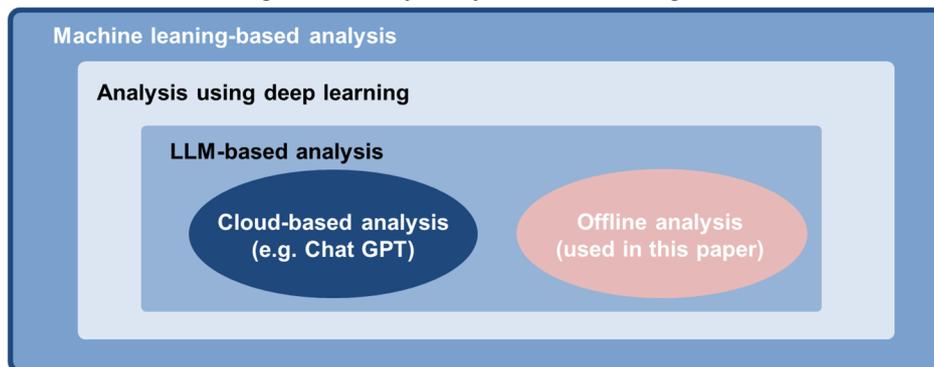
This paper categorizes AI-based text analysis into two approaches: (1) machine learning-based analysis and (2) rule-based analysis without machine learning (Figure 1). The former involves training data to build models, while the latter relies primarily on predefined rules and formulas. Both approaches are utilized in this paper. For (1), large language models (LLMs) are applied; for (2), morphological analysis—breaking down text into individual words—and TF-IDF<sup>3</sup> (Term Frequency–Inverse Document Frequency) are used to evaluate the importance of terms.

Figure 1: Classification of text analysis



Within machine learning-based text analysis, approaches using deep learning are often distinguished from other machine learning methods. Among deep learning techniques, analyses using LLMs—which are trained on vast amounts of text data—can be considered a separate category. LLM-based analysis has recently evolved into two main approaches: cloud-based analysis using services such as ChatGPT, and offline analysis using publicly available AI models (Figure 2). This paper employs the latter, conducting LLM-based analysis in an offline environment.

Figure 2: Analysis by machine learning



<sup>3</sup> "TF-IDF" is a commonly used metric for evaluating the importance of individual words within a document (see Box 2 for details).

## II. Text analysis on disclosure publications

Although disclosure publications are required to include certain items under the legislation, their formats are not standardized like securities reports, and vary across financial institutions. As a result, rule-based analysis alone is insufficient to comprehensively extract information on specific themes or to conduct cross-institutional comparisons. In contrast, advanced AI models such as LLMs are capable of interpreting unstructured and non-standardized texts, making it possible to perform meaningful analysis even in the absence of uniform formatting.

Sub-section 1 outlines the process used in this study to analyze disclosure publications using AI. Sub-section 2 presents the results of an analysis—focused on the theme of “real estate and housing loans”—conducted on five years of disclosure publications<sup>4</sup> (fiscal years 2019 to 2023, covering publication years 2020 to 2024) from major banks, regional banks, and others (internet only banks)<sup>5</sup>.

### 1. Process of text analysis using AI

Figure 3 illustrates the text analysis process employed in this paper. First, text data from disclosure publications are collected. Then, using LLMs, each sentence is classified based on whether it is relevant to a selected theme (Figure 4). Sentences identified as relevant are extracted and then term frequency analysis is conducted using TF-IDF (see Box 2), ranking the most salient keywords. In addition, LLMs are used to evaluate changes in content, such as year-over-year comparisons. This process enables identification of institution-specific keywords associated with the selected theme, tracking their evolution over time, and assessing whether textual descriptions have become more detailed or comprehensive compared to the previous year.

To mitigate risks such as hallucinations—i.e., the generation of inaccurate or unfounded information—the LLMs' classification decisions and content evaluations are accompanied by explanation outputs, which are then reviewed and corrected by human analysts as necessary.

<sup>4</sup> Disclosure publications available on each financial institution's website as of January 2025 were used as the analysis target.

<sup>5</sup> The analysis covers banks and banking groups that publish disclosure publications. In this paper, “major banks” refer to Mizuho Financial Group, Mitsubishi UFJ Financial Group, Sumitomo Mitsui Financial Group, Resona Holdings, Sumitomo Mitsui Trust Group, SBI Shinsei Bank, and Aozora Bank. “Regional banks” refer to banks and groups that are members of the Regional Banks Association of Japan and the Second Association of Regional Banks. “Others (internet only banks)” include PayPay Bank, Seven Bank, Sony Bank, Rakuten Bank, SBI Sumishin Net Bank, au Jibun Bank, AEON Bank, Daiwa Next Bank, Lawson Bank, and GMO Aozora Net Bank.

Figure 3: Test analysis process using LLMs developed in this paper

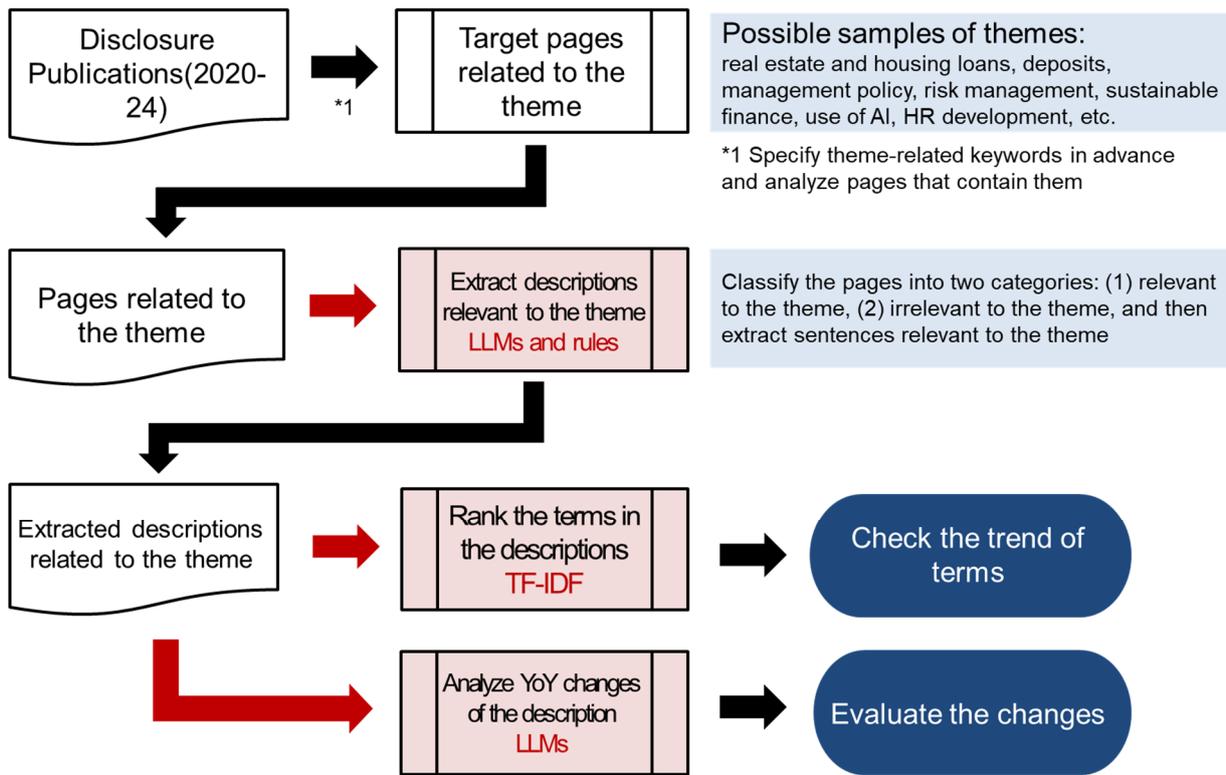


Figure 4: Category classification by LLMs

Categories	Rationale	Samples of the rationale provided by LLMs (cases where “real estate and housing loans” is selected for the theme)
Relevant to the theme	Description directly related to the theme or sentences which include words relevant to the theme	An apartment loan is a type of real estate financing that can be used when purchasing or constructing an apartment or condominium for investment purposes or for purposes other than personal residence.
Irrelevant to the Theme	Description Irrelevant or only have indirect relation with the theme	The description does not directly refer to real estate financing or housing loans, but rather focuses on XX.

**BOX 2: TF-IDF**

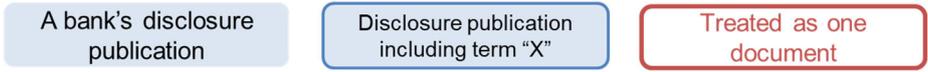
TF-IDF (Term Frequency – Inverse Document Frequency) is a commonly used metric for assessing the importance of individual words within a document. It is calculated by multiplying the term frequency (TF) and the term rarity (IDF). Term frequency is computed by dividing the number of times a specific word appears by the total number of words in the document. Term rarity reflects how rare a word is across a set of documents, with higher values assigned to words that appear infrequently in other documents. Words with high TF-IDF scores are considered to be key terms that characterize the document (Figure 5).

Figure 5: Calculation method of TF-IDF

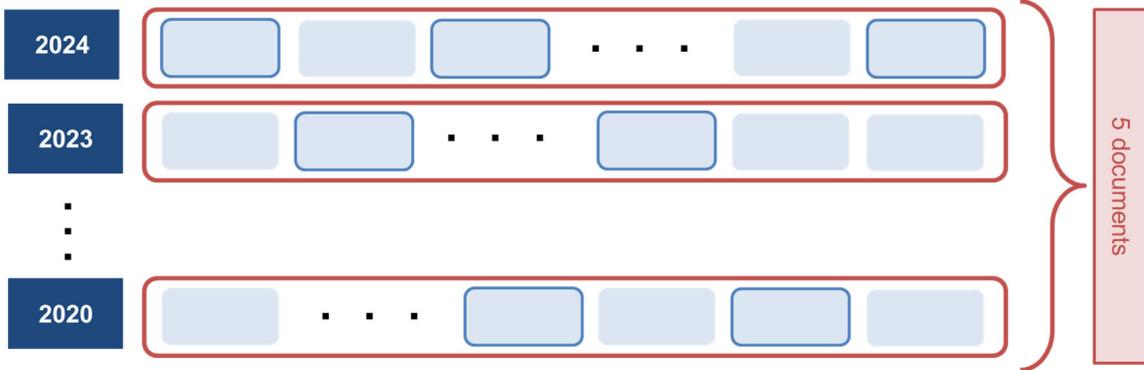
$$\begin{aligned}
 & \text{TF} \times \text{IDF} = \text{Term frequency} \times \text{Term rarity} \\
 & \text{Term frequency} \\
 & \text{TF} = \frac{\text{How many times term "X" appears in document A}}{\text{Number of all words appears in text A}} \\
 & \text{Term rarity} \\
 & \text{IDF} = \ln\left(\frac{\text{Number of all documents}}{\text{Number of documents including term "X"}}\right) + 1
 \end{aligned}$$

For the TF-IDF calculation in this paper, specific adjustments were made to the unit of analysis, as shown in Figure 6, to enable year-by-year comparisons (2020–2024) of key terms by bank or banking group. This approach avoids aggregating disclosure content at the annual level, which would otherwise cause the IDF values of many terms to reach their minimum across all years—thus limiting the influence of IDF in the evaluation. Additionally, only nouns were included in the TF-IDF calculation, with other types of words excluded.

Figure 6: Adjustment made in this paper on calculation of IDF

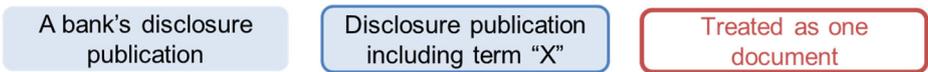


**Unit of analysis (Normal case)**

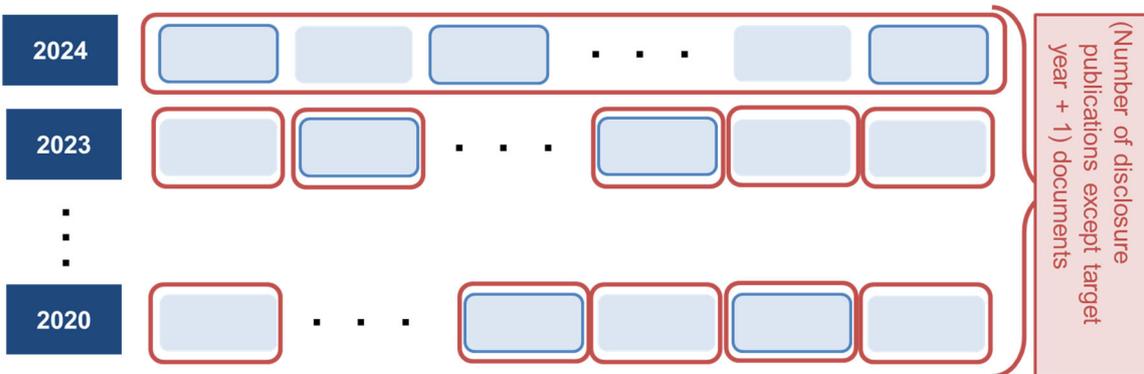


In this case, if term "X" is included in at least one of the disclosure publications in each year, then IDF will reach its minimum, i.e.,  $IDF = \ln\left(\frac{5}{5}\right) + 1 = 1$

It is highly likely for term "X" to appear in at least one of the disclosure documents in a year, thus analysis cannot effectively grasp IDF (term rarity).



**Adjustment made in this paper**



Calculation of 2024 IDF for term "X" of 2024:  $\ln\left(\frac{\text{Number of disclosure publications except 2024}+1}{\text{Number of documents including term "X"}}\right) + 1 \geq 1$

This calculation enables IDF to have variance among each term.

## 2. Analysis on the theme of “real estate and housing loans”

This chapter presents an example analysis focused on the theme of “real estate and housing loans” by using disclosure publications of major banks, regional banks, and others (internet only bank). The theme was selected as it is the topic addressed across institution types and with consistent coverage in disclosure publications.

Figure 7 summarizes the results of a TF-IDF-based analysis conducted on text extracted from disclosure publications related to this theme, aggregated by institution type. Among major banks, the term “real estate” consistently ranks high, and terms such as “finance” also appear prominently, reflecting a notable volume of text related to structured and real estate finance. In addition, The term “corporate” appears within the top 10 rankings in all years except 2021. In regional banks, “housing loan” ranks higher than in major banks, and “risk” has been the top-ranked term over the past three years. For others (internet only banks), “housing loan” was the highest-ranked term through 2023, with other frequently appearing terms including “service” and “launch.” In 2024, however, terms such as “exposure” and “credit risk” emerged in the rankings.

Additionally, in 2024, environment-related terms such as “emission,” “environment,” and “carbon” appeared in the top 10 rankings for both major and regional banks. This likely reflects the growing number of references to environmentally conscious housing loans, suggesting a rising awareness of sustainability even in the context of real estate and housing loans.

Figure 7: List of TF-IDF on “real estate and housing lonas” by industry type

	real estate/finance
	housing loan
	risk/exposure
	environment/sustainability

\*Note that the terms are derived from an analysis of the original Japanese text and then translated directly into English, the nuances may differ from those of original Japanese.

### Major banks

	2020	2021	2022	2023	2024
1	real estate	real estate	real estate	real estate	real estate
2	trust	finance	finance	sector	risk
3	finance	asset	risk	finance	sector
4	asset	trust	corporate	value	finance
5	relevance	risk	ESG	emission	business
6	risk	management	environment	creation	value
7	provision	corporate	initiative	risk	environment
8	business	housing loan	profit	business	creation
9	management	business	individual	investment	corporate
10	corporate	individual	business	zero	emission

### Regional banks

	2020	2021	2022	2023	2024
1	exposure	housing loan	risk	risk	risk
2	housing loan	launch	housing loan	group	result
3	trust	balance	balance	scenario	increase
4	balance	support	group	increase	group
5	group	group	service	housing loan	emission
6	support	exposure	support	balance	carbon
7	fund	fund	launch	real estate	sector
8	securitization	sales	exposure	support	value
9	lending	service	real estate	agent	support
10	real estate	risk	increase	service	balance

### Others (Internet only banks)

	2020	2021	2022	2023	2024
1	housing loan	housing loan	housing loan	housing loan	exposure
2	launch	launch	launch	launch	housing loan
3	service	service	service	service	method
4	balance	exceeding	exceeding	balance	real estate
5	guarantee	rating	account	account	credit risk
6	special agreement	consolidation	balance	exceeding	eligible
7	interest rate	balance	consolidation	non-consolidated	for retail
8	exceeding	interest rate	provisionlaunch	provisionlaunch	asset
9	use	account	interest rate	deposti	delinquency
10	repayment	center	rating	interest rate	application

Next, text related to “real estate and housing loans” extracted from each bank’s disclosure publication was analyzed using LLMs to compare descriptions from 2020 to 2024, by institution type. In this analysis, the LLMs were instructed to classify the nature of year-over-year changes as *positive*, *negative*, or *neutral*. It is important to note that these classifications reflect the LLMs’ interpretation of textual trends within the disclosure documents and do not necessarily correspond to the actual lending stance or performance of the institutions. A review of the reasoning behind the LLMs’ classifications suggests that the model makes holistic judgments. For example, an increase in loan balances may lead to a *positive* classification, while shifts in the volume of narrative content alone may also influence the assessment (Figure 8).

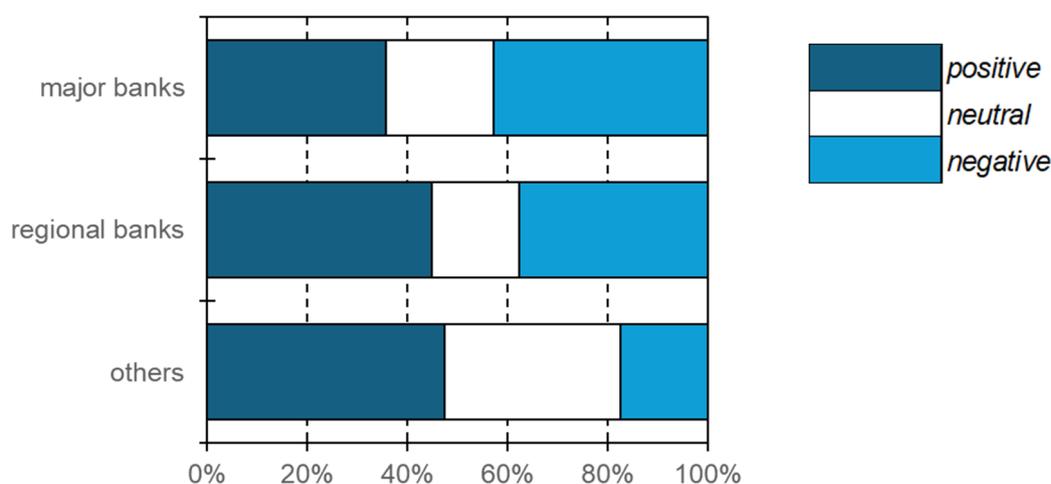
Figure 8: Reasoning of classification by LLMs

LLMs classification	Examples of rationale provided by LLMs
<i>positive</i>	The classification was based on the observation that the current year’s content indicates an increase in housing loan balances compared to the previous year. Specifically, the text notes that the housing loan balance exceeded [XX] yen, and that initiatives such as [XX] made housing loans more accessible to a greater number of customers.
<i>neutral</i>	The classification was based on the observation that both this year and last year contain similar core information such as [XX], along with additional details such as [XX], and no significant differences were identified.
<i>negative</i>	The classification was based on the limited coverage of real estate and housing loans in this year’s content. While last year’s publication included references to initiatives such as [XX], no such descriptions were found this year. Furthermore, the document states [XX], and no references to real estate or housing loan-related lending activities were identified.

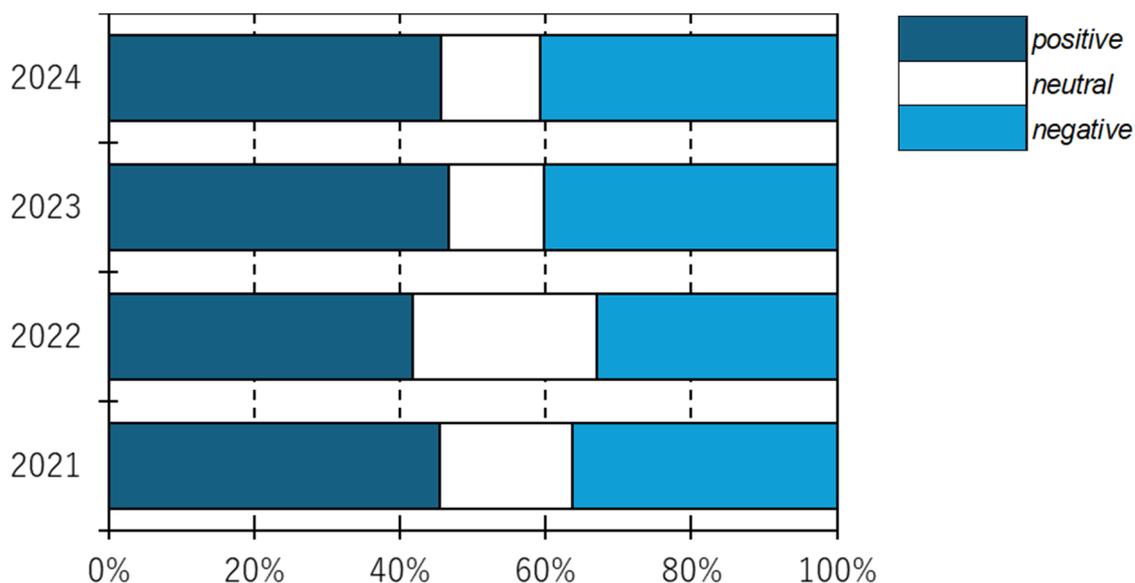
The analysis found that the institution type with the highest proportion of descriptions classified as *positive* was others (internet only banks), at approximately 48%. While others (internet only banks) also had a relatively high proportion of *neutral* compared to other institution types, this appears to be due to a number of disclosure publications containing little to no content related to the specified theme through years. The next highest was regional banks, with around 45% of descriptions classified as

*positive*. Major banks had the lowest proportion, at approximately 35%, although the share of descriptions classified as *negative* was not significantly higher (Figure 9). A review of the classification rationale shows that, for others (internet only banks), the main reasons cited were references to new services and increases in loan balances. For regional banks, increases in loan balances or the number of contracts were cited in approximately 50% of the cases. Major banks exhibited a wider variety of reasons, including factors such as portfolio shifts and management-related changes, which were rarely observed in other institution types.

Figure 9: LLM classification by industry type (5-year average)



Additionally, to assess the consistency between LLM-based classifications and actual data, a comparison was conducted for regional banks—the institution type with the largest number of financial institutions. Specifically, the year-over-year growth rates (arithmetic average of banks) of end-of-period balances for real estate and housing loans were examined against the LLM classifications (Figures 10 and 11). The results show that regional banks classified as *positive* by the LLMs exhibited higher year-over-year growth rates than those classified as *negative*, confirming certain consistency between the LLM assessments and the actual data.

Figure 10: Distribution of *positive/neutral/negative* for regional banksFigure 11: Growth rate of real estate and housing loan balance (YoY, arithmetic average of banks classified as *positive/negative*)

	2022	2023	2024
<i>positive</i>	4.42	4.17	4.40
<i>negative</i>	2.96	3.02	2.64

### III. Conclusion

This paper applied text analysis techniques, including LLMs, to disclosure publications in order to extract descriptions related to a specified theme from large volumes of text and to examine the appearance of characteristic terms and time-series changes in narrative content.

Focusing on the theme of “real estate and housing loans,” the TF-IDF analysis suggested that major banks frequently referenced terms such as “real estate,” “finance,” and “risk,” regional banks emphasized “housing loans” and “risk,” and others (internet only banks) primarily focused on “housing loans.” More recently, however, there has been an increasing emphasis on “sustainability,” and others (internet only banks) have begun to highlight “risk” as a key topic.

The LLM-based analysis of year-over-year changes in narrative content suggested that the

proportion of descriptions classified as *positive* was highest for others (internet only banks), followed by regional banks and then major banks. Disclosure publications classified as *positive* often included references to increased loan balances, growth in the number of customers, or initiatives that were well received by clients. Cross-checking these classifications with actual loan balance data confirmed their consistency with the LLMs' assessments.

These findings suggest that applying AI technologies to the analysis of text data—such as disclosure publications—can be effective in deepening understanding of specific themes. The analytical approach employed in this paper offers the potential to streamline the collection and interpretation of large volumes of unstructured text, which has traditionally required substantial time and human resources, thereby enhance the monitoring capabilities. At the same time, it is essential to be mindful of the specific risks associated with AI technologies such as LLMs, including limitations in model performance, prompt optimization, and model biases introduced during training. These factors can result in phenomena such as hallucination, where inaccurate or unfounded information is generated. To mitigate these risks, this analysis was designed to have the LLM output not only classification results but also the rationale behind its decisions, which were then reviewed and, if necessary, corrected by humans.

The FSA will continue efforts to advance the use of AI, including text data analysis, while managing its unique risks, with the aim of enhancing its monitoring capabilities.

# Current trends in deposits under the increasing interest rate environment

## (Summary)

**This report analyzes the current trends in deposit balances and deposit interest rates under the increasing interest rate environment. While overall deposit balances are increasing, differences in growth rates are observed depending on institution type and deposit type. A positive correlation between deposit yields—particularly those influenced by deposit campaigns—and deposit balance growth are observed. The FSA will continue to analyze deposit trends in a timely manner, while capturing macroeconomic trends such as the interest rate environment and demographic shifts.**

## I. Introduction

In response to the Bank of Japan's revision of its negative interest rate policy and subsequent increases in policy rates, yen deposit interest rates have recently been rising (Figure 1). As demographic trends and the competitive environment continue to evolve, it is important for the FSA to monitor, in a timely manner, how financial institutions are setting deposit interest rates and funding strategies in this phase of rising interest rates. Such monitoring is essential for informed dialogue with financial institutions regarding profitability and asset-liability management (ALM) practices.

As shown in Figures 2 and 3, while deposit balances are generally on an upward trend, closer examination by institution type<sup>1</sup> reveals that growth has been particularly notable among others (mainly includes online banks). Similarly, when viewed by deposit type<sup>2</sup>, demand and time deposits show divergent trends (Figure 4). These variations highlight the importance of analyzing deposit

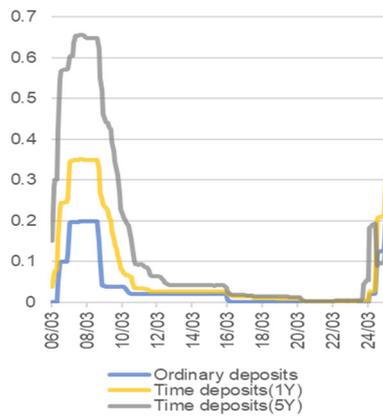
<sup>1</sup> "Major banks" in this report refers to 9 banks: Mizuho Bank, MUFG bank, SMBC, Sumitomo Mitsui Trust Bank, Resona Bank, Mizuho Trust & Banking, Mitsubishi UFJ Trust & Banking, Aozora Bank, and SBI Shinsei Bank. "Regional bank I" refers to Saitama Resona Bank and members of the Association of Regional Banks (62 banks). "Regional banks II" refers to members of the Second Association of Regional Banks (36 banks). Credit Associations (Shinkin banks) refers to members of the National Association of Shinkin Banks (254 associations). Credit Cooperatives (Shinkumi banks) refers to members of the National Central Society of Credit Cooperatives (143 cooperatives). "Others" (mainly including online banks) refers to PayPay Bank, Seven Bank, Sony Bank, Rakuten Bank, SBI Sumishin Net Bank, au Jibun Bank, AEON Bank, Daiwa Next Bank, Lawson Bank, Minna Bank, UI Bank, and GMO Aozora Net Bank (12 banks). ( ) indicates numbers of banks as of March 2025. In addition, "regional banks" refers to Regional bank I and Regional bank II. "Regional financial institution" refers to Regional banks, Shinkin banks and Shinkumi banks. Japan Post Bank are excluded from the scope of the analysis except Box 1.

<sup>2</sup> In this report, deposits are classified into two types: demand deposits and time and savings deposits. Demand deposits are the sum of current deposits, ordinary deposits, saving deposits, deposits at notice, special deposits, and deposits for tax payments. Time and savings deposits are the sum of time deposits, fixed savings, and installment savings. Nonresident yen deposits, and foreign currency deposits are excluded.

developments by institution type and deposit type.

The data<sup>3</sup> used in this analysis includes: branch-level deposit balances by depositor type (corporate/individual)<sup>4</sup> and deposit category (Dataset 1), posted interest rates by deposit type (Dataset 2), and financial statement data of financial institutions (Dataset 3).

Figure 1: Posted interest rate trends<sup>5</sup>



(Source) Bank of Japan

Figure 2: Share of deposits by institution type

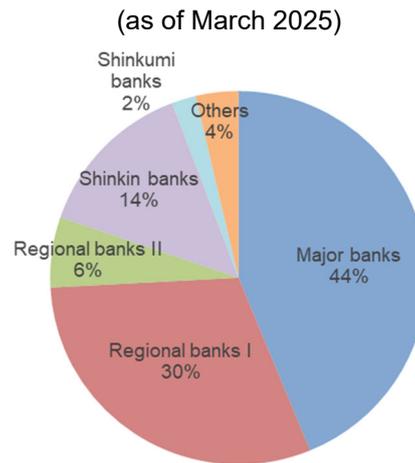


Figure 3: Growth of deposit balance

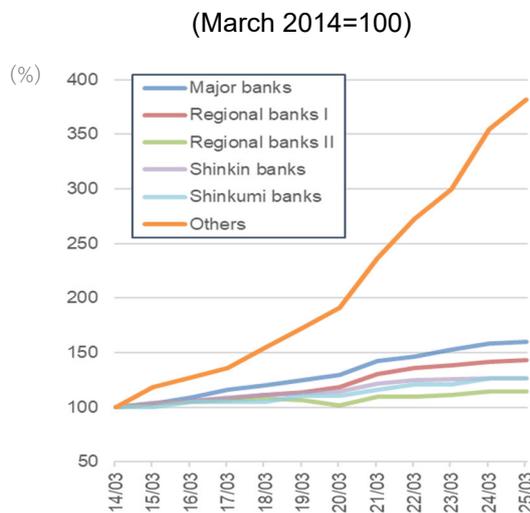
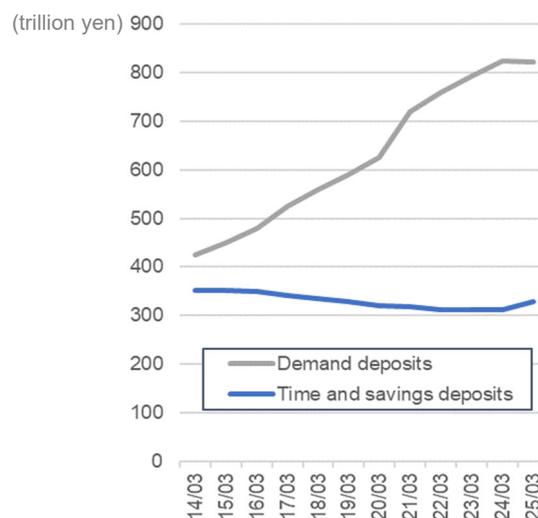


Figure 4: Deposit balances by deposit type



<sup>3</sup> Datasets 1 and 2 are based on data from the FSA. For Dataset 1, the institution types covered are listed in Footnote 1. Dataset 3 does not cover Shinkin banks and Shinkumi banks; as of the end of September 2024, this includes 63 banks in Regional banks I and 37 banks in Regional banks II. Dataset 2 uses "Nikkun Kinri Joho" (Interest Rate Information) published by The Japan Financial News Co., Ltd. Dataset 2 covers the institution types as defined in Footnote 1; however, it should be noted that the number of institutions covered differs by type—specifically, 106 Shinkin banks, 18 Shinkumi banks, and 7 Others.

<sup>4</sup> Public funds and financial institutions' deposits are excluded.

<sup>5</sup> Time deposits refer to deposits with amounts of 3 million yen or more but less than 10 million yen.

## II. Current trend in deposits

In this section, the growth rate of deposit balances<sup>6</sup> by institution type are analyzed by using Dataset 1 (sub-section 1). Next, trends in deposit interest rates during the phase of rising interest rates are examined by using Dataset 2 (sub-section 2).

### 1. Deposit balance growth

Figures 5 to 9 illustrate the distribution of growth rate of deposit balances from the end of September 2023 to the end of September 2024, by institution type, by deposit type and by depositor type. Although the overall growth rate in total deposit balances was +1.2%, certain institution types included many financial institutions with declining balances (Figure 5).

By depositor type, corporate deposits showed no significant skew in distribution for either demand or time deposits—some institutions experienced increases, while others experienced decreases, with a wide range of changes. Nonetheless, the total balance increased in both categories, with time deposits recording a substantial increase of +13.8% (Figures 6 and 7). For individual deposits, demand deposits increased at many institutions, resulting in an overall growth rate of +3.0%. In contrast, time deposits declined at many institutions, with an overall growth rate of -2.3% (Figures 8 and 9).

By institution type, major banks tended to show substantial increases in corporate deposits at many institutions, whereas individual deposits declined at a number of institutions. Among regional financial institutions, individual demand deposits increased, while individual time deposits declined. Others, which had a relatively high number of institutions with strong overall deposit growth, did not show notable differences across depositor or deposit types (Figures 5 to 9).

However, it is important to note that deposit characteristics vary by institution type. As of the end of September 2023, others held relatively small total deposit balances. For regional banks, shinkin banks, and shinkumi banks, the proportion of individual time deposits relative to total deposits was higher than that of other institution types (Figure 10).

<sup>6</sup> Impacts of the bank merger are also considered.

Figure 5: Distribution of deposit balance growth (All institution and deposit types, +1.2% in total)

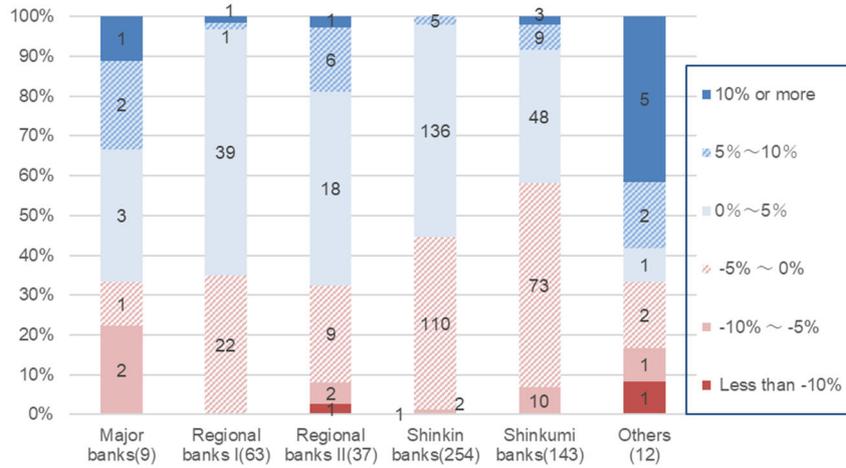


Figure 6: Distribution of deposit balance growth

(Corporate demand deposit, +1.2% in total)

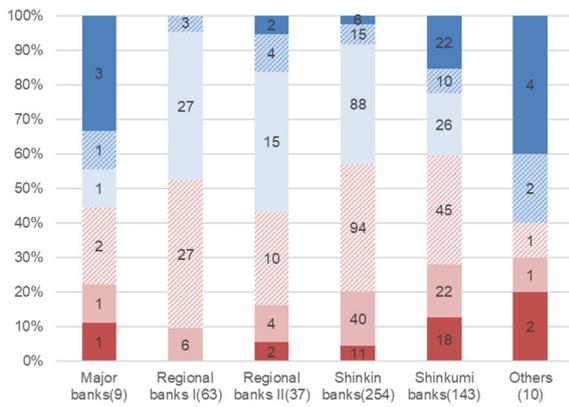


Figure 7: Distribution of deposit balance growth

(Corporate time deposit, +13.8% in total)

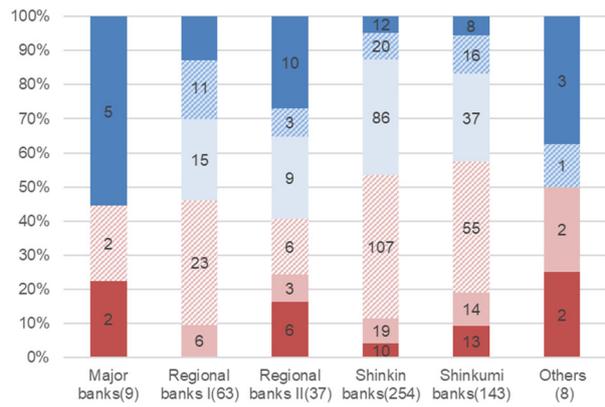


Figure 8: Distribution of deposit balance growth

(Individual demand deposit, +3.0% in total)

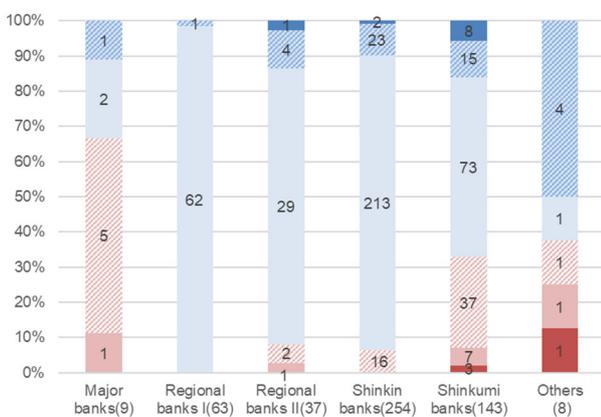


Figure 9: Distribution of deposit balance growth

(Individual time deposit, -2.3% in total)

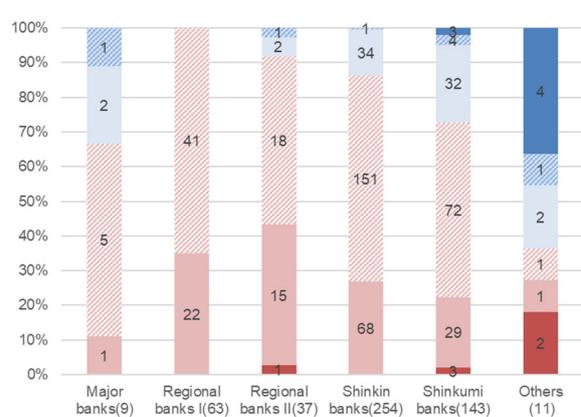
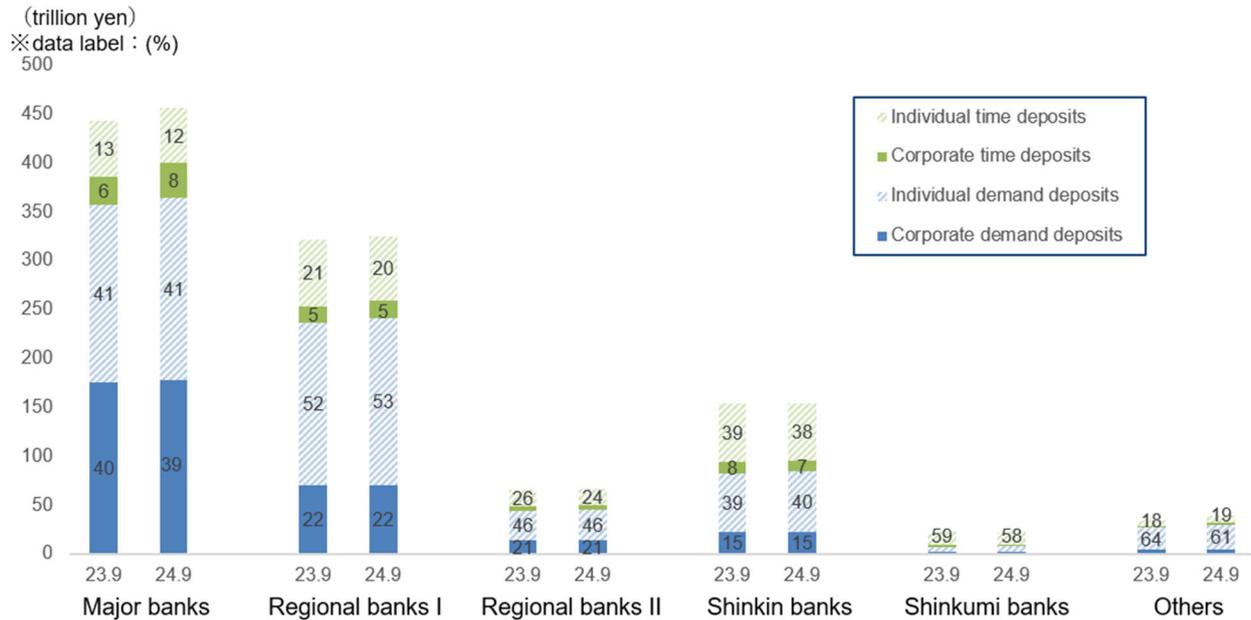


Figure 10: Deposit balance by institution type (figures on the bar graphs shows the proportion)



### BOX 1: Relationship between demographics and deposit balances

Deposit balances are considered to be influenced by the population in the regions where financial institutions operate. Figure 11 illustrates the relationship between population growth rates<sup>7</sup> and deposit balance growth rates by prefecture, based on branch-level deposit data for major banks, regional banks, shinkin banks, shinkumi banks, and also Japan Post Bank<sup>8</sup>.

The results show a general trend in which branches located in prefectures with higher population growth also experience higher deposit growth. Notably, Tokyo and Okinawa—both with high population growth—recorded significantly larger increases in deposit balances compared to other prefectures. Even in prefectures with negative population growth, deposit balances continued to grow, possibly reflecting the influence of elderly households, which tend to hold relatively larger deposit balances.

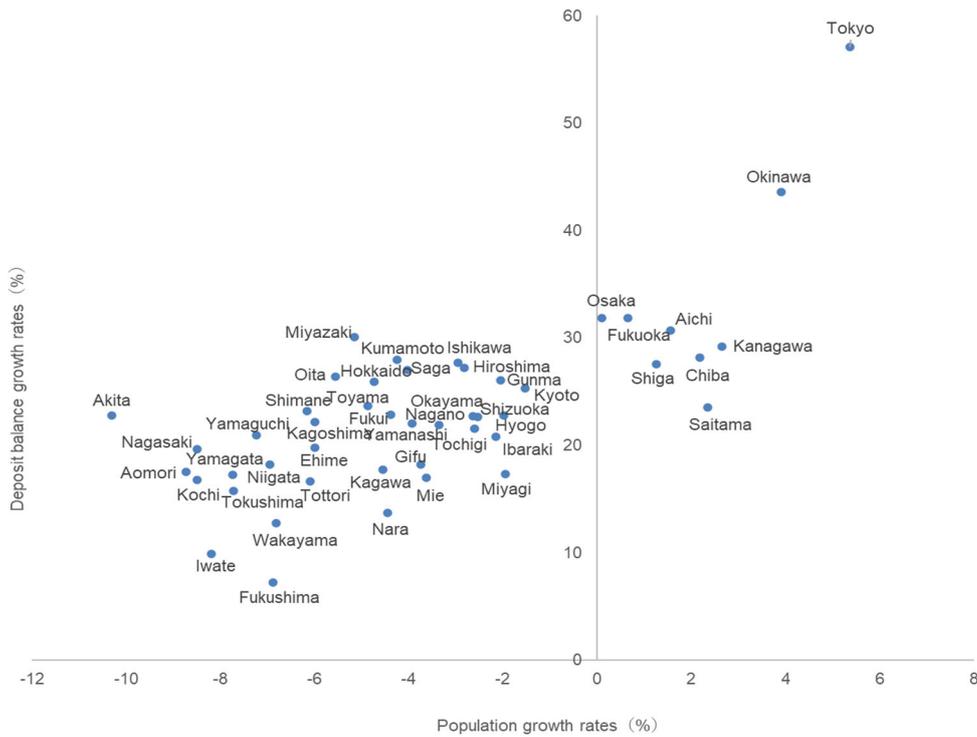
It is projected that by 2035, only Tokyo and Okinawa will maintain population levels comparable to those in 2025, while all other prefectures are expected to experience population declines (Figure

<sup>7</sup> To use census (conducted every five years), the analysis covers the nine-year period from the end of September 2015 to the end of September 2024. Population growth rates were calculated based on the population aged 15 and over in each prefecture. The population for September 2024 was estimated using linear interpolation between the figures for 2020 and 2025.

<sup>8</sup> Others (online banks) were excluded from the analysis, given that they generally do not have physical branches and have limited correlation with the depositor's place of residence.

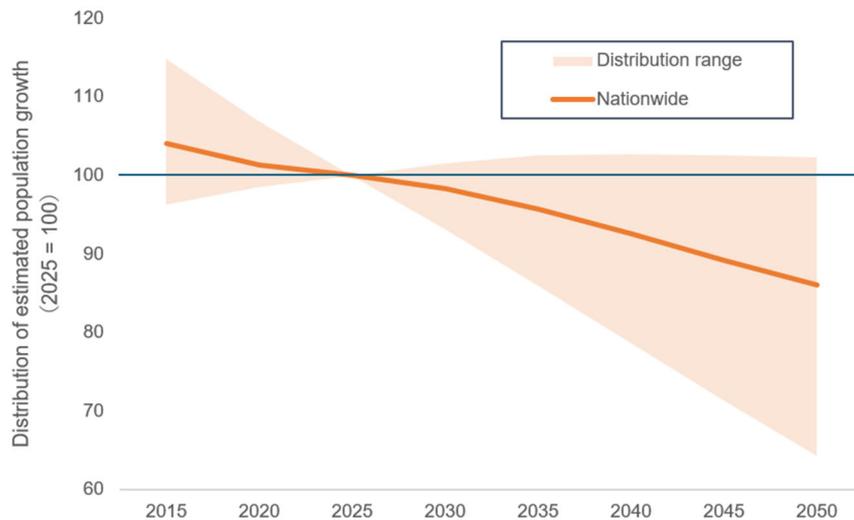
12). While projections should be made with caution as Figure 11 excludes others such as online banks, if the current relationship holds, these demographic trends are likely to exert downward pressure on deposit balances at the prefectural level.

Figure 11: Population growth and deposit balance growth by prefecture



(Source) MIC, National Institute of Population and Social Security Research

Figure 12: Distribution of estimated population growth by prefecture (Aged 15 years-old or elder)

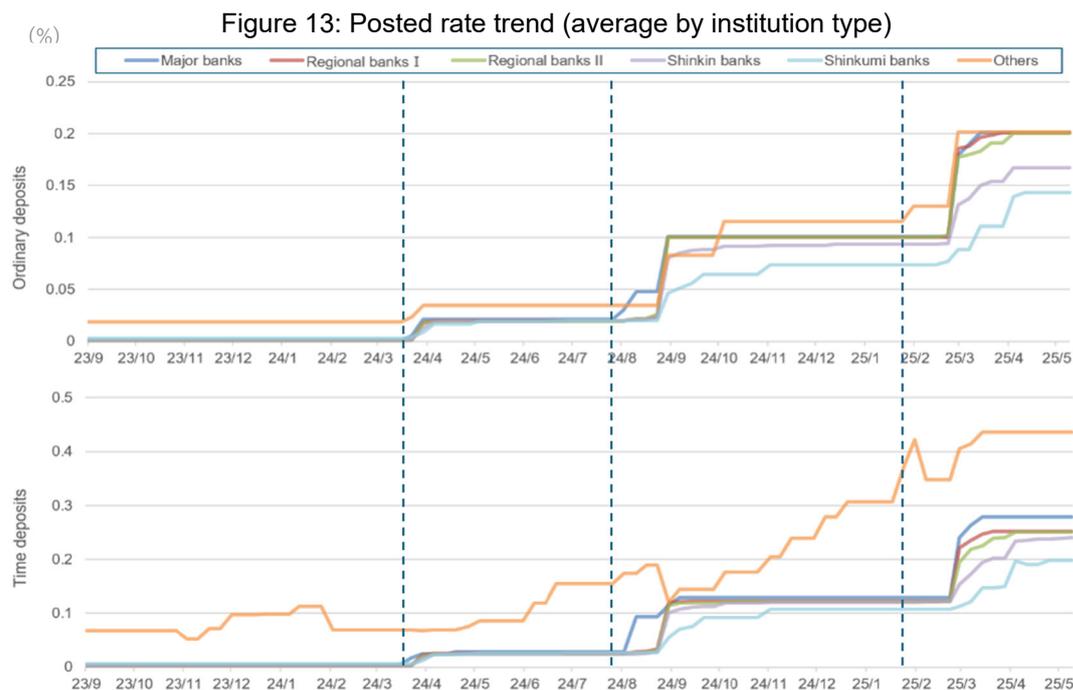


(Source) MIC, National Institute of Population and Social Security Research

## 2. Time-series trends in deposit interest rates

Figure 13 shows the time-series trends<sup>9</sup> in average posted deposit interest rates<sup>10</sup> by institution type<sup>11</sup>. The Bank of Japan revised its negative interest rate policy in March 2024 and subsequently raised the policy rate twice. About one month after each policy decision, deposit interest rates were observed to rise sequentially—first at major banks, followed by regional banks I, regional banks II, shinkin banks, and shinkumi banks. Others (online banks) had already maintained higher interest rates for both ordinary and time deposits compared to other institution types prior to the policy revision. However, as of May 12, 2025, the ordinary deposit rate for online banks stands at 0.2%, the same level as that of major banks, regional banks I, and regional banks II.

It should be noted that these figures are based on posted interest rates and do not reflect promotional rates (campaign rates) or those offered exclusively through online banking channels.



(Note) The dashed lines in the chart indicate the timing of monetary policy meetings that had an impact on interest rate levels:

- March 2024: revision of the negative interest rate policy
- July 2024: policy rate (uncollateralized call rate) hike to 0.25%
- January 2025: policy rate (uncollateralized call rate) hike to 0.5%

(Source) The Japan Financial News Co.,Ltd,

<sup>9</sup> Weekly data from September 4, 2023 to May 12, 2025.

<sup>10</sup> (Sum of post rates by each financial institutions) / (number of financial institutions)

<sup>11</sup> When using time deposit interest rate data, deposits with a deposit amount of less than 3 million yen and a deposit term of one year are used.

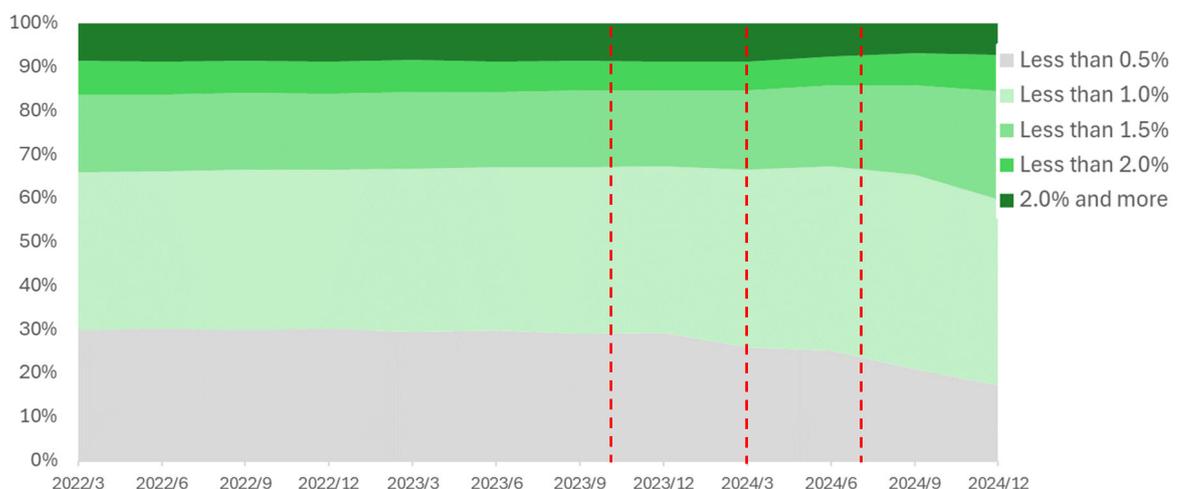
## BOX 2: Recent lending rate trends

Following the Bank of Japan's monetary policy decisions, lending interest rates on a stock basis have been rising as well (Figure 14). Using loan-level data from the Common Data Platform, recent trends in new lending rates<sup>12</sup> at regional banks I were examined by borrower type and industry (Figures 15 and 16).

Corporate lending rates have been on an upward trend since the October 2023 monetary policy meeting, in which the yield cap on 10-year government bonds under the yield curve control framework was revised to 1.0%. In contrast, lending rates for individuals and sole proprietors began to rise after the July 2024 policy rate hike to 0.25%, with an additional delay of around three months observed for sole proprietors other than house and room lending households.

Between March and September 2024, deposit rates at regional banks I increased by an average of approximately 0.1%pt for both ordinary and time deposits (Figure 13). Lending rates for corporates and individuals rose by at least that amount through December 2024. However, rate increases for sole proprietors including house and room lending households remained limited and did not exceed the level of deposit rate increases.

Figure 14: Proportion of lending rates (weighted by balances)



<sup>12</sup> The loan-level data are based on the execution date of loans within each quarterly reference period. For example, loan records as of the end of September 2023 include loans disbursed between the beginning of July and the end of September 2023. Only lendings to borrowers who has been rated as "normal" are covered.

Figure 15: Lending rate by borrower type (weighted average by lending volume, differences from September 2023)

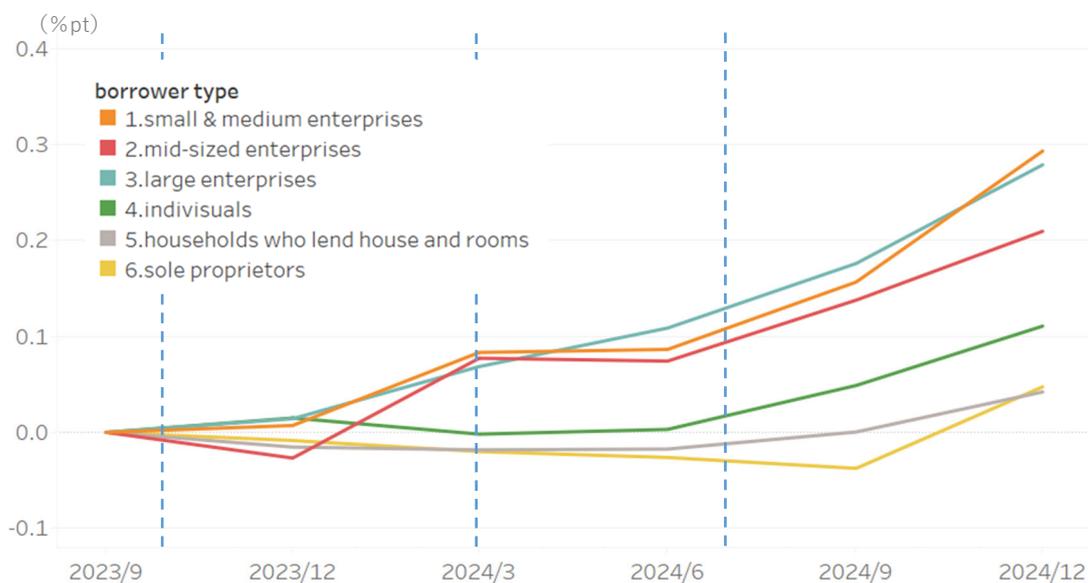
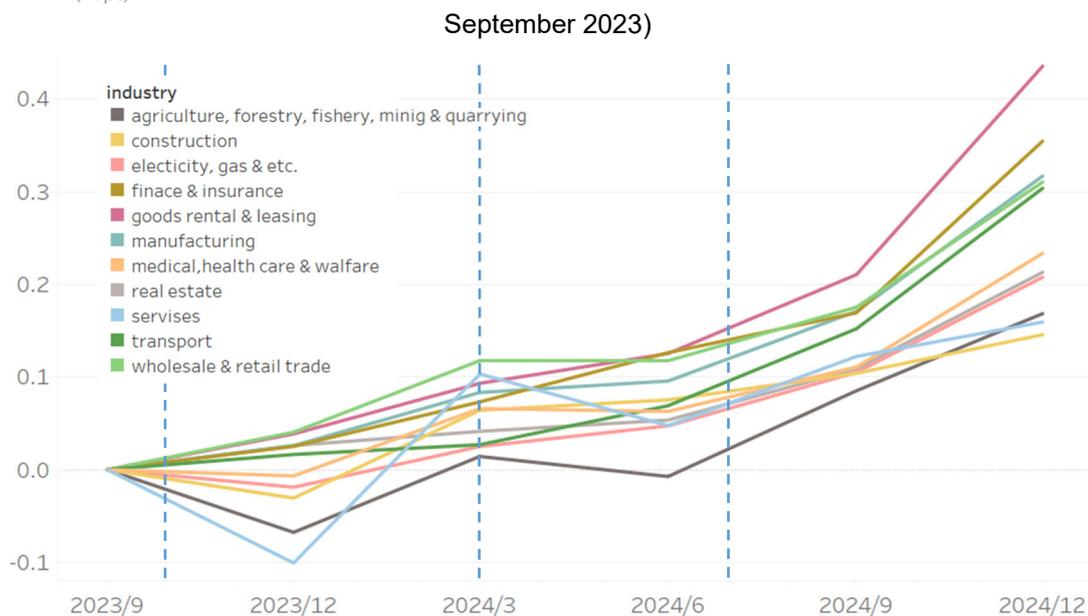


Figure 16: Lending rate by borrower industry (weighted average by lending volume, differences from September 2023)



(Note) The dashed lines in the chart indicate the timing of monetary policy meetings that had an impact on interest rate levels:

- October 2023: increasing the flexibility in the conduct of yield curve control
- March 2024: revision of the negative interest rate policy
- July 2024: policy rate hike to 0.25%

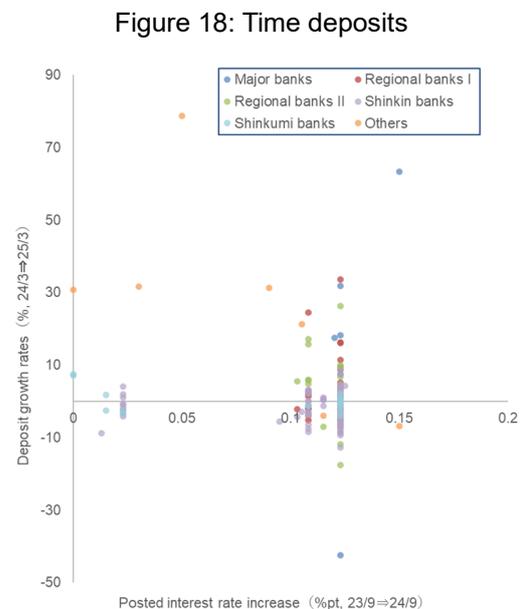
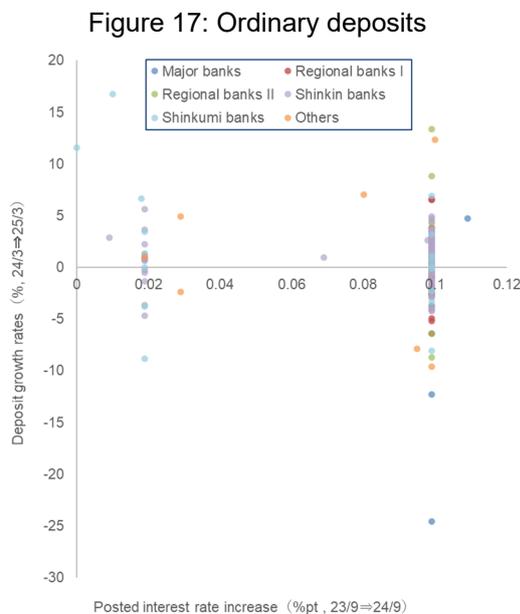
### III. Relationship between deposit rate and growth

Using Datasets 1 and 2, the relationship between the extent of posted interest rate increases and deposit balance growth at each institution is analyzed (sub-section 1). Next, using Dataset 3, the relationship between deposit yields and deposit balance growth is examined (sub-section 2).

#### 1. Posted rate increase vs. balance growth

The relationship between posted interest rate increase (from September 2023 to September 2024) and deposit growth (from March 2024 to March 2025) was examined. The reason for the difference in the calculation period is that there is likely to be a certain lag before an increase in posted rates affects the deposit balance.

Figures 17 and 18 illustrate the relationship between the posted rate hikes in ordinary and time deposit<sup>13</sup> interest rates and the corresponding deposit balance growth. While variations in the magnitude of interest rate increases were limited within each institution type—major banks, regional banks, shinkin banks, and shinkumi banks—considerable disparities were observed in the growth of deposit balances. In contrast, for others, interest rate increases varied significantly across banks for both ordinary and time deposits.



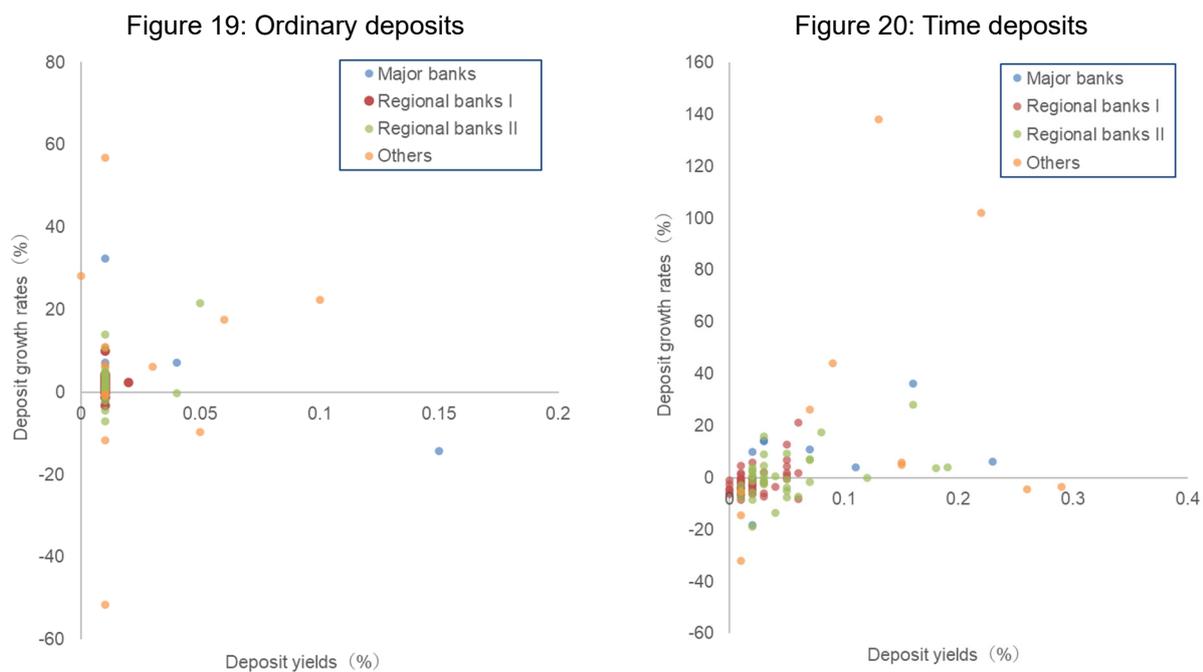
(source) The Japan Financial News Co.,Ltd,

<sup>13</sup> Due to data limitation, ordinary deposits and time deposits data are used for posted rate while total demand deposits and time and savings deposits are used for balances.

## 2. Change in yields vs. balance growth

Deposit yields reflect not only interest paid based on posted rates, but also interest paid through campaigns and internet banking-exclusive rates, thereby capturing the impact of various interest-related strategies implemented by financial institutions.

Figures 19 and 20 illustrate this relationship for major banks, regional banks, and others, separately for ordinary deposits and time deposits. Generally, a higher yield tends to be associated with a higher growth rate in deposit balances, and this trend is particularly evident in the case of time deposits. However, at the individual institution level, there are cases where deposit balances declined despite high yields, and conversely, cases where balances grew significantly even with yields comparable to other institutions. Among the different institution types, others<sup>14</sup> show the greatest variability in both yields and balance growth rates<sup>15</sup>.

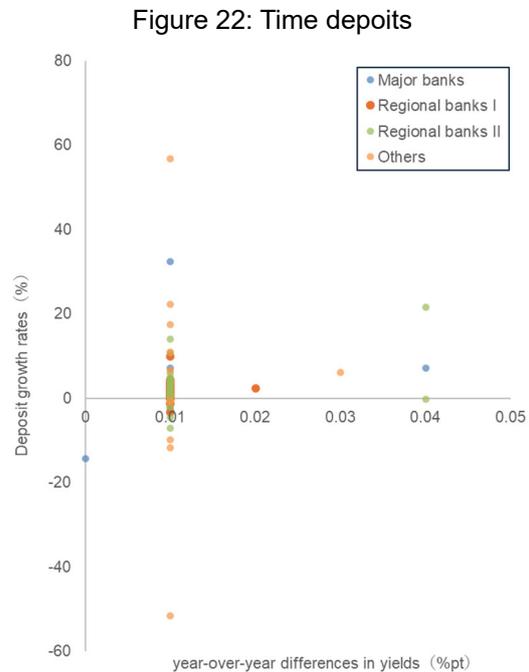
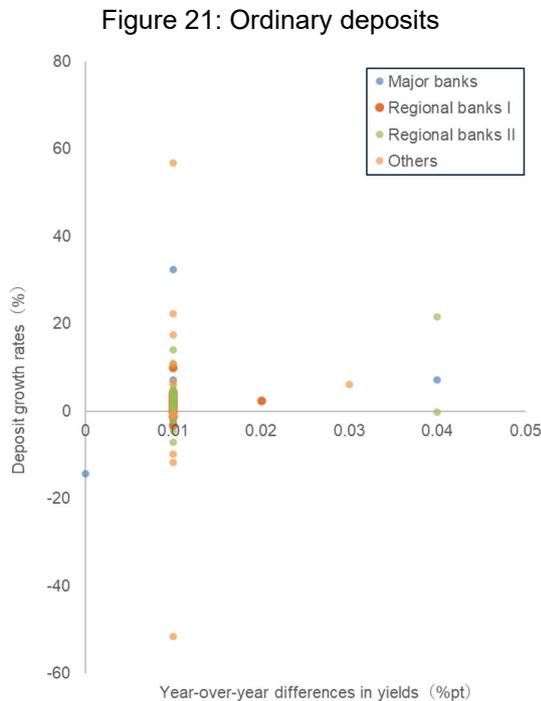


Figures 21 and 22 focus on major banks, regional banks, and others, and illustrate the relationship between year-over-year differences in yields and growth in balances for ordinary and time deposits, respectively. In the case of time deposits, institutions that offered higher yields compared to the previous year generally experienced greater growth in deposit balances. This suggests that upward

<sup>14</sup> One other bank shows large decrease in growth rate due to their relatively small deposit balances. Although there was a large decline between 23/9 and 24/9, the trend of its deposit balance over time is fluctuating (both ups and downs).

<sup>15</sup> Due to data limitation, shinkin banks and shinkumi banks are excluded for yield related analysis.

adjustments in deposit yields are positively associated with increased deposit accumulation, particularly for time deposit products.



## IV. Regression Analysis

In order to verify the relationship observed in the previous section, regression analyses are conducted by changing explanatory variables.

### 1. Posted rate increase vs. balance growth (Analysis 1)

The hypothesis that "financial institutions that raised their posted deposit rates more significantly experienced higher deposit growth rates" are tested. The analysis (hereafter referred to as Analysis 1) covers 238 financial institutions, including major banks, regional banks, shinkin banks, shinkumi banks, and others, and is conducted separately for ordinary and time deposits. As shown in Figure 23, the object variable is the deposit balance growth rate, measured over a period six months after the explanatory variables, in recognition of the potential time lag between interest rate adjustments

and their effects on deposit behavior. The analysis includes control variables that account for institutional type, as well as region-specific factors such as household income and population.

Figure 23: List of variables

Object variable	Deposit growth rates(%)	24/3⇒25/3
Explanatory variable	Posted interest rate increase (%pt)	24/9 - 23/9
Control	Household income growth rates (%)	23/9⇒24/9
	Population growth rates (%)	23/9⇒24/9
	Bank type Dummy	Standard : Regional banks I

(Source) The Japan Financial News Co.,Ltd, MIC, National Institute of Population and Social Security Research

No significant correlation was found between posted rate increases and deposit growth. This may be due to the narrow variation in posted rate hikes among traditional institutions. In this analysis, the time period between the increase in posted rate hike and the growth rate is set at six months, however, it may take even longer for the increase in posted rates to affect the deposit balance. Therefore, further analysis using alternative timeframes could be valuable for future research.

Figure 24: Result of Analysis 1

		Ordinary deposits	Time deposits
Explanatory variable	Posted interest rate increase	-11.91	-36.02
Control	Household income growth rates	+0.01	+0.01
	Population growth rates	+0.43	+1.64
Const		+1.74	+6.02*
Coefficient of determination ( $R^2$ )		0.093	0.372

\*\*  $p < 0.01$  , \*  $p < 0.05$

## 2. Deposit yield vs. growth rate (Analyses 2 and 3)

This sub-section conducts two analyses based on the following hypotheses: “financial institutions offering higher deposit yields tend to exhibit greater deposit balance growth” (Analysis 2) and “financial institutions with a larger year-over-year increase in deposit yields<sup>16</sup>—reflecting the impact of campaigns and other factors— experience higher deposit growth” (Analysis 3). Both analyses focus on 119 institutions across major banks, regional banks, and others.

The list of variables<sup>17</sup> used is shown in Figure 25. Unlike Analysis 1, the object variable (deposit growth rate) in Analyses 2 and 3 covers the same period as the explanatory variables. Control variables are consistent with those used in Analysis 1.

Figure 25: List of Variables

Object variable	Deposit growth rates (%)	23/9⇒24/9
Analysis② Explanatory variable	Deposit yields (%)	23/10~24/9
Analysis③ Explanatory variable	Year-over-year change in deposit yield (%pt)	(23/10~24/9) – (22/10~23/9)
Control	Household income growth rates (%)	23/9⇒24/9
	Population growth rates (%)	23/9⇒24/9
	Bank type Dummy	Standard : Regional banks I

(Source) MIC, National Institute of Population and Social Security Research

Analysis 2 showed significance only for time deposits. Analysis 3 showed significance for both ordinary and time deposits. Furthermore, from the coefficient of determination ( $R^2$ ), among the regression equations used in this section, Analysis 3, which used the year-over-year change in yields as an explanatory variable, explained the deposit growth rate more effectively.

<sup>16</sup> The difference in deposit yields can be decomposed into components attributable to changes in balances and changes in interest rates. However, given the persistently low interest rate environment in recent years, estimates indicate that the balance-driven component is negligible compared to the interest rate-driven component. Therefore, the yield difference is deemed appropriate as an explanatory variable for deposit balance growth.

<sup>17</sup> Analysis 3 (difference in deposit yields), like Analysis 1 (increase in posted interest rates), may be subject to a certain time lag before affecting deposit balances. However, due to data constraints, the analysis uses the same time period for both the explanatory and object variables.

Figure 26: Results of Analyses 2 and 3<sup>18</sup>

			Ordinary deposits	Time deposits
Analysis ②	Explanatory variable	Deposit yields	-18.89	+102.19**
	Control	Household income growth rates	-0.007	-0.02
		Population growth rates	-1.27	+1.06
	Const		+1.32	-3.24
	Coefficient of determination ( $R^2$ )		0.133	0.227
Analysis ③	Explanatory variable	Year-over-year change in deposit yield	+252.97*	+566.26**
	Control	Household income growth rates	-0.002	+0.006
		Population growth rates	-1.48	-0.98
	Const		-1.57	-7.9**
	Coefficient of determination ( $R^2$ )		0.163	0.477

\*\* p&lt;0.01 , \* p&lt;0.05

Figure 27 shows the result of regression analysis conducted for each institutional types<sup>19</sup>. When viewed by institution type, Analysis 2 showed statistically significant results for regional banks, while in Analysis 3, significant results were observed for regional banks II and for time deposits in all sectors except major banks. The coefficients in Analysis 3 for time deposits were as follows: 388.89 for regional banks I, 354.55 for regional banks II, and 628.37 for others. These coefficients indicate the expected percentage growth in deposit balances when the time deposit yield increases by 1 percentage point. Specifically, a 1 basis point (0.01 percentage point) increase in yield would correspond to an approximate deposit balance growth of 3.88% for regional banks I, 3.54% for regional banks II, and 6.28% for others.

<sup>18</sup> One other bank with large fluctuations in deposit balances were treated as outliers and excluded from this analysis. On the other hand, as shown in Figures 19 and 21, some other banks exhibited significant increases in ordinary deposit balances despite having yields comparable to those of the subject bank. However, since the subject bank has shown a consistently stable upward trend in its time-series data, it was included in these analyses. Even when the previously excluded outlier banks were included in these analyses, the results of Analysis 2 remained largely unchanged for both ordinary and time deposits. In contrast, for Analysis 3, the results for ordinary deposits lost statistical significance, while time deposits continued to show significant results. This suggests that time deposits are more sensitive to changes in deposit yield differentials.

<sup>19</sup> Analyses 2 and 3 use deposit data based on the location of each bank's head office. Therefore, for major banks and other banks—whose head offices are primarily concentrated in Tokyo—the impact of regional characteristics is considered negligible. For regional banks, multiple regression analysis was conducted with the addition of control variables such as “household income growth rate” and “population growth rate.” However, as the coefficients for these control variables were small and did not demonstrate significant effects, the results of the simple regression analyses are presented instead.

Figure 27: Results of Analyses 2 and 3 by institution type

		Major banks (n=9)	Regional banks I (n=63)	Regional banks II (n=37)	Others (n=10)	
Analysis② Time deposits	Explanatory variable	Time Deposit yields	+73.55	+149.90**	+82.22**	+127.43
	Const		+2.52	-4.77**	-3.49	+6.68
	Coefficient of determination ( $R^2$ )		0.143	0.255	0.190	0.057
Analysis③ Ordinary deposits	Explanatory variable	Year-over-year change in ordinary deposit yield	+284.47	+50.84	+284.66*	-197.40
	Const		+0.69	+1.27	-0.74	+12.12
	Coefficient of determination ( $R^2$ )		0.063	0.001	0.166	0.004
Analysis③ Time deposits	Explanatory variable	Year-over-year change in time deposit yield	+491.35	+389.89**	+354.55**	+628.37*
	Const		-6.58	-5.66**	-5.55*	-0.38
	Coefficient of determination ( $R^2$ )		0.225	0.296	0.277	0.409

\*\* p<0.01 , \* p<0.05

Based on the above results, it was found that for ordinary deposits, the year-over-year change in yield is positively correlated with deposit balance growth, while for time deposits, both the annual yield and the change in yield show a positive correlation with deposit growth. Although Analysis 2 did not show statistically significant results for ordinary deposits, this may be due to the limited variation in deposit yields observed across many institutions between October 2023 and September 2024, as shown previously. As a result, linear regression may not have captured meaningful differences.

In Analyses 1 through 3 (excluding those by institution type), the analysis included household income growth as a control variable, based on the hypothesis that "financial institutions located in regions with higher household income growth rates tend to exhibit higher deposit balance growth." However, this control variable did not have a significant effect in any of the analyses. This may be attributed to data limitations, such as the use of data based on prefectural capital cities as a proxy for each prefecture, or to the possibility that income effects may not manifest clearly over a short observation period.

Moreover, when viewed by institution type, the results of Analysis 3 for ordinary deposits showed a positive correlation between the change in deposit yield and deposit balance growth only for regional banks II. This may reflect the fact that certain banks classified as regional banks II offer higher deposit interest rates through internet-only accounts, which has led to an increase in ordinary deposit balances. In addition, the results of Analysis 3 for time deposits revealed a particularly strong positive

correlation between the change in deposit yield and deposit balance growth for others. This may be attributed to the relatively small deposit balances held by others as of the end of September 2023 compared to other institution types, as well as to the customer base of others, which tends to consist of individuals who frequently use the internet via smartphones and are more likely to access information on deposit campaigns. While various deposit campaigns are conducted by financial institutions, it is possible that deposit behavior is influenced not only by whether a campaign is conducted, but also by the level of advertising exposure associated with it. If competition for deposit acquisition intensifies, it will become more important to monitor whether strategies emerge that emphasize nominal yields excessively—potentially at odds with the actual interests of depositors.

Finally, although deposit interest rates for major banks did not show statistically significant results, they serve as a reference point for regional banks and others in setting their own deposit rates. Accordingly, it is possible that deposit rates at major banks may influence the rates and deposit balances of other institution types in subsequent periods. As more deposit balance data becomes available under a rising interest rate environment, it will be important to continue refining the analysis—for example, by incorporating major banks' deposit interest rates as control variables.

It should be noted that while this analysis used posted interest rates, deposit yields, and their changes as explanatory variables, deposit trends are influenced by a wide range of factors beyond just posted rates or yields. These include fee structures, integration with investment and other financial services, and overall depositor convenience. Therefore, it is important to take such qualitative aspects into account and adopt a comprehensive perspective.

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## V. Conclusion

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This paper examined recent trends in deposit balance growth and deposit interest rates among financial institutions during the current phase of rising interest rates, using deposit balance data, financial statements, and interest rate information from sources such as The Japan Financial News Co.,Ltd.

While deposit balances have generally increased, variations in growth rates were observed depending on the institution type and the deposit type. In addition, a correlation was found between population growth and deposit balances growth in each region. An analysis of the relationship between deposit interest rates and deposit balance growth revealed a positive correlation between

deposit yields—particularly those influenced by deposit campaigns—and deposit balance growth. Notably, the year-over-year change in deposit yield had the strongest explanatory power for deposit growth. Furthermore, when analyzed by institution type, a strong positive correlation was identified between changes in deposit yield and deposit balance growth for others.

Although the analysis in this paper suggests a certain relationship between deposit balances and deposit interest rates, at present, many financial institutions continue to offer similar interest rates, and no major fluctuations have been observed across the deposit market as a whole. However, should future shifts in demographics or regional economic trends alter the competitive landscape for financial institutions, it is possible that more institutions will adopt differentiated deposit strategies. In such a scenario, disparities in the interest rates offered may widen depending on each institution's managerial capacity. It is important to continue monitoring deposit trends and the deposit strategies of financial institutions in a timely manner, while also keeping a close eye on macro-level developments such as interest rate conditions and demographic changes.

The analysis presented in this paper primarily covers the one-year period from the end of September 2023 to the end of September 2024, which coincides with the timing of the Bank of Japan's shift in monetary policy. However, to fully understand the impact of rising policy interest rates on deposit balances, it is desirable to examine a longer time horizon. The FSA will continue to monitor and analyze trends in the domestic deposit market in order to deepen its understanding on such as financial institutions' profitability and ALM practices.