FSA Analytical Notes

March 2024

Introduction

As financial institutions' business environments and profit structures change, it is important to understand economic and market trends based on data, and to accurately grasp the business conditions of individual financial institutions and also the resilience and vulnerabilities of the financial system as a whole. From this perspective, the Financial Services Agency (FSA) has been focusing on the utilization of granular data, such as financial data on individual corporations and transaction-level bank loan data. The FSA published the first "FSA Analytical Notes" in June 2023 to demonstrate three case examples of data analyses using such granular data.

"The JFSA Strategic Priorities July 2023-June 2024" states that, in order to further enhance financial supervision and policy-making, the FSA will continue to deepen and enhance its analyses of corporates' financial conditions and the status and behavior of financial institutions. Against this backdrop, the "FSA Analytical Notes (2024.3)" compiles the following two data analyses.

1. Analysis of credit guaranteed borrowers amid the COVID-19 pandemic (P2-12)
2. Quantitative analysis of consultation and support functions by financial institutions (P13-28)

While data analysis can provide quantitative and clear results, such results are subject to models and assumptions of the analyses. The data analyses presented here are at the early stage of testing various methods by utilizing currently available granular data while the FSA is still in the process of collecting and accumulating granular data. Therefore, challenges remain, including data limitations. Therefore, it should be noted that it is necessary to understand the data and model limitations as well as the underlying assumptions and premises and not to draw conclusive conclusions at an early stage when interpreting the results of these analyses. Ongoing analysis is required to further deepen understanding.

Enhancing the use of data in financial supervision and policy-making is a medium- to long-term agenda. The FSA will continue to build its data analysis capabilities and data infrastructure.

* Unless otherwise noted, the figures and tables in this report were prepared by the FSA.

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Analysis of credit guaranteed borrowers amid the COVID-19 pandemic

(Summary)

This paper attempts to reveal the characteristics and trends of borrowing covered by the Credit Guarantee System amid the COVID-19 pandemic, using anonymized data of the financial statements and credit profiles of corporate borrowers obtained from 62 member banks of the Regional Banks Association of Japan. The analysis suggests that prompt funding support using the Credit Guarantee System in times of emergency may have contributed to business continuation until corporate earnings were on a recovery track and to mitigating sharp deterioration of borrower classification. However, continuous analyses from various perspectives are necessary to further elucidate the effects of credit guaranteed borrowing while taking into account the repayment status of effectively interest-free and unsecured loans (so-called "zero-zero loans").

I. Introduction

The purpose of the Credit Guarantee System is to facilitate financing for small and medium-sized enterprises (SMEs) by having Credit Guarantee Corporations provide debt guarantees to SMEs when they borrow from financial institutions. The system has been used by private financial institutions to extend effectively interest-free and unsecured loans[1] during the COVID-19 pandemic, thereby supporting business operators' funding amid economic instability. Against this backdrop, SMEs' reliance on loans guaranteed under the Credit Guarantee System ("credit guaranteed loans") has increased in recent years, making it increasingly important to identify and analyze trends in credit guaranteed loans in order to assess trends in the financial system as a whole.

In this paper, the period from April 2020 to March 2021 is defined as the height of the COVID-19 pandemic, and firms who borrowed credit guaranteed loans during this period ("credit guaranteed borrowers") are analyzed in order to help assess the impact and the effectiveness of rapid liquidity

[1] https://www.meti.go.jp/press/2020/05/20200501008/20200501008.html

support provided in times of emergency. Specifically, using anonymized data of the financial statements and credit profiles of corporate borrowers obtained from 62 member banks of the Regional Banks Association of Japan ("regional banks"), credit guaranteed borrowers, who had business relationships with the banks as of March 2021, are classified into two categories, i.e., borrowers who had business relationships with the banks before March 2020 ("existing borrowers") and those who started business relationships with the banks after April 2020 ("new borrowers"), and their corporate attributes and sales trends are observed.[2] In addition, the comparison between credit guaranteed borrowers and borrowers who had not borrowed credit guarantee loans during the period (“other borrowers”) are examined to assess the impact of credit guaranteed loans on borrower classification.

II. Characteristics of credit guaranteed borrowers

Figures 1 and 2 show the proportion of credit guaranteed borrowers (existing borrowers and new borrowers) by their industry and size (amount of capital). These figures indicate that, among new borrowers, the proportion of service industry is high in terms of the industries, while the proportion of small firms is high in terms of size. Looking at the breakdown of the service industry, the proportion of the food and restaurant industry is relatively high. It suggests that, among firms that have not had transactional relationships with regional banks in the past, small firms in the food and restaurant industry in particular have received credit guaranteed loans during the COVID-19 pandemic.

[2]The number of existing borrowers in the sample is 214,389, and the number of new borrowers in the sample is 53,754.

Figure 1: Industry composition

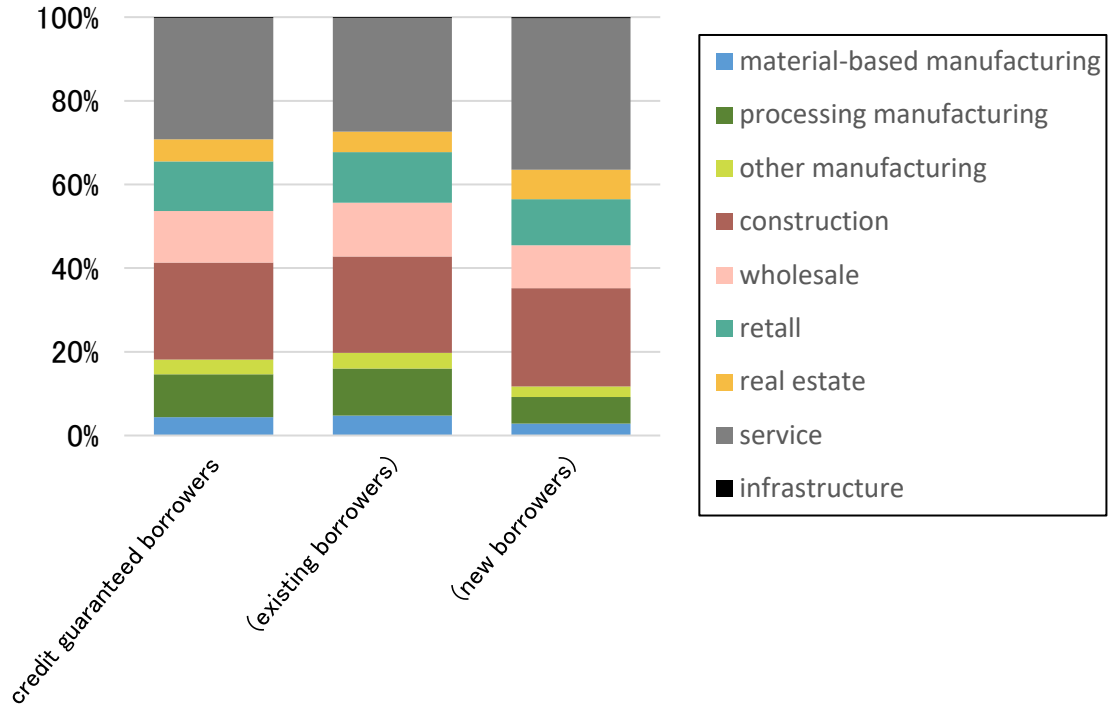


Figure 2: Size Composition (Amount of stated capital)

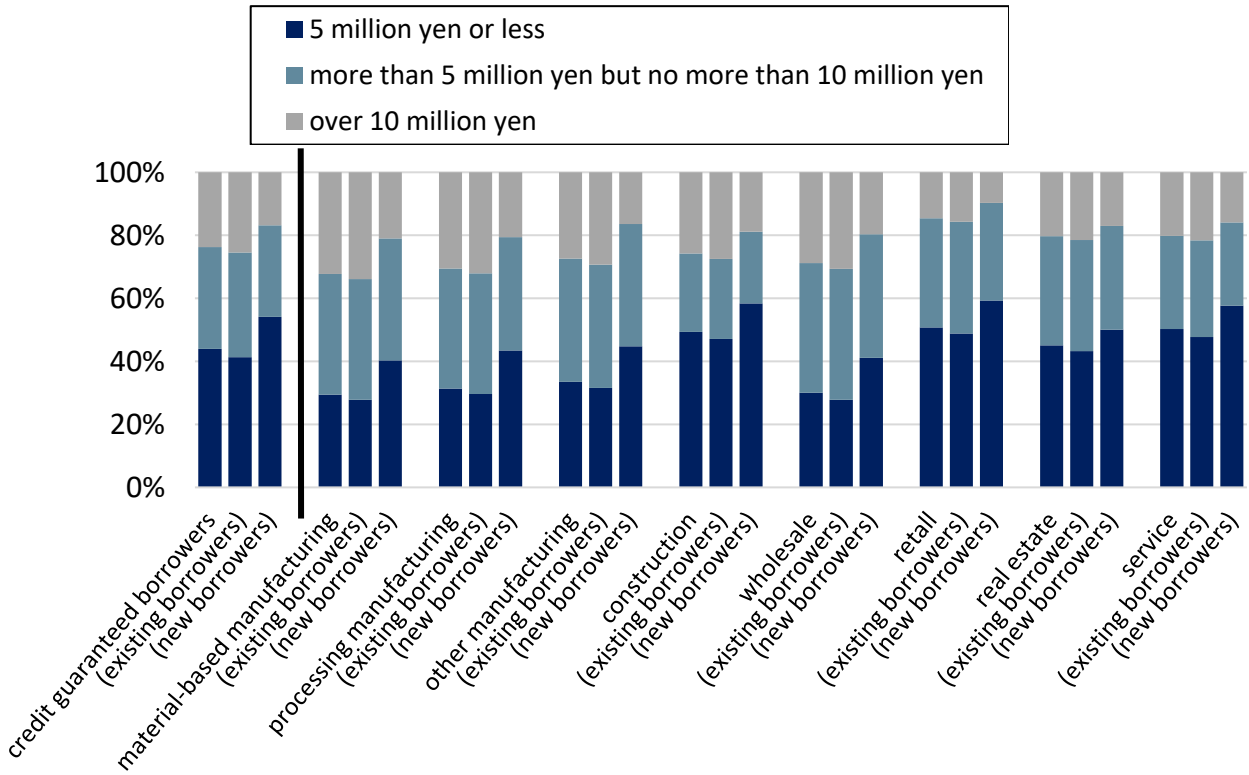
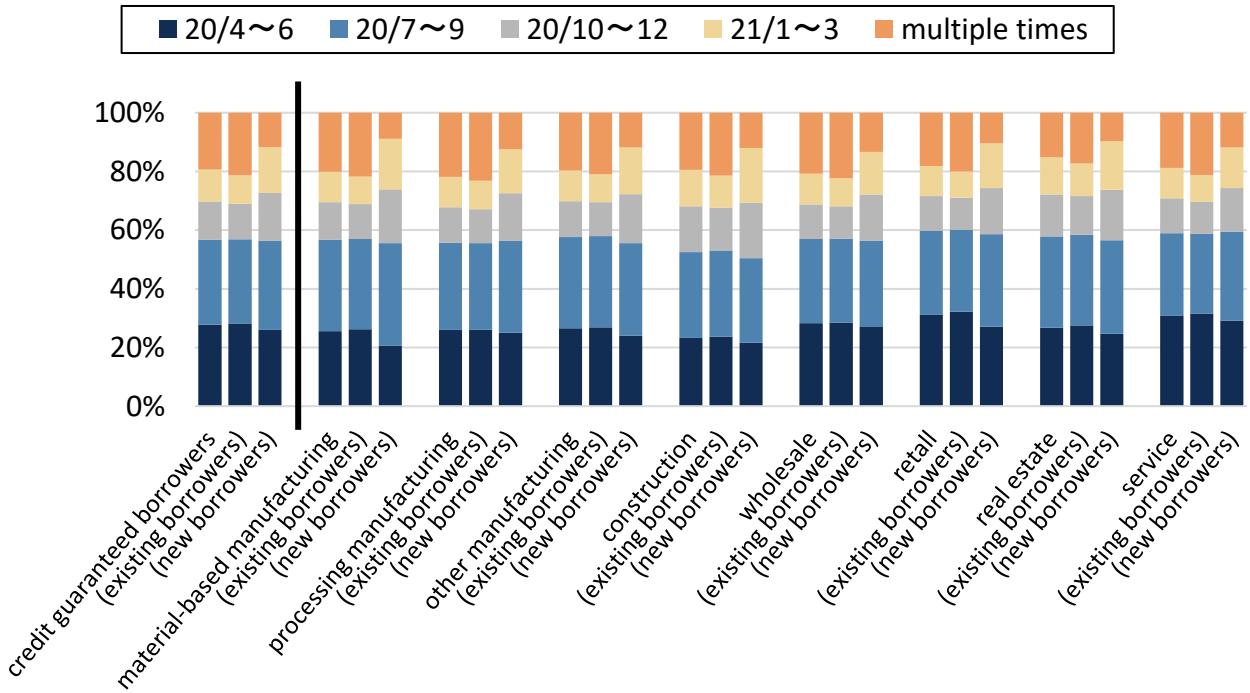


Figure 3 shows the timing of credit guaranteed loans by industry during the height of the COVID-19 pandemic, broken down into four sub-periods. A comparison between existing borrowers and new borrowers reveals that a high proportion of existing borrowers borrowed multiple times during the period, while a high proportion of new borrowers borrowed during the second half of the period (from October 2020 to March 2021). A closer look at existing borrowers who borrowed multiple times reveals that a high proportion of them took out their first credit guaranteed loan during the first half of the period (from April to September 2020) and took another credit guaranteed loan during the last quarter period (from January to March 2021).

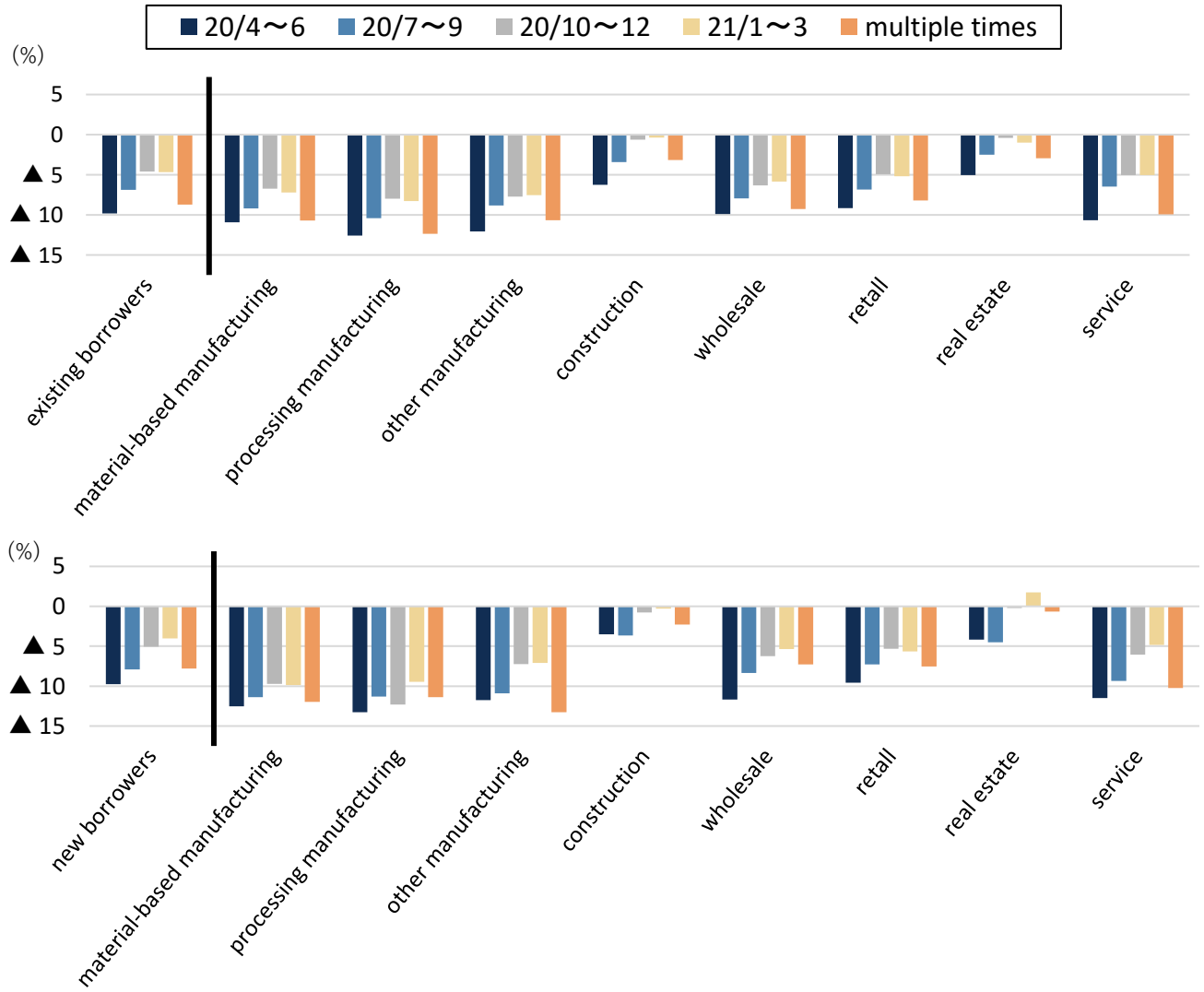
Figure 4 shows the year-on-year change in the current period sales rate (median) reported as of the end March 2021[3] by borrowing period and by industry. By borrowing period, the rate of change in the current period sales decreased significantly for borrowers who took loans in the first half of the period (from April to September 2020) or who used multiple credit guaranteed loans. By industry, the rate of change in the manufacturing sector has shown a significant decrease, while the rate of change in the construction and real estate sectors has shown a slight decrease.

Figure 3: Timing of credit guaranteed loans



[3]The latest current period sales data available in end-March 2021 reporting is used.

Figure 4: Rate of change (YoY) in the current period sales reported as of March 31, 2021
(median; top: existing borrowers, bottom: new borrowers)



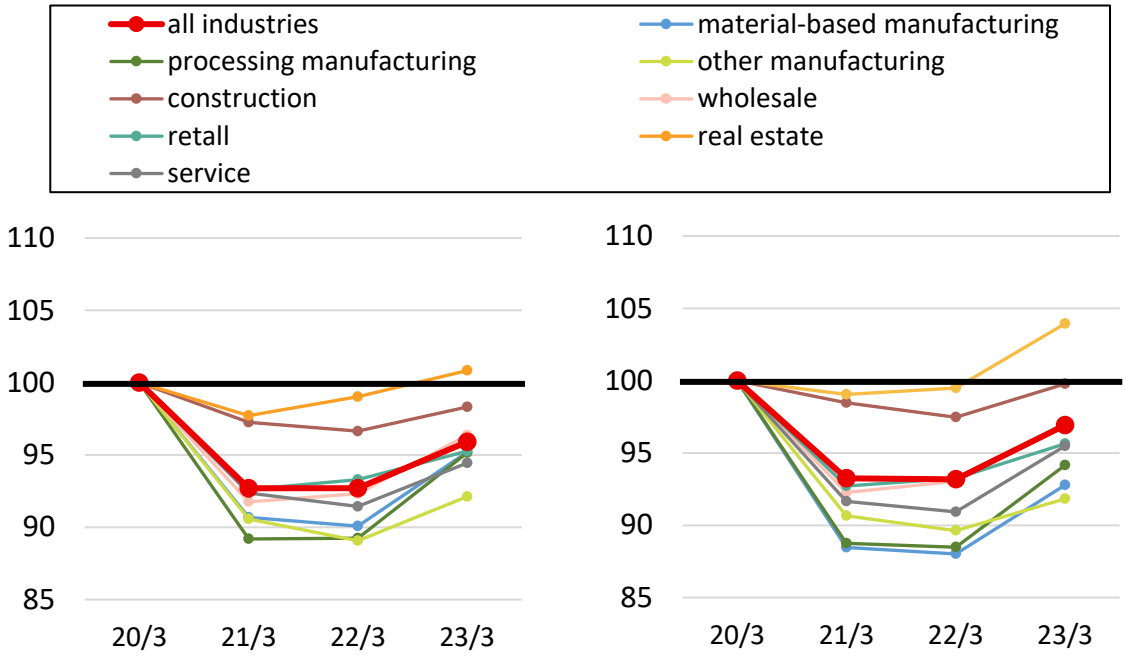
The above figures indicate that existing borrowers, who already had relationships with the regional banks, could consult the regional banks regarding working capital soon after the COVID-19 pandemic, making it easier for them to receive funding support in the form of effectively interest-free and unsecured loans. It is likely that those most affected by the COVID-19 pandemic were those that had borrowed multiple times, suggesting that these firms may have borrowed again before the application deadline for the effectively interest-free and unsecured loans at the end of March 2021. On the other hand, the proportion of new borrowers that had borrowed multiple times was smaller than that of

existing borrowers, while the proportion of new borrowers that had borrowed during the first half of the period was the same as that of the existing borrowers. In addition, the proportion of new borrowers that had borrowed during the second half of the period was larger, although the decrease in the current period sales rate (YoY) was comparatively small at the period. These suggest that, in light of the uncertain COVID-19 environment, a considerable number of new borrowers may have borrowed as a precautionary motivation in the second half of the period, immediately before the end of effectively interest-free and unsecured loans, while others who had hesitated to accept debt may have not borrowed until the second half of the period even though their performance deteriorated.

III. Trend in sales of credit guaranteed borrowers

Next, the effects of funding support provided by credit guaranteed loans during the height of the COVID-19 pandemic were examined by looking at the trends in sales of credit guaranteed borrowers. Figure 5 shows the trend of the current period sales (median) where the amount as of March 2020 (before the COVID-19 pandemic) is adjusted to 100. According to this figure, the current period sales decreased significantly in March 2021 as a whole, but the decline stopped in March 2022, and there are signs of recovery at the end of March 2023. This indicates that credit guaranteed loans during the height of the COVID-19 pandemic may have contributed to the business continuation until their sales return to a recovery track. On the other hand, looking at each sector, although the real estate sector had a limited impact from the COVID-19 pandemic and achieved recovery above pre-COVID-19 level at the end of March 2023, many other sectors did not recover to pre-COVID-19 levels. It suggests that a considerable number of borrowers are still in a severe condition due to external factors, such as geopolitical risks, labor shortages, soaring raw material costs, in addition to the prolonged impact of the COVID-19 pandemic.

Figure 5: Trend of the current period sales
(median, end of March 2020 = 100; left: existing borrowers, right: new borrowers)



IV. Impact on borrower classification

Finally, trends in borrower classifications of the credit guaranteed borrowers and other borrowers[4] are examined. The proportion of borrowers rated as "special attention" or higher ("normal," "needs attention," or "special attention"; hereafter defined as the "proportion of general borrowers") at the end of each March from 2020 to 2023 is used as an indicator.[5]

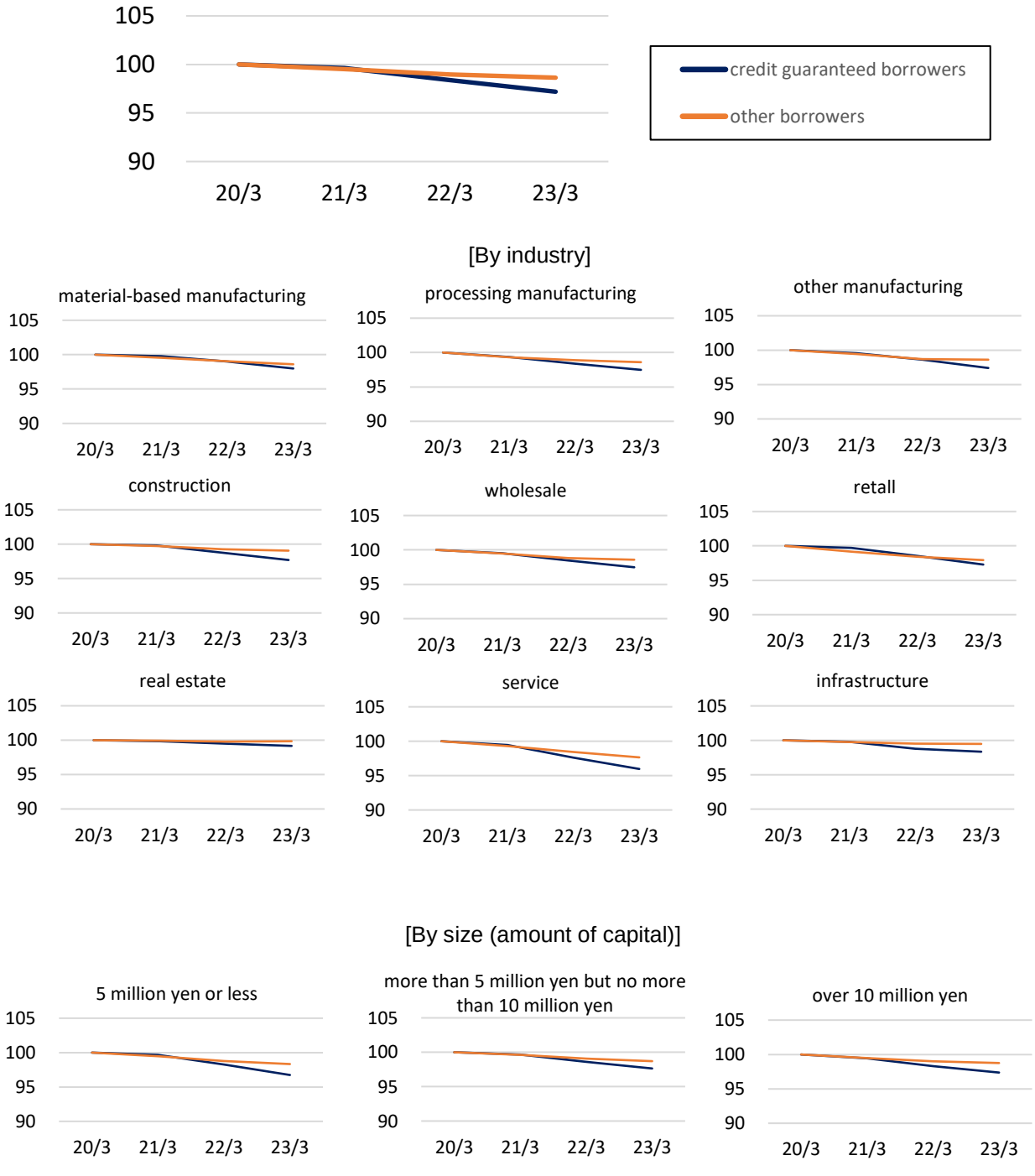
Figure 6 shows the trend of the proportion of general borrowers for both credit guaranteed borrowers and other borrowers by industry and size, where the ratio at the end of March 2020 is adjusted to 100. According to this figure, the proportion of general borrowers for credit guaranteed borrowers, which have presumably been strongly affected by COVID-19, remained at the same level as that of other borrowers at the end of March 2021. This trend is also observed in each industry and

[4]The number of borrowers that had business relationships with banks as of the end of March 2021 but did not borrow on credit guarantees during the COVID-19 pandemic (sample size: 357,033).

[5]The data obtained from regional banks used in this analysis classifies borrowers into six categories: "normal," "needs attention," "needs management," "in danger of default," "substantial default," and "default." The borrower categories used in this analysis use the same classification.

size, indicating that the rapid decrease in the proportion of general borrowers was not widespread in March 2021. On the other hand, as the impact of COVID-19 prolongs, the proportion of general borrowers as a whole has gradually decreased since the end of March 2022. Moreover, the decrease in the proportion of general borrowers to all credit guaranteed borrowers has been larger than that of other borrowers.

Figure 6: Trends of proportion of general borrowers (end of March, 2020 = 100)



To statistically examine the trends shown in Figure 6, an analysis on the impact of credit guaranteed loans on borrower classification is conducted. Specifically, the following logit model is used to estimate the aforementioned impact for the following three estimation periods: from the end of March 2020 to the end of March 2021, from the end of March 2021 to the end of March 2022, and from the end of March 2022 to the end of March 2023, while controlling corporate attributes and industry types.

$$log\frac{p_{i,t}}{1-p_{i,t}} = \beta_{0,t} + \beta_{1,t}Hosho\ Dummy_{i,t} + \beta_{2,t}Sales_{i,t} + \beta_{3,t}Equity\ Ratio_{i,t} + \beta_{4,t}Industry_{i,t} + \epsilon_{i,t}$$

The dependent variable $p_{i,t}$ denotes the probability that firm i's borrower classification is changed from "special attention" or higher at the beginning of each estimation period t to "in danger of bankruptcy" or lower at the end. The probability that a firm i's borrower classification stays at the same level is $(1-p_{i,t})$. The explanatory variable $Hosho\ Dummy_{i,t}$ is a binary variable where "1" indicates credit guaranteed borrowers and "0" indicates other borrowers at time t. In addition, the natural logarithm of the current period sales at the end of each fiscal year $Sales_{i,t}$, capital ratio[6] at the end of each period $Equity\ Ratio_{i,t}$, and industry dummies $Industry_{i,t}$ are used as control variables for corporate attributes and industry types. The coverage of the borrowers consists of those whose data are available as of the end of March 2021, however, for some borrowers who started transactions between April 2020 and March 2021, data as of end March 2020 is not available. To fill in this data gap, it is assumed that all borrowers who do not have data as of end March 2020 are classified as “special attention" or higher.[7]

Table 7 shows the estimation results of the above logit model for each estimation period. Statistically significant positive correlations for $Hosho\ Dummy_{i,t}$ are observed for the two periods: from the end of March 2021 to the end of March 2022, and from the end of March 2022 to the end of March 2023, indicating that the proportion of general borrowers to all credit guaranteed borrowers is lower in a statistically significant manner than that of other borrowers in these two periods, as can be seen in Figure 6. On the other hand, the estimated value for $Hosho\ Dummy_{i,t}$ from the end of March 2020 to the end of March 2021 is negative with statistical significance, despite the fact that Figure 6 shows the same level of proportion of general borrowers for both clusters. However, some samples from this estimation period may have been affected by the aforementioned assumption due to the data gap,

[6]Net worth divided by total asset (times 100).

[7]In general, it is not likely that banks start new transactions with the corporations that are classified as “in danger of default”,

and thus it would be appropriate to consider the results as reference values.

In addition, with regard to this logit model, there is a possibility of an endogeneity problem that firms that applied for credit guaranteed loans had difficulties in their financial soundness compared with firms that did not apply for those loans, which may lead to the deterioration of borrower classification. Therefore, it should be noted that it is appropriate to handle the results of this analysis as a statistical examination of the changes shown in Figure 6. Addressing the endogeneity problem remains as a future consideration.

Table 7: Results of logit estimation

estimation periods		20/3-21/3				21/3-22/3				22/3-23/3			
		Coefficient	Std.Error	z		Coefficient	Std.Error	z		Coefficient	Std.Error	z	
Constant		-3.78	0.19	-19.70	***	-3.79	0.18	-20.92	***	-4.26	0.21	-20.04	***
Credit guaranteed Dummy		-0.27	0.03	-8.72	***	0.20	0.03	7.20	***	0.35	0.03	11.23	***
Sales		-0.04	0.01	-4.37	***	-0.04	0.01	-5.15	***	-0.03	0.01	-2.74	**
Equity Ratio		-0.01	0.00	-59.72	***	-0.01	0.00	-68.87	***	-0.01	0.00	-59.39	***
Industry	*material-based manufacturing*	-0.17	0.11	-1.61		-0.15	0.10	-1.52		0.03	0.11	0.32	
	processing manufacturing	0.13	0.09	1.52		0.03	0.08	0.38		0.06	0.09	0.66	
	construction	-0.20	0.09	-2.38	*	-0.09	0.08	-1.19		0.06	0.09	0.65	
	wholesale	0.19	0.87	2.15	*	0.05	0.08	0.56		0.17	0.09	1.87	
	retall	0.03	0.09	0.34		0.00	0.08	0.01		0.08	0.09	0.82	
	real estate	-1.26	0.11	-11.42	***	-1.18	0.10	-11.32	***	-1.30	0.12	-10.53	***
	service	0.14	0.08	1.78		0.27	0.08	3.55	***	0.35	0.09	4.16	***
	infrastructure	-1.04	0.26	-3.95	***	-1.02	0.27	-3.79	***	-1.36	0.39	-3.52	***

***,** and * indicate significance at the 0.1%,1%,5% levels

Furthermore, there are other points to note when interpreting the graphs and estimation formulas shown in this paper. For example, during the COVID-19 pandemic, the FSA announced that the borrower classification could be maintained for borrowers who had been deemed normal before the pandemic based on the financial institutions' discretion.[8] However, the impact of this announcement has not been taken into account in this analysis. Moreover, due to data limitations, it is difficult to detect the cause of the changes in the sample size of the borrowers, i.e., whether the sample size changes come from bankruptcy or repayment is uncertain, which may have a non-negligible impact on the estimation. Therefore, the results of this analysis should be interpreted with caution.

[8]Financial Services Agency, "Cash Flow Support in Light of the Decision on the Second Supplementary Budget for Fiscal 2020 (Request)" (Japanese Only)
https://www.fsa.go.jp/news/r1/ginkou/20200527_2yousei.html

V. Conclusion

In this analysis, the characteristics and trends of credit guaranteed loans by regional banks amid the COVID-19 pandemic were identified, and the impact of such loans on borrower classification was analyzed by comparing this impact with that of firms that have not applied for credit guaranteed loans. The results suggest that swift and large-scale liquidity support using the Credit Guarantee System during the COVID-19 pandemic may have contributed to firms' business continuity until sales are on a recovery track and preventing a sharp deterioration in borrower classification. On the other hand, there has been only a limited proportion of firms whose sales have recovered to pre-COVID-19 levels and borrower classification has been deteriorating, albeit moderately. With these in mind, further analyses need to be conducted from various perspectives to examine the impact of credit guaranteed loans during the COVID-19 pandemic, while the repayment of effectively interest-free and unsecured loans will proceed.

Quantitative Analysis of Consultation and Support Functions by Financial Institutions

(Summary)

This paper attempts to conduct a quantitative analysis of business consultation and support functions provided by financial institutions to their client firms, using a questionnaire asking how firms evaluate financial institutions' practices as well as firms' financial data. It is suggested that there are certain correlations between the consultation and support functions provided by financial institutions and changes in firms' financial performance, although data and analytical methods need to be improved to further examine the effects of policies related to consultation and support functions by financial institutions.

I. Scope of analysis

The concept of "relationship banking," in which financial institutions provide loans to firms based on information about the qualities of the managers and business potential of the firm under a long-term business relationship, has been widely recognized since the Financial Services Agency (FSA) and its expert committee published reports titled "Toward Strengthening the Function of Relationship Banking" (2003) and the following "Action Program for Strengthening the Function of Relationship Banking" (2003).[1] The program proposed the need to strengthen the function of relationship banking, and since then many narrative-based case studies of relationship banking have been accumulated. However, quantitative verification of the effects of relationship banking has not been conducted so widely compared to the accumulation of qualitative cases. Therefore, in this paper, an analysis using a quantitative method is conducted to examine how financial institutions provide business consultation and support services to their client firms (hereinafter, "consultation and support functions"). In the analysis, individual responses to the FSA's questionnaire on financial institutions' practices collected from SMEs (hereafter, "corporate questionnaire") are utilized as a part of the dataset.

This paper conducts analyses from the following three perspectives by using data, such as a corporate questionnaire conducted in March 2020, corporate financial data (FY2019 data) obtained

[1] https://www.fsa.go.jp/news/newsj/14/ginkou/f-20030328-2.html (Japanese only)

from a third-party vendor, and the FSA's internal data on financial institutions' loans and capital as of the end of March 2020:

(1) Analysis of trends in consultation and support functions

(2) Analysis of the impact of the support functions on firms' willingness to continue their relationship with a financial institution

(3) Analysis of the impact of consultation and support functions on firms' financial performance

This paper analyzes the performance of consultation and support functions by main banks (the banks with the top financing share to certain firms among other peers) based on responses to the corporate questionnaire; the trends of non-main banks are not in the scope of the analysis.

II. Analysis (1): Analysis of trends in consultation and support functions

As pointed out in the progress report on enhancing the financial intermediary function published by the FSA in June 2023,[2] regional financial institutions are, by their nature, required to develop business models that enable them to achieve their own sustainable management based on their regional business bases. Therefore, providing consultation and support to their regional clients could be an effective measure for ensuring both the stability of their own business bases and the sustainability of the regional economies.

On the other hand, how to perform consultation and support functions depends on the business model and the management strategy of each financial institution. Therefore, an analysis using the data mentioned above is conducted in order to grasp the characteristics of what types of banks and clients are more involved in consultation and support functions.

1. Analytical method

A corporate questionnaire conducted by the FSA asks SMEs about how their main banks are performing and whether they make use of various services provided by their main banks. Questions cover banks' consultation activities, such as "attentive interview on business and management concerns," and support services, such as "support on business plan development," as shown in Table

[2] https://www.fsa.go.jp/news/r4/ginkou/20230628/20230628.html (Japanese only)

1 below (hereafter, activities and services related to consultations and support functions by banks are collectively referred to as "services"). SMEs answer the questionnaire by selecting “yes” or “no” to the applicability of each service. Based on this, the following logit model is built to estimate the relationship between the probability of a firm i answering "yes" to each service s ($p_{i,s}$) and variables related to individual firms’ financial status and financial institutions’ characteristics.[3]

$$log\frac{p_{i,s}}{1-p_{i,s}} = \beta_{0,j,s} + \sum_{m=1}^{5} \beta_{m,j,s} \cdot Company_{m,i} + \sum_{m=6}^{8} \beta_{m,l,s} \cdot Financial\_institution_{m,k} + \varepsilon_{i,s}$$

Three services related to consultation and five services related to support are used for dependent variables. In addition, the question about whether the firms are "receiving visits from the main bank about once a month” is also included as a dependent variable for comparison. In total, nine regression analyses are performed. Explanatory variable $Company_{m,i}$ denotes firms’ financial status and $Financial\_institution_{m,k}$ denotes the characteristics of the financial institutions providing services. $\beta_{0-5,j,s}$ and $\beta_{6-8,l,s}$ are parameters to be estimated and $\varepsilon_{i,s}$ represents the error term.

[3]The items related to the implementation status of consultation services, such as "attentive interview on business and management concerns," are items that are evaluated subjectively by client firms. Therefore, when a high rating is observed for these items, there are two possibilities: financial institutions are focusing on providing consultation services, or a client gives a high rating simply because it has a favorable impression of financial institutions. Analyses in this paper use consultation-related services as a proxy variable for the former and thus do not consider the latter possibility. Therefore, various possibilities need to be considered when interpreting the results presented in this paper.

Table 1: List of Variables

[Service (dependent variables)]

Consultation

(1) Attentive interview on business and management concerns

(2) Frequent communication on issues and concerns related to business and management

(3) Issues raised and evaluations conveyed by the main bank are convincing

Support

(4) Business plan development

(5) Improvement of financial conditions

(6) Introduction of business partners and distributors

(7) Fixed cost reduction

(8) Introduction of management personnel

Other

(9) Receiving visits approximately once a month

Corporate financial variables (Company)

(1) ROA (operating income / total assets)

(2) Debt ratio (long-term and short-term debt / total assets)

Control variable

(3) Industry dummy

(4) Number of employees dummy

(5) Management age dummy

[Financial institution characteristic variables]

(6) Share of loans in the prefecture where the head office is located

(7) Lending competition in the prefecture where the head office is located (loan amount HHI*)

(8) Equity capital (logarithm)

(*) HHI (Herfindahl-Hirschman Index) is an index measuring the competitiveness in the market. Here, HHI is calculated by aggregating the squares of the loan amount shares of all financial institutions in the certain prefecture. The value range from 0 to 1, with closer to 0 being more competitive and closer to 1 being more monopolistic.

2. Estimation results

Table 2 shows the logit model's estimation results for each service, from which the following three trends can be observed. First, the coefficients for firms' ROA are significantly positive for 2 out of the 3 consultation services and 4 out of the 5 support services, and the coefficients for the debt ratio are significantly positive for all services. This indicates that firms with better profitability (ROA) and more borrowing (higher debt ratio) are more likely to receive consultation and support from financial institutions. Second, the coefficients for the size of financial institutions (equity capital) are significantly negative for all 5 support services, indicating that smaller financial institutions are more likely to provide support services. Third, the coefficients for the loan amount HHI are significantly positive for the 3 consultation services and negative for 2 support services, indicating that financial institutions headquartered in regions where competition among financial institutions is not intense (i.e., where the

loan amount HHI is high) are relatively more likely to provide consultation, but in contrast, for some support services, financial institutions in regions where competition is intense (i.e., where the loan amount HHI is low) are more likely to provide support services.

It should be noted that this analysis confirmed only the correlation between questionnaire responses and various variables related to firms' financial status and characteristics of financial institutions. For example, the first observation that "firms with higher profitability (ROA) receive more consultation and support from financial institutions" suggests that there are both possibilities that financial institutions may be actively providing services to firms with higher profitability (ROA), and that firms with higher profitability (ROA) may have more need for such services from financial institutions. Thus, it is necessary to consider these various possibilities when interpreting this analysis.

Table 2: Estimation results (Regression against each service)

Consultation services

dependent variables	Attentive interview on bussiness and management concerns	Frequent communication on issues and concerns related to bussiness and management	Issues raised and evaluations conveyed by main bank are convinsing
ROA (oprerating income / total assets)	1.2034**	0.9433*	0.4523
	(0.008)	(0.024)	(0.395)
Debt ratio (long-term and short-term debt / total assets)	0.6521***	0.5656***	0.5143***
	(0.000)	(0.000)	(0.001)
Share of loans in the prefecture where the head office is located	0.0126	-0.3236	-0.0002
	(0.971)	(0.303)	(0.999)
Lending competition in the prefecture where the head office is located (loan amount HHI)	1.1860 †	1.1988*	1.0001 †
	(0.076)	(0.048)	(0.094)
Equity capital (logarithm)	0.0147 †	0.0003	-0.0043
	(0.068)	(0.964)	(0.554)
pseudo-R2	0.04198	0.0307	0.02359

Supporting services

dependent variables	Bussiness plan development	Improvement of financial conditions	Introduction of bussiness partners and distributors	Fixed cost reductions	Introduction of management personnel	Receiving visits approximately once a month
ROA (oprerating income / total assets)	1.7485**	2.5295**	0.6723	1.8225 †	2.2673 †	1.0185*
	(0.009)	(0.007)	(0.288)	(0.087)	(0.076)	(0.027)
Debt ratio (long-term and short-term debt / total assets)	1.6045***	1.3095***	0.3688*	0.7203*	0.6771*	0.4649**
	(0.000)	(0.000)	(0.039)	(0.012)	(0.014)	(0.006)
Share of loans in the prefecture where the head office is located	0.4874	0.5228	0.2642	-0.6970	0.8567	-0.6464 †
	(0.300)	(0.219)	(0.509)	(0.306)	(0.187)	(0.068)
Lending competition in the prefecture where the head office is located (loan amount HHI)	-1.7069 †	-0.212	-0.7641	-0.8453	-3.5722**	0.4145
	(0.062)	(0.800)	(0.324)	(0.517)	(0.004)	(0.547)
Equity capital (logarithm)	-0.1117***	-0.1109***	-0.0790***	-0.1366***	-0.1192***	0.0406***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
pseudo-R2	0.03629	0.02929	0.02504	0.01300	0.01384	0.04661

※ upper row : Estimated coefficients、lower row : (p-value)

※ Constant terms and dummy variables are omitted.

※ “†”, “*”, “**”, and “***” indicate that the significance level is met at 10%, 5%, 1%, and 0.1%.

III. Analysis (2): Analysis of the impact of the support functions on firms' willingness to continue their relationship with a financial institution

In order for financial institutions to realize the business model of relationship banking, it is ideal to create a virtuous cycle between the services provided by financial institutions and their clients' willingness to continue business transactions. In other words, relationship banking requires financial institutions to build good relationships with their client firms by providing support and other services. In turn, these firms are expected to become willing to maintain a relationship with the financial institutions, which leads to sustainable profitability of the financial insitutions.

In this section, the impact of the support functions on the clients' willingness to continue transactions with financial institutions is examined by using the aforementioned data.

1. Analytical method

The following logit model is built, where $p_{i,s}$ denotes the probability that firm i answers, "Yes, I definitely want to continue doing business with the current main bank," to the question, "Do you want to continue doing business with your current main bank?" $Service_{i,s}$ denotes whether a firm received each support service from a financial institution (binary variable: applicable: 1, not applicable: 0).

$$log\frac{p_{i,s}}{1-p_{i,s}} = \beta_{0,j,s}+\beta_{1,j,s}\cdot Service_{i,s} + \sum_{m=2}^{6}\beta_{m,j,s}\cdot Company_{m,i}$$

$$+\sum_{m=7}^{9}\beta_{m,l,s}\cdot Financial\_institution_{m,k}+\varepsilon_{i,s}$$

The list of variables is shown in Table 3. $\beta_{0-6,j,s}, \beta_{7-9,l,s}$ are the parameters to be estimated and $\varepsilon_{i,s}$ is the error term. Services provided by financial institutions to clients are used as explanatory variables. A total of ten services are chosen as explanatory variables, of which five are related to business support, such as "business plan development," and four are related to financing, such as "loans for equipment funds." Another service, “Receiving visits approximately once a month," is included as a comparison. Ten separate regressions were run to evaluate the impact of each service

on willingness to continue the relationship. In addition, firms' financial status $Company_{m,i}$ and the characteristics of financial institutions $Financial\_institution_{m,k}$ are included in the logit formula as control variables similar to Analysis (1).

Table 3: List of Variables

Questionnaire item (dependent variables)

- Whether the client firm is willing to continue transactions with the main bank

Service

Support

(1-1) Business plan development

(1-2) Improvement of financial conditions

(1-3) Introduction of business partners and distributors

(1-4) Fixed cost reduction

(1-5) Introduction of management personnel

Loan

(1-6) Loans for equipment funds

(1-7) Loans for working capital for purchases of commodities and raw materials

(1-8) Loans for funds related to the payment of expenses, such as employees' salaries

(1-9) Loans for funds related to the repayment of existing loans

Other

(1-10) Receiving visits approximately once a month

Corporate financial variables (Company)

Control variable

(2) ROA (operating income / total assets)

(3) Debt ratio (long-term and short-term loans / total assets)

(4) Industry dummy

(5) Number of employees dummy

(6) Management age dummy

Financial Institution characteristic variables

(7) Share of loans in the prefecture where the head office is located

(8) Lending competition in the prefecture where the head office is located (loan amount HHI*)

(9) Equity capital (logarithm)

(*) HHI (Herfindahl-Hirschman Index) is an index measuring the competitiveness in the market. Here, HHI is calculated by aggregating the squares of the loan amount shares of all financial institutions in the certain prefecture. The value range is from 0 to 1, with closer to 0 being more competitive and closer to 1 being more monopolistic.

2. Estimation results

Table 4 shows the estimated results of the logit model for each service provided by financial institutions. For 9 of the 10 items, significantly positive coefficients were observed, indicating that there is a certain correlation between the willingness of firms to continue transactions with their current

main bank and the provisioning of support services by the main bank.

However, similar to the previous Analysis (1), this analysis also confirmed just the correlation and did not evaluate the causal relationship, i.e., causality between the proposal or provision of services by the financial institution, and clients' willingness to continue transactions with the financial institution is uncertain. Thus, it is necessary to recognize such possibilities in interpreting the results.

Table 4: Estimation results (Regression using each service as explanatory variable)

Supporting services

dependent variables	Whether the client firm is willing to continue transactions with the main bank				
Bussiness plan development	0.3331*				
	(0.018)				
Improvement of financial conditions		0.3356**			
		(0.009)			
Introduction of bussiness partners and distributors			0.5671***		
			(0.000)		
Fixed cost reductions				0.2078	
				(0.311)	
Introduction of management personnel					0.6208**
					(0.002)
pseudo-R2	0.02882	0.02928	0.03501	0.02702	0.03059

Loans, other services

dependent variables	Whether the client firm is willing to continue transactions with the main bank				
Loans for equipment funds	0.3762***				
	(0.000)				
Loans for working capital for purchases of commidities and raw materials		0.5975***			
		(0.000)			
Loans for funds related to the payment of expenses, such as employees' salaries			0.5398**		
			(0.002)		
Loans for funds related to the repayment of existing loans				0.2301 †	
				(0.082)	
Receiving visits approximately once a month					0.9379***
					(0.000)
pseudo-R2	0.03138	0.03954	0.03047	0.02779	0.06047

※ upper row : Estimated coefficients、lower row : (p-value)

※ Constant terms and dummy variables are omitted.

※ " † ", "*", "**", and "***" indicate that the significance level is met at 10%, 5%, 1%, and 0.1%.

IV. Analysis (3) Analysis of impact of consultation and support functions on firms' financial performance

As previously noted, the need for financial institutions to provide consultation and support to their clients has been widely recognized since the publication of the "Action Program" by the FSA in 2003. Many case studies of relationship banking have been accumulated in narrative forms since then, however, a quantitative examination of its effects seems to still be underway due to limitations in

available data and methods.

Against this backdrop, this section attempts to conduct a quantitative analysis, using the aforementioned data, to examine the causality question, that is, whether the consultation and support functions by financial institutions contribute to the financial performance of their clients.

1. Analytical method

First, the relationship between the changes in financial indicators of clients between FY2019 and FY2022 and services related to consultation and support functions are estimated by using regression formula 1 below.

(Regression formula 1)

$$Financial\_indicator\_diff_{i,f} = \beta_{0,j,f,s} + \beta_{1,j,f,s} \cdot Service_{i,s} + \beta_{2,j,f,s} \cdot Industry_i + \beta_{3,j,f,s} \cdot Number\_of\_employees_i + \varepsilon_{i,f,s}$$

The dependent variable $Financial\_indicator\_diff_{i,f}$[4] denotes the differences in three financial indicators between FY2019 and FY2022, i.e., EBITDA, liquidity ratio, and expenses (excluding interest expenses and other extraordinary expenses). Since it is considered that it takes a certain period for consultation and support functions to have an actual impact on clients' financial performances, the three-year differences in financial indicators are used.

The explanatory variable $Service_{i,s}$ denotes services related to consultation and support functions provided by financial institutions. $Industry_i$ and $Number\_of\_employees_i$ are control variables representing industry and the number of employees dummy respectively. $\beta_{0-3,j,f,s}$ are the parameter to be estimated and $\varepsilon_{i,f,s}$ is the error term.

However, even if a significant coefficient is found in the assumed direction in regression formula 1, the possibility of an inverse causal relationship cannot be ruled out. That is, financial institutions may actively provide consultation and support to financially sound firms. Therefore, as shown in regression formula 2 below, the instrumental variables method, which is a common method in causal inference, was conducted in the following analysis.

[4]The definition of subscript f represents the letter that identifies the difference between the 2019 and 2022 financial measures of the explained variable.

Specifically, first, the dependent variable $Service_{i,s}$, which denotes consultation and support services provided by financial institutions, is estimated by the instrumental variable $Bank\_Equity_k$, which denotes financial institutions' equity capital. In addition, $Bank\_Share_k$, which denotes financial institutions' share of loans in the prefecture in which their head offices are located, is used as a control variable (regression formula 2-1). Next, $fitted\_Service_{i,s}$ is estimated as shown in regression formula 2-2 below to identify a causal relationship.

(Regression formula 2)

(Regression formula 2-1)

$$Service_{i,s} = \beta_{0,j,s} + \beta_{1,l,s} \cdot Bank\_Equity_k + \beta_{2,l,s} \cdot Bank\_Share_k + \varepsilon_{i,s}$$

(Regression formula 2-2)

$$Financial\_indicator\_diff_{i,f} = \beta_{0,j,f,s} + \beta_{1,j,f,s} \cdot fitted\_Service_{i,s} + \beta_{2,l,f,s} \cdot Bank\_Share_k + \varepsilon_{i,f,s}$$

Box 1: Instrumental variable method

In the instrumental variable method, a certain variable that is not correlated with the dependent variable but is correlated with the explanatory variable (instrumental variable) is used to specify a causal relationship by excluding the impact of covariates that affect both the dependent variable and the explanatory variable.

On the premise that the size of financial institutions is correlated with the extent to which they provide consultation and support functions to their clients but is unrelated to the financial performance of the clients to some extent, "the amount of financial institutions' equity capital (logarithm)," which is a proxy variable for the size of financial institutions, is introduced as an instrumental variable.

However, the selected instrumental variable may directly affect the dependent variable, i.e., there may be a tendency for firms with good financial conditions to have a relationship with a large-sized financial institution in the region. Therefore, the share of loans in the prefecture where the financial institution's head office is located is used as a control variable, as a proxy variable for "the relative size of the financial institution in its region." By controlling this, the aforementioned tendency is expected to be controlled and thus the exogeneity of the instrumental variable on the dependent variable is expected to be strengthened.[5]

[5]It should be noted that the control may not be perfect because the business area of financial institutions is actually subdivided at the level of municipalities or even smaller, not at the level of prefectures.

2. Estimation results

Table 5 shows the estimated results of regression formula 1. A significantly positive coefficient is observed for "Fixed cost reduction" against "ΔEBITDA," while significantly negative coefficients are observed for "Improvement of financial conditions" and "Referrals of business partners and distributors" against "Δexpenses (excluding interest expenses, etc. and extraordinary expenses)."[6]

Table 5: Estimation results

Consultation services

dependent variables	Δ EBITDA			Δ liquidity ratio			Δ expenses (excluding interest expenses, etc. and extraordinary		
Attentive interview on bussiness and management concerns	0.3881			-0.3402			1.0414 †		
	(0.427)			(0.157)			(0.069)		
Frequent communication on issues and concerns related to bussiness and management		0.6519			-0.3603			0.5083	
		(0.244)			(0.191)			(0.439)	
Issues raised and evaluations conveyed by main bank are convinsing			0.279			-0.2992			0.8770
			(0.694)			(0.391)			(0.291)
R2	0.023	0.023	0.022	0.005	0.005	0.004	0.013	0.012	0.012

Supporting services

dependent variables	Δ EBITDA					Δ liquidity ratio					Δ expenses (excluding interest expenses, etc. and extraordinary expenses)				
Bussiness plan development	-0.5019					-0.1474					-0.2224				
	(0.488)					(0.679)					(0.794)				
Improvement of financial conditions		0.4911					-0.2198					-1.3265 †			
		(0.462)					(0.503)					(0.090)			
Introduction of bussiness partners and distributors			0.7509					0.0174					-1.3562 †		
			(0.229)					(0.955)					(0.064)		
Fixed cost reductions				2.3353*					0.2184					-1.3702	
				(0.033)					(0.685)					(0.285)	
Introduction of management personnel					0.0313					0.0432					-0.4788
					(0.974)					(0.927)					(0.672)
R2	0.023	0.023	0.023	0.025	0.022	0.004	0.004	0.004	0.004	0.004	0.011	0.013	0.013	0.012	0.011

※ upper row : Estimated coefficients、lower row : (p-value)

※ Constant terms and dummy variables are omitted.

※ "†", "*", "**", and "***" indicate that the significance level is met at 10%, 5%, 1%, and 0.1%.

※ For EBITDA and expenses, NEG-LOG transformation (Yn = sng(Xn) x ln(|Xn| + 1), if Xn > 0, sgn = +1 else sgn = -1) was applied.

Table 6 shows the results of the first step estimation (regression formula 2-1) of the two step least-squares method of the instrumental variable method. Given the significant coefficient for the consultation service "Attentive interview on business and management concerns" against the instrumental variable $Bank\_Equity_k$, the second step estimation (regression formula 2-2) is conducted for "Attentive interview on business and management concerns" as shown in Table 7.

[6]"Attentive interview on business and management concerns" is significant for "Δexpenses (excluding interest expenses, etc. and extraordinary expenses)" in the opposite direction to the assumed sign, but there is a possibility of an inverse causal relationship. The point is the same that it cannot be evaluated based on this analysis alone.

Table 6: Estimation results

	consultation services				support services			
dependent variables	Attentive interview on bussiness and management concerns	Frequent communication on issues and concerns related to bussiness and management	Issues raised and evaluations conveyed by main bank are convinsing	Bussiness plan development	Improvement of financial conditions	Introduction of bussiness partners and distributors	Fixed cost reductions	Introduction of management personnel
Bank Equity (logarithm)	-0.0183†	-0.0070	-0.0045	-0.0077	-0.0100	0.0014	-0.0045	0.0018
	(0.087)	(0.451)	(0.541)	(0.286)	(0.202)	(0.872)	(0.342)	(0.740)
Share of loans in the prefecture where the head office is located	0.0293	-0.0002	-0.0727	-0.0366	0.0459	-0.0007	-0.0524	-0.0264
	(0.698)	(0.998)	(0.159)	(0.469)	(0.404)	(0.990)	(0.118)	(0.489)
R2	0.002	0.000	0.002	0.001	0.001	0.000	0.003	0.000
F-value	1.49	0.3243	1.677	1.249	0.9023	1.40E-02	2.485	0.2441

※ upper row : Estimated coefficients、lower row : (p-value)

※ Constant terms and dummy variables are omitted.

※ "†", "*", "**", and "***" indicate that the significance level is met at 10%, 5%, 1%, and 0.1%.

Table 7: Estimation results

dependent variables	Δ EBITDA	Δ liquidity ratio	Δ expenses (excluding interest expenses, etc. and extraordinary expenses)
Attentive interview on bussiness and management concerns	2.0312	-1.5615	24.942
	(0.8718)	(0.7633)	(0.2191)
R2	-0.0057	-0.0126	-0.9874

※ upper row : Estimated coefficients、lower row : (p-value)

※ Constant terms and dummy variables are omitted.

※ "†", "*", "**", and "***" indicate that the significance level is met at 10%, 5%, 1%, and 0.1%.

※ for EBITDA and expenses, NEG-LOG transformation (Yn = sng(Xn) x ln(|Xn| + 1), if Xn > 0, sgn = +1 else sgn = -1) was applied.

A causal relationship between the consultation item "Attentive interview on business and management concerns" and three-year differences between financial indicators could not be confirmed under this instrumental variable method. However, for the following reasons, it would not be appropriate to conclude from this analysis alone that the consultation and support functions do not improve firms' financial performance. First, there is room for further consideration in the selection of instrumental variables[7] as the causal inference was unstable and also performed partially since no effective instrumental variables were found for the three services for which significant coefficients were confirmed in the aforementioned regression formula 1, i.e., "Improvement of financial conditions," "Fixed cost reduction," and "Introduction of business partners and distributors", within the data used in this analysis. Second, a significant sample reduction occurred in the process of combining a corporate questionnaire and corporate financial data, so there might be some sample bias in the dataset. Third, the time horizon covered in this analysis needs to be discussed as some consultation and support services may take more than three years to improve firms' financial

[7]For the selection of instrumental variable, in addition to the analysis using regression formula 2, a separate analysis using another instrumental variable, a dummy variable indicating how a firm answered to the corporate questionnaire (whether by online or by post), has also been tested. The result was same, i.e., significant causality was not observed. This alternative instrumental variable was selected based on the hypothesis that the attitude of understanding the questionnaire instructions and responding via online form is correlated with the extent to which the firm receives consultation and support functions from financial institutions. Industry and number of employees are controlled in the analysis, assuming that larger firms may tend to respond by online and that ICT literacy by industry may correlate with the way of answering the questionnaire.

performance, depending on the nature of the services.

V. Conclusion

In this paper, a quantitative analysis of financial institutions' consultation and support functions was conducted using corporate questionnaires and corporate financial data.

Analysis (1) and (2) identified the trends and characteristics of consultation and support by financial institutions, which is expected to help deepen the understanding of financial institutions' business models and behavior. Analysis (3) found a certain correlation between the provision of consultation and support functions by financial institutions and firms' financial performance, although causal relationship was not observed.

Although the models and analytical results presented in this paper provide some clues to understanding the current situation, the analytical framework of utilizing qualitative information, such as a corporate questionnaire and individual firms' financial data and other granular data, is still at the experimental phase. Furthermore, since it is not possible to directly observe the performance of consultation and support functions provided by financial institutions to their clients, the analysis utilized the responses of corporate questionnaires, which may be affected by factors other than the performance of consultation and support functions, such as firms' subjective favorable impression of financial institutions and firms' need for services. Moreover, the process of sampling and submitting corporate questionnaires, and the sample reduction that occurred when combining corporate questionnaires with corporate financial data, may generate sample bias. For these reasons, it is important to interpret the results taking these points into consideration.

Enhancing policy making and policy assessment based on data and quantitative analysis is a medium- to long-term agenda. Even in cases where it is difficult to identify causality due to the existence of various confounding factors and simultaneous determinism as in the analysis in this paper, it may be possible to assess policy effects through the construction of appropriate datasets and models. The FSA will continue to improve its data infrastructure including collection of granular data, such as transaction-level data on bank loans[8] and corporate financial data. The FSA will also continue to enhance analytical methods to better understand the environment surrounding the financial system and the economy, and to have effective dialogues with financial institutions.

[8]https://www.fsa.go.jp/news/r4/sonota/20230623/20230623.html

Box 2: Another method of modeling analysis (3) by focusing on changes in questionnaire responses

Analysis (3) analyzed the relationship between three-year changes in financial indicators and the "level" of questionnaire responses (i.e., whether or not client firms are receiving consultation or support services at a certain point in time), under the assumption that ongoing commitment by financial institutions improves the financial performance of the clients.

However, given that changes in the provision of consultation/support functions trigger improvements in the financial performance of the clients, there may be another way of designing the analysis focusing on "changes" in the responses of the same firm to the corporate questionnaire (i.e., changes over time from the status of not receiving consultation/support services to the response of receiving consultation/support services). Therefore, an additional analysis was conducted using the following fixed effects model[9] with a focus on the relationship between “changes” in the responses of the same company to the corporate questionnaire and changes in its financial indicators.

In this analysis, firm-fixed effect $Firm_i$ and time-fixed effect $Year(2020,2021)_t$ are introduced (due to the introduction of a time-fixed effect, the dependent variable, a financial indicator, is changed from its difference to its level at a certain time). Estimation for $t = 2020$ $(t = 2021)$ uses the corporate questionnaires conducted in March 2020 (April 2021) and TDB's corporate financial data for FY2019 (FY2020)[10]. The number of samples used in this analysis is N = 1834, where $\beta_{0-1,j,f,s}$, $\beta_{2,i,f,s}$ and $\beta_{3,f,s,t}$ are the parameters to be estimated and $\varepsilon_{i,f,s,t}$ represents the error term.

(Regression formula 3)

$$Financial\_indicator_{i,f,t} = \beta_{0,j,f,s}+\beta_{1,j,f,s}\cdot Service_{i,s,t} + \beta_{2,i,f,s}\cdot Firm_i + \beta_{3,f,s,t}\cdot Year(2020,2021)_t+\varepsilon_{i,f,s,t}$$

The results of the estimation are shown in Table 8. As with regression formula 1 in Analysis (3), significant coefficients were found among some services but no causal relationship could be observed by applying the instrumental variable method using "the amount of equity capital of financial institutions," which was controlled by the share of loans in the prefecture where the financial

[9]In this section, dummy variables are set for observed individuals and time, respectively, and the problem of missing variables is solved by controlling elements that are different for observed individuals but constant over time, and elements that are constant for observed individuals but different over time. Therefore, the effect of trends common to all individuals against time and fluctuating over time is removed from the estimation.

[10]Fiscal period ends between April 2019 (2020) and March 2020 (2021) are defined as FY2019 (FY2020).

institution's head office is located, as an instrumental variable.[11]

However, as in analysis (3), it is not possible to conclude from this analysis alone that the provision of consultation and support function to clients has no impact on their financial performances given that it may take considerable time for financial institutions' services to take effect on firms' financial performance and so on.

Table 8: Results of model estimates (regression results for each service against financial indicators)

Consultation services

dependent variables	EBITDA			liquidity ratio			expenses (excluding interest expenses, etc. and extraordinary expenses)		
Attentive interview on bussiness and management concerns	0.0225			0.0314			-0.0059		
	(0.615)			(0.757)			(0.969)		
Frequent communication on issues and concerns related to bussiness and management		0.0127			0.2259*			-0.0004	
		(0.791)			(0.037)			(0.982)	
Issues raised and evaluations conveyed by main bank are convinsing			-0.0458			0.0900			0.0007
			(0.432)			(0.496)			(0.973)
R2	0.946	0.946	0.946	0.936	0.937	0.936	0.969	0.969	0.969

Supporting services

dependent variables	EBITDA					liquidity ratio					expenses (excluding interest expenses, etc. and extraordinary expenses)				
Bussiness plan development	-0.0872					0.0798					-0.0424 †				
	(0.240)					(0.635)					(0.090)				
Improvement of financial conditions		-0.0660					-0.0443					0.0232			
		(0.281)					(0.750)					(0.262)			
Introduction of bussiness partners and distributors			-0.0129					0.0202					-0.0007		
			(0.816)					(0.872)					(0.969)		
Fixed cost reductions				0.0107					-0.1324					-0.0092	
				(0.910)					(0.536)					(0.772)	
Introduction of management personnel					-0.1786*					-0.1491					0.0096
					(0.046)					(0.463)					(0.750)
R2	0.946	0.946	0.946	0.946	0.946	0.936	0.936	0.936	0.936	0.936	0.969	0.969	0.969	0.969	0.969

※ upper row : Estimated coefficients、lower row : (p-value)

※ Constant terms and dummy variables are omitted.

※ "†", "*", "**", and "***" indicate that the significance level is met at 10%, 5%, 1%, and 0.1%.

※ for EBITDA and expenses, NEG-LOG transformation (Yn = sng(Xn) x ln(|Xn| + 1), if Xn > 0, sgn = +1 else sgn = -1) was applied.

[11]A significant relationship is observed between EBITDA and "Introduction of management personnel" in the opposite direction from the expectation. It is possible to interpret this as meaning that a company with low profitability (EBITDA) is more likely to use the "Introduction of management personnel" service (reverse causality) and that the "Introduction of management personnel" service does not immediately lead to an improvement in profitability (EBITDA). In any case, it is difficult to make a convincing interpretation without addressing the issue of simultaneous determinism of the dependent and explanatory variables.