

Supervisory Policy and Business Model Transformation: Evidence from Japanese Regional Banks*

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Abstract

This paper examines whether supervisory policy influences the evolution of bank business models in Japan. While recent studies document that a subset of regional banks has persistently shifted away from the traditional regional banking model, little is known about the factors driving such transformation. Building on Kimura (2024), which identifies bank business models using a clustering approach, this study employs a fixed-effects framework to investigate whether the Financial Services Agency's supervisory stance contributed to changes in banks' business models. Business model evolution is measured by changes in the Euclidean distance between individual banks and business model centroids, allowing us to capture both departures from and convergence toward alternative business models. The results show that supervisory policy significantly encourages banks to move away from the traditional regional banking model. However, there is no robust evidence that supervision systematically directs banks toward a specific alternative model, such as the major-bank business model. Instead, the destination of business model transformation appears to be determined primarily by broader macro-financial conditions and bank-specific strategic responses. These findings suggest that supervisory policy serves as a catalyst for business model change rather than as a determinant of its ultimate direction, highlighting the complementary roles of regulatory and market forces in shaping structural transformation in the banking sector.

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1. Introduction

The business models of banks¹ have become an increasingly important subject of both academic research and financial regulation. Technological innovation, the entry of FinTech firms and other non-bank competitors, the prolonged low-interest-rate environment, and changes in supervisory and regulatory frameworks have fundamentally altered the environment in which banks operate. As a result, banks have been under growing pressure to adapt their business models in order to maintain profitability, competitiveness, and financial resilience.

Despite the growing recognition that banks' business models are evolving, there is remarkably little empirical evidence on the determinants of such transformation. In particular, while regulatory reforms and supervisory policies are frequently cited as important drivers of banks' strategic adjustments, their causal effects on business model evolution remain largely unexplored.

In Japan, the financial crisis of the late 1990s triggered a series of government-led reforms of banks, including capital injections and industry restructuring (Osada et al., 2017). Subsequently, banks have continued to face pressure to transform their business models in response to prolonged low interest rates, sluggish economic growth, and changes in financial supervision and regulatory policies.

Against this background, this study analyzes, using the results of Kimura (2024), the impact of changes in the Financial Services Agency's supervisory stance on the business models of regional banks through fixed-effects estimation.

Kimura (2024) quantitatively examined whether Japanese bank business models are similar

¹ In this paper, the term "banks" is used in its broad sense to refer to deposit-taking financial institutions.

across institutional types². Using financial data of Japanese banks from fiscal year 2011 to fiscal year 2018, it identified and classified bank business models by applying clustering methods used in previous studies (Roengpitya et al., 2017; Ayadi et al., 2020; Farnè and Vouldis, 2021; Hryckiewicz and Kozłowski, 2017). As a result, Japanese banks were broadly classified into seven business models (see Table 1). Moreover, from fiscal year 2014 onward, it was observed that some regional banks irreversibly shifted from the regional bank-type business model (BM4) to the major bank-type business model (BM1), crossing institutional boundaries.

Accordingly, focusing on regional banks for which movements away from the BM4 are clearly observed as a result of strategic choices, we conduct fixed-effects estimation to examine whether the supervisory stance of the Financial Services Agency has an impact. Regional banks exhibiting “clear movement away from the regional bank-type business model” are defined as those whose distance from the centroid of “Business Model 4 (BM4)” increased by 30% or more, or by 50% or more, between fiscal years 2011 and 2018 in the clustering analysis of Kimura (2024).

The focus on regional banks' transition toward the major-bank business model is motivated by two considerations. First, during the sample period, the Financial Services Agency (FSA) maintained separate supervisory frameworks for major banks and for small and regional financial institutions through the Comprehensive Guidelines for the Supervision of Major Banks (Shuyōkō-muke no Sōgōteki na Kantoku Shishin) and the Comprehensive Guidelines

² In Kimura (2024), “similarity” refers to whether banks can be distinguished by institutional type when classified based on financial indicators. Furthermore, “business model” is defined as the strategic choices underlying banks’ corporate activities, specifically, the classification results based on combinations of multiple financial indicators. “Institutional type” refers to classifications of banks—based on the Financial Services Agency’s “List of Licensed, Authorized, and Registered Institutions,” with some modifications—such as major banks, regional banks, shinkin banks, and credit cooperatives.

for the Supervision of Small and Regional Financial Institutions (Chūshō Chiiki Kin'yū Kikan-muke no Sōgōteki na Kantoku Shishin). This institutional arrangement suggests that the difference in supervisory stance between major banks and regional financial institutions was substantially greater than that among different categories of regional financial institutions. Consequently, a transition from the regional bank business model to the major-bank business model represents the most meaningful change from the perspective of supervisory policy.

Second, Kimura (2024) shows that while regional banks were overwhelmingly classified into BM4, a non-negligible number of them gradually shifted away from this business model. By contrast, although major banks were almost exclusively classified into BM1, there were virtually no cases in which they moved to other business models. This asymmetric pattern suggests that business model transformation was primarily a phenomenon observed among regional banks, making them the appropriate focus of the present analysis.

The analysis is further motivated by changes in Japan's supervisory policy. Since around 2014, the FSA has increasingly emphasized the construction of sustainable business models tailored to the circumstances of individual banks, rather than encouraging uniform business strategies. In particular, while relationship banking has remained a core expectation for regional financial institutions, the supervisory stance has evolved toward allowing banks greater flexibility to combine relationship banking with other business activities according to their own strategic judgment. This shift provides a natural setting for examining whether changes in supervisory policy influenced the evolution of regional banks' business models.

Here, although we refer to the banks' transition as "movement toward changing the regional bank-type business model," what is estimated is not the determinants that actually cause business model changes. Rather, based on the clustering classification conducted in Kimura (2024), we estimate the impact of the supervisory stance of the Financial Services Agency on

movements away from the centroid of the BM4 cluster (regional bank-type business model) or movements toward the centroids of other business model clusters.

Table 1: Characteristics of Business Models Identified by Kimura (2024)

Business Model	Characteristics
BM1	Major bank business model. Fee-income-oriented banking model. Characterized by a relatively high ratio of fee income to total assets and relatively low ratios of interbank loans, loan-loss reserves, securities holdings, and customer deposits. Compared with other business models, BM1 relies less on traditional lending and generates a larger share of revenue from non-interest business activities.
BM2	Retail-funded, securities-investment-oriented model. Characterized by high customer deposits and securities holdings, together with relatively low customer lending and fee income. Banks in this cluster rely primarily on retail deposits for funding while allocating a substantial proportion of assets to securities investment.
BM3	Interbank-active traditional banking model. Characterized by relatively high ratios of interbank loans, customer loans, loan-loss reserves, and customer deposits, together with relatively low securities holdings and fee income. This model represents traditional financial intermediation combined with relatively greater risk-taking and stronger participation in interbank markets.
BM4	Regional bank business model. Characterized by high customer loans and customer deposits and low interbank loans and fee income. Banks in this cluster primarily engage in conventional relationship-based financial intermediation while maintaining prudent risk management. Because almost all regional banks belong to this cluster, Kimura (2024) identifies BM4 as the regional bank business model.
BM5	Cooperative retail banking model. Dominated by shinkin banks and credit cooperatives. The model is characterized by retail deposit-based funding and conventional banking activities tailored to cooperative financial institutions rather than commercial banks.
BM6	ATM-specialized banking model. This cluster consists exclusively of Seven Bank, whose business model is centered on ATM network operations in convenience stores rather than traditional deposit-lending intermediation.
BM7	RCC model. This cluster consists exclusively of the Resolution and Collection Corporation (RCC), whose activities focus on the acquisition and resolution of distressed assets and the administration of public capital injections.

Furthermore, in the estimation, the supervisory stance of the Financial Services Agency is constructed by combining factors specific to individual banks and general supervisory stance factors excluding such idiosyncratic conditions. However, it should be noted that strong assumptions are imposed regarding the bank-specific factors.

The remainder of this paper is organized as follows. Section 2 introduces the data and reviews the business model classification proposed by Kimura (2024). Section 3 describes the empirical methodology and model specification. Section 4 presents the estimation results and discusses their implications. Section 5 concludes the paper by summarizing the main findings and policy implications. Finally, Section 6 discusses the limitations of the study and suggests directions

for future research.

2. Data and Business Model Classification

The data used in Kimura (2024) and this study are primarily obtained from the BankFocus database provided by Bureau van Dijk. Where information was unavailable in BankFocus, the missing data were manually collected from historical disclosure reports published on the official websites of individual financial institutions.

The sample consists of deposit-taking financial institutions (broadly defined as banks) in Japan over the period from fiscal year 2011 to fiscal year 2018. To construct the financial indicators used in the clustering analysis, only bank-year observations for which all required variables were available were included in the analysis. Furthermore, following previous studies (e.g., Roengpitya et al., 2017; Lucas et al., 2019; Ayadi et al., 2020), a bank was included in the sample if the necessary data were available for at least one fiscal year during the sample period.

Among the alternative reporting formats available in BankFocus, we employ the Global Standard Format, as it provides the broadest coverage of Japanese banks. The final sample consists of 589 financial institutions and 4,256 bank-year observations. Taking into account institutions that were established, merged, or dissolved during the sample period, the dataset covers approximately 92.9% of all potential bank-year observations between 2011 and 2018. Relative to all deposit-taking financial institutions covered by the Deposit Insurance Corporation of Japan, the sample represents between 84.5% and 92.2% of institutions, depending on the fiscal year.

The sample period is restricted to fiscal years 2011–2018 because, under the terms of our data licensing agreement, data availability outside this period is substantially more limited,

rendering a comprehensive clustering analysis infeasible.

Kimura (2024) develops a taxonomy of Japanese banks' business models using an unsupervised clustering approach based on financial statement indicators. Assuming that banks' strategic choices are reflected in their balance-sheet structures, the study classifies banks into seven business models according to their asset and liability characteristics (See Table 1)³. The resulting taxonomy is subsequently validated by examining the institutional characteristics of the banks belonging to each cluster. In particular, the cluster labeled BM4 is found to consist almost exclusively of regional banks and is therefore interpreted as representing the regional bank business model. This classification provides the basis for the empirical analysis conducted in this study.

The primary focus of this study is on banks classified as BM4, whose business model is characterized by relatively high shares of customer loans and customer deposits in total assets, alongside relatively low shares of interbank loans and fee income. Banks belonging to this cluster are therefore characterized as engaging primarily in traditional financial intermediation while maintaining prudent risk management. Kimura (2024) further examines the types of banks represented by each business model. Among the 474 banks for which observations are available for every fiscal year between 2011 and 2018, 361 banks remained in the same business model throughout the sample period. A tabulation of these banks by business model and institutional category reveals that, with the exception of one bank, all banks classified as BM4 are regional banks. Furthermore, among the major banking groups, Resona Holdings and Resona Bank are also classified into BM4, reflecting their strong orientation toward regional

³ When both a bank holding company and its subsidiary bank are included in the dataset, each entity is treated as a separate observation. This approach reflects the view that the subsidiary bank possesses its own business model, while the holding company represents a distinct business model encompassing the banking subsidiaries as well as other affiliated businesses.

financial intermediation.

3. Empirical Methodology: Fixed-Effects Estimation

We estimate the impact of changes in the supervisory stance of the Financial Services Agency on regional bank business models using the following equation (1).

$$\Delta D_{it} = \beta_0 + \beta_1 X_{it-1} + \beta_2 Y_{t-1} + \beta_3 Z_{it-1} + \beta_m MP_{t-1} + FE_i + \varepsilon_{it}, \quad (1)$$

where i denotes an individual regional bank, and t denotes the fiscal year of observation. The dependent variable ΔD_{it} is defined in three alternative ways to capture changes in a bank's business model position between fiscal years $t-1$ and t , measured by changes in the Euclidean distance from the BM4 centroid or toward the centroids of alternative business model clusters. The explanatory variables X_{it} , Y_t , and Z_{it} represent, respectively, the supervisory stance of the Financial Services Agency, regulatory constraints, and the decline in bank profitability resulting from lower interest rates. MP_t is a dummy variable representing the phases of monetary policy under Governor Kuroda at the Bank of Japan (March 20, 2013 - April 8, 2023), classified by fiscal year. The underlying idea of equation (1) is that movements of regional banks away from the centroid of the regional bank-type business model cluster are the result of managerial strategic decisions under the influence of: (i) regulatory constraints, (ii) interest rate conditions (including prolonged low interest rates and Kuroda easing), (iii) supervisory stance.

The estimation period covers fiscal years 2012–2018. This is because the clustering analysis is based on data from fiscal years 2011–2018, and all explanatory variables enter the regression with a one-period lag. The analysis focuses on regional banks whose distance from the centroid of BM4, the regional bank business model, increased substantially during the clustering period.

Specifically, we examine whether changes in the Financial Services Agency's supervisory stance contributed to this business model transformation. Following this approach, two alternative samples are considered: (i) regional banks whose distance from the BM4 centroid increased by at least 30% between fiscal years 2011 and 2018 (hereafter, the 30%+ group), and (ii) regional banks whose distance increased by at least 50% over the same period (hereafter, the 50%+ group).

The dependent variable ΔD_{it} is defined in three ways:

$$\Delta D_{it}^{BM4} = d_{it}^{BM4} - d_{it-1}^{BM4} \quad (2)$$

$$\Delta D_{it}^{BM4-BM1} = (d_{it}^{BM4} - d_{it-1}^{BM4}) - (d_{it}^{BM1} - d_{it-1}^{BM1}) \quad (3)$$

$$\Delta D_{it}^{BM4-BMn} = (d_{it}^{BM4} - d_{it-1}^{BM4}) - \min\{d_{it}^{BMn} - d_{it-1}^{BMn} \mid n = 1, 2, 3, 5\} \quad (4)$$

d_{it}^{BMn} denotes the distance between the observation and the centroid of business model d_{it}^{BMn} in the clustering analysis. Equation (2) defines the dependent variable, ΔD_{it}^{BM4} , as the increase in the Euclidean distance between regional bank i and the centroid of BM4 from fiscal year $t-1$ to fiscal year t . Thus, it captures the extent to which a bank moves away from the traditional regional bank business model. Equation (3) extends this measure by defining $\Delta D_{it}^{BM4-BM1}$ as the sum of the increase in the distance from the BM4 centroid and the decrease in the distance to the BM1 centroid over the same period. This specification captures movements away from the regional bank business model while simultaneously moving toward the major-bank business model. Equation (4) further generalizes the measure by defining $\Delta D_{it}^{BM4-BMn}$ as the sum of the increase in the distance from the BM4 centroid and the largest decrease in the distance to any of the alternative business model centroids (BM1, BM2, BM3, or BM5) during the same period. This specification captures movements away from the regional bank business model together with convergence toward whichever alternative business model the bank approaches most closely. Accordingly, a larger value of ΔD_{it} indicates a greater degree of business model transformation away from the traditional regional bank business model.

A key point is that “movement away from BM4” does not necessarily mean an actual change in business model classification. Rather, it refers to an increase in the distance between the bank’s financial indicator vector and the centroid of the BM4 cluster.

The explanatory variable X_{it} a quantitative proxy for the Financial Services Agency's (FSA) supervisory stance toward regional bank i in fiscal year t , and is defined as follows:

$$X_{it} = \{1/\exp(\text{LifeExpectancy}_{it}^{FSA})\} \times \text{SustainableBusinessModel_}E_t, \quad (5)$$

where the components on the right-hand side are defined as follows:

- ✓ $\text{LifeExpectancy}_{it}^{FSA}$: The number of years until the “main business profit” ($\text{MainBusinessProfit}_{it}^{FSA}$)⁴, is exhausted due to the reduction in loan interest income caused by the compression of the loan–deposit interest rate spread (Spread_{it}) for regional bank i at time t , relative to time $t-1$.
- ✓ $\text{SustainableBusinessModel_}E_t$: The frequency with which the term “business model” appears in the contexts of business model sustainability and relationship-based regional finance within the FSA’s supervisory policy documents, counted using method E⁵.

By interacting each regional bank's profitability with the general supervisory stance, the

⁴ $\text{MainBusinessProfit}_{it}^{FSA}$ denotes the main business profit of regional bank i in fiscal year t . Following Samikawa (2020) and FSA, it is calculated as follows:

$$\text{MainBusinessProfit}_{it}^{FSA} = \text{Loan}_{it} \times \text{Spread}_{it} + \text{NetFeeAndCommision}_{it} - \text{Overhead}_{it},$$

where Loan_{it} denotes the outstanding amount of customer loans held by bank i in fiscal year t . Spread_{it} denotes the interest rate spread, collected from the annual Zenkoku Zaimu Shohyō Bunseki (Analysis of Financial Statements of Banks) published by the Japanese Bankers Association (JBA). $\text{NetFeeAndCommision}_{it}$ denotes net commission and fee income, while Overhead_{it} denotes operating expenses.

⁵ As method E, two alternative measures are employed:

- ✓ $\text{SustainableBusinessModel_}N_t$: the raw number of occurrences of the term business model in fiscal year t .
- ✓ $\text{SustainableBusinessModel_}R_t$: the number of occurrences of the term business model per ten pages of the Supervisory Policy documents in fiscal year t .

variable X_{it} serves as a proxy for the bank-specific effect of supervisory policy on business model transformation.

The explanatory variable Y_{it} is specified as follows, representing the impact of regulatory conditions on regional bank i at time t with respect to changes in its business model:

$$Y_{it} = TotalCapitalRatio_{it},$$

where, $TotalCapitalRatio_{it}$ denotes the regulatory capital adequacy ratio of regional bank i at time t .

The explanatory variable Z_{it} is specified as follows, representing the impact of declining profitability due to falling interest rates on regional bank i at time t with respect to changes in its business model:

$$Z_{it} = \{NetInterestIncome_{it} - 3 \times Loan_{it} \times (Spread_{it-1} - Spread_{it})\} \\ - NetInterestIncome_{i2011},$$

where $NetInterestIncome_{it}$ denotes the net interest income of regional bank i in fiscal year t , $Loan_{it}$ denotes the outstanding amount of customer loans, and $Spread_{it}$ denotes the interest rate spread (loan yield minus deposit rate).

The estimations are conducted separately for domestic-standard banks and internationally active banks. For each group, two alternative samples are constructed based on the magnitude of business model transformation. Specifically, the first sample consists of regional banks whose distance from the centroid of BM4 increased by at least 30% between fiscal years 2011 and 2018 (the 30%+ group), while the second consists of those whose distance increased by at least 50% over the same period (the 50%+ group).

This procedure yields four potential estimation samples: (i) domestic-standard banks in the

30%+ group, (ii) domestic-standard banks in the 50%+ group, (iii) internationally active banks in the 30%+ group, and (iv) internationally active banks in the 50%+ group. However, all internationally active banks in the 30%+ group also belong to the 50%+ group, making these two samples identical. Consequently, the empirical analysis is based on three distinct estimation samples.

The final samples comprise 33 domestic-standard banks in the 30%+ group, 27 domestic-standard banks in the 50%+ group, and 5 internationally active banks. Each sample contains seven years of observations, with the dependent variable covering fiscal years 2012–2018 and the explanatory variables covering fiscal years 2011–2018. Descriptive statistics are reported in Table 2.

Table 2: Descriptive Statistics

Note: E_t^N and E_t^R , components of X_{it} , differ only in the definition of E_t in Equation (5). E_t represents the frequency measurement method. of the term *business model* in the Financial Services Agency's annual *Supervisory Policy* documents, either as the raw number of occurrences (N_t) or as the number of occurrences per ten pages (R_t), separately for the contexts of business model sustainability and relationship banking.

A) Domestic-Standard Banks ($\geq 30\%$ Increase Group)

ΔD_{it}			X_{it}		Y_{it}	Z_{it}
ΔD_{it}^{BM4}	$\Delta D_{it}^{BM4-BM1}$	$\Delta D_{it}^{BM4-BMn}$	$E_t = N_t$	$E_t = R_t$		
Av. 0.095960	Av. 0.131552	Av. 0.220061	Av. 11,397,511	Av. 2,783,763	Av. 0.106776	Av. -6,847
SD 0.227021	SD 0.369476	SD 0.321922	SD 155,802,481	SD 38,001,013	SD 0.017318	SD 5,569
Min. -0.581363	Min. -1.114378	Min. -0.353700	Min. 0	Min. 0	Min. 0.061700	Min. -26,601
Max. 1.482474	Max. 2.551188	Max. 2.551188	Max. 2,361,352,288	Max. 575,939,582	Max. 0.179900	Max. 3,277
Obs. 231	Obs. 231	Obs. 231	Obs. 231	Obs. 231	Obs. 231	Obs. 231

B) Domestic-Standard Banks ($\geq 50\%$ Increase Group)

ΔD_{it}			X_{it}		Y_{it}	Z_{it}
ΔD_{it}^{BM4}	$\Delta D_{it}^{BM4-BM1}$	$\Delta D_{it}^{BM4-BMn}$	$E_t = N_t$	$E_t = R_t$		
Av. 0.106644	Av. 0.145387	Av. 0.234724	Av. 13,906,531	Av. 3,396,569	Av. 0.108063	Av. -7,088
SD 0.237736	SD 0.386535	SD 0.344303	SD 172,228,082	SD 42,007,232	SD 0.016763	SD 5,819
Min. -0.581363	Min. -1.114378	Min. -0.353700	Min. 0	Min. 0	Min. 0.071000	Min. -26,601
Max. 1.482474	Max. 2.551188	Max. 2.551188	Max. 2,361,352,288	Max. 575,939,582	Max. 0.179900	Max. 3,277
Obs. 189	Obs. 189	Obs. 189	Obs. 189	Obs. 189	Obs. 189	Obs. 189

C) International-Standard Banks ($\geq 30\%$ Increase Group)

ΔD_{it}			X_{it}		Y_{it}	Z_{it}
ΔD_{it}^{BM4}	$\Delta D_{it}^{BM4-BM1}$	$\Delta D_{it}^{BM4-BMn}$	$E_t = N_t$	$E_t = R_t$		
Av. 0.095854	Av. 0.174825	Av. 0.242976	Av. 12,746,513	Av. 3,108,955	Av. 0.151957	Av. -12,260
SD 0.204873	SD 0.416027	SD 0.360476	SD 71,471,519	SD 17,432,069	SD 0.024084	SD 3,690
Min. -0.253671	Min. -0.465844	Min. -0.256280	Min. 0	Min. 0	Min. 0.117500	Min. -22,045
Max. 0.675266	Max. 1.234562	Max. 1.234562	Max. 422,878,365	Max. 103,141,065	Max. 0.206200	Max. -7,167
Obs. 35	Obs. 35	Obs. 35	Obs. 35	Obs. 35	Obs. 35	Obs. 35

D) International-Standard Banks ($\geq 50\%$ Increase Group)

ΔD_{it}			X_{it}		Y_{it}	Z_{it}
ΔD_{it}^{BM4}	$\Delta D_{it}^{BM4-BM1}$	$\Delta D_{it}^{BM4-BMn}$	$E_t = N_t$	$E_t = R_t$		
Av. 0.095854	Av. 0.174825	Av. 0.242976	Av. 12,746,513	Av. 3,108,955	Av. 0.151957	Av. -12,260
SD 0.204873	SD 0.416027	SD 0.360476	SD 71,471,519	SD 17,432,069	SD 0.024084	SD 3,690
Min. -0.253671	Min. -0.465844	Min. -0.256280	Min. 0	Min. 0	Min. 0.117500	Min. -22,045
Max. 0.675266	Max. 1.234562	Max. 1.234562	Max. 422,878,365	Max. 103,141,065	Max. 0.206200	Max. -7,167
Obs. 35	Obs. 35	Obs. 35	Obs. 35	Obs. 35	Obs. 35	Obs. 35

4. Results

Using equation (1), we conduct fixed-effects estimations based on seven years of data ($t = 2012\text{--}2018$) for four groups of regional banks (domestically regulated banks with $\geq 30\%$ increase: 33 banks; domestically regulated banks with $\geq 50\%$ increase: 27 banks; internationally regulated banks with $\geq 30\%$ increase: 5 banks; internationally regulated banks with $\geq 50\%$ increase: 5 banks). The dependent variable is specified in three alternative forms based on equations (2), (3) and (4) ($\Delta D_{it}^{BM4}, \Delta D_{it}^{(BM4-BM1)}, \Delta D_{it}^{(BM4-BMn)}$), and the explanatory variable X_{it} is specified using two alternative definitions of E_t in equation (5) ($E_t = N_t, E_t = R_t$), resulting in 24 estimation specifications. The results are presented in Tables 3-6. However, since the composition of internationally regulated banks is identical for both the $\geq 30\%$ and $\geq 50\%$ increase groups, the effective number of distinct estimations is 18, and Tables 5 and 6 are based on the same dataset.

From these results, for domestically regulated banks in the $\geq 30\%$ increase group, the impact of supervisory stance on business model changes—regardless of the method used to count the frequency of the term “business model” in the “Supervisory Policy, etc.”—is statistically significant at the 1% level for both (i) movement away from the centroid of the BM4 cluster and (ii) movement away from the centroid of the BM4 cluster combined with movement toward the centroids of other business model clusters. However, the effect is not statistically significant for movement away from the BM4 centroid combined with movement toward the BM1 centroid.

For the $\geq 50\%$ increase group, when the counting method is based on the simple frequency of occurrences of the term “business model,” the impact is significant at the 1% level for movement away from the BM4 centroid and at the 5% level for movement away from the BM4 centroid combined with movement toward other clusters. However, it is not significant for

movement toward the BM1 centroid. When the counting method is defined as frequency per 10 pages of the “Supervisory Policy, etc.,” the effect is significant at the 1% level only for movement away from BM4 combined with movement toward other clusters, while no significant effects are observed for movement toward BM1 or for movement away from BM4 alone.

For internationally regulated banks, although the $\geq 30\%$ and $\geq 50\%$ increase groups consist of the same sample, no statistically significant effects are observed for any dependent variable, regardless of the counting method.

These results may be interpreted as follows. First, for domestically regulated regional banks, those banks that exhibited clear movements away from the typical regional bank business model between FY2011 and FY2018 may have been influenced by the frequency of the term “business model” in the contexts of business model sustainability and relationship-based regional finance within the “Supervisory Policy, etc.” In other words, they may have been influenced by supervisory stance in terms of incentives to change business models. This interpretation holds regardless of the degree of deviation ($\geq 30\%$ or $\geq 50\%$).

However, when the frequency is normalized per 10 pages, the effect becomes insignificant for banks with larger deviations ($\geq 50\%$ increase group). This suggests that while the introduction of the Kuroda monetary easing (quantitative and qualitative easing) may have influenced banks that exhibited clear shifts away from the traditional model, such influence is not observed for banks with larger deviations.

Furthermore, among domestically regulated banks, those that exhibited clear movements toward other business models may have been influenced by supervisory stance regardless of the counting method. However, such influence does not appear to extend to movements specifically toward major bank-type business models.

Taken together, these findings suggest that supervisory stance may have exerted some influence on movements toward alternative business models other than the major bank type. However, it does not appear to explain the observed transitions from BM4 to BM1 identified in the clustering analysis of Kimura (2024). In this context, the only statistically significant variable in the estimation using $\Delta D_{it}^{(BM4-BM1)}$ is the MP2013 dummy at the 10% level, suggesting that the introduction of Kuroda easing—while not directly inducing model changes—may have contributed to a general tendency among certain regional banks to reduce similarity with the typical regional bank model and increase similarity with the major bank model.

For internationally regulated banks, possibly due to the small sample size, no evidence is found for the effects of supervisory stance, regulatory constraints, profitability pressures due to declining interest rates, or monetary easing.

It should be noted that “movement away from a business model” does not necessarily imply an actual change in classification in the clustering results of Kimura (2024). Rather, it indicates that the distance between the observation (the vector of financial indicators) and the centroid of the corresponding cluster increases. Similarly, “movement toward another business model” does not necessarily imply an actual reclassification; rather, it reflects a decrease in distance to the centroid of another cluster. While actual reclassification cases are included, changes in distance do not translate proportionally into changes in cluster membership, since classification depends on relative proximity to centroids.

Finally, although not the main focus of the estimation, the dummy variable $MP_{(2016-)}$ is statistically significant for domestically regulated banks at the 1% and 10% levels for ΔD_{it}^{BM4} and $\Delta D_{it}^{(BM4-BMn)}$, respectively. However, no significant effect is found for movement toward BM1. This suggests that the yield curve control phase of Kuroda easing may have influenced movements away from the traditional regional bank model and toward alternative

models, but not specifically toward the major bank-type model.

Table 2: Estimation Result: Domestic-Standard Banks ($\geq 30\%$ Increase Group)

	(1)	(2)	(3)	(4)	(5)	(6)
d2018 - d2011 resulation Δd	+30% domestic BM4	+30% domestic BM4-BM1	+30% domestic BM4-minBMn	+30% domestic BM4	+30% domestic BM4-BM1	+30% domestic BM4-minBMn
X(Supervision)						
SBM_N	1.40E-10 *** (2.0E-11)	5.3E-11 (2.8E-11)	1.08E-10 *** (2.4E-11)			
SBM_R				5.76E-10 *** (8.1E-11)	2.18E-10 (1.13E-10)	4.44E-10 *** (9.7E-11)
Y(Regulation)						
TotalCapitalRatio	2.917 (2.453)	-2.072 (3.573)	-0.517 (2.742)	2.917 (2.453)	-2.072 (3.573)	-0.517 (2.742)
Z(Interest Rate)						
ΔNII	-4.171E-06 (6.653E-06)	-2.042E-05 (1.090E-05)	-1.925E-05 (9.813E-06)	-4.172E-06 (6.654E-06)	-2.042E-05 (1.090E-05)	-1.925E-04 (9.813E-06)
MP2013	0.078 (0.057)	0.257 * (0.099)	0.216 * (0.095)	0.078 (0.057)	0.257 * (0.099)	0.216 * (0.095)
MP2014	0.065 (0.038)	0.021 (0.064)	0.067 (0.043)	0.065 (0.038)	0.021 (0.064)	0.067 (0.043)
MP2015	0.105 * (0.048)	0.123 (0.074)	0.130 (0.067)	0.105 * (0.048)	0.123 (0.074)	0.130 (0.067)
MP2016~	0.238 *** (0.062)	0.080 (0.084)	0.160 * (0.067)	0.238 *** (0.062)	0.080 (0.084)	0.160 * (0.067)
Bank-fixed effect	YES	YES	YES	YES	YES	YES
Cluster	Bank	Bank	Bank	Bank	Bank	Bank
R-squared	0.242	0.251	0.242	0.242	0.251	0.242
N	231	231	231	231	231	231

Table 3: Estimation Result: Domestic-Standard Banks ($\geq 50\%$ Increase Group)

	(7)	(8)	(9)	(10)	(11)	(12)
d2018 - d2011 resulation Δd	+50% domestic BM4	+50% domestic BM4-BM1	+50% domestic BM4-minBMn	+50% domestic BM4	+50% domestic BM4-BM1	+50% domestic BM4-minBMn
X(Supervision)						
SBM_N	1.28E-10 *** (2.1E-11)	3.1E-11 (2.9E-11)	9.4E-11 ** (2.6E-11)			
SBM_R				5.23E-10 (8.7E-11)	1.26E-10 (1.18E-10)	3.87E-10 ** (1.08E-10)
Y(Regulation)						
TotalCapitalRatio	1.942 (2.687)	-3.198 (3.973)	-1.347 (3.078)	1.942 (2.687)	-3.198 (3.973)	-1.347 (3.078)
Z(Interest Rate)						
ΔNII	-4.997E-06 (7.806E-06)	-2.422E-05 (1.260E-05)	-2.215E-05 (1.092E-05)	-4.997E-06 (7.806E-06)	-2.422E-05 (1.260E-05)	-2.215E-05 (1.092E-05)
MP2013	0.081 (0.063)	0.263 * (0.116)	0.217 (0.114)	0.081 (0.063)	0.263 * (0.116)	0.217 (0.114)
MP2014	0.059 (0.044)	-0.008 (0.077)	0.059 (0.052)	0.059 (0.044)	-0.008 (0.077)	0.059 (0.052)
MP2015	0.100 (0.055)	0.130 (0.087)	0.138 (0.078)	0.100 (0.055)	0.130 (0.087)	0.138 (0.078)
MP2016~	0.264 *** (0.067)	0.134 (0.086)	0.196 * (0.071)	0.264 *** (0.067)	0.134 (0.086)	0.196 * (0.071)
Bank-fixed effect	YES	YES	YES	YES	YES	YES
Cluster	Bank	Bank	Bank	Bank	Bank	Bank
R-squared	0.283	0.283	0.316	0.283	0.283	0.316
N	189	189	189	189	189	189

Table 4: Estimation Result: International-Standard Banks ($\geq 30\%$ Increase Group)

	(13)	(14)	(15)	(16)	(17)	(18)
d2018 - d2011 resulation Δd	+30% int'l BM4	+30% int'l BM4-BM1	+30% int'l BM4-minBMn	+30% int'l BM4	+30% int'l BM4-BM1	+30% int'l BM4-minBMn
X(Supervision)						
SBM_N	2.05E-10 (2.79E-10)	7.08E-10 (4.79E-10)	5.39E-10 (4.68E-10)			
SBM_R				8.40E-10 1.145E-09	2.904E-09 (1.964E-09)	2.212E-09 (1.917E-09)
Y(Regulation)						
TotalCapitalRatio	-2.416 (6.558)	-2.761 (11.457)	-4.657 (11.208)	-2.416 (6.558)	-2.761 (11.457)	-4.657 (11.208)
Z(Interest Rate)						
ΔNII	1.225E-05 (1.390E-05)	3.079E-05 (2.091E-05)	2.688E-05 (2.727E-05)	1.225E-05	3.079E-05 (2.091E-05)	2.688E-05 (2.727E-05)
MP2013	0.158 (0.090)	0.224 (0.214)	0.209 (0.174)	0.158 (0.090)	0.224 (0.214)	0.209 (0.174)
MP2014	0.064 (0.300)	0.023 (0.578)	0.129 (0.537)	0.064 (0.300)	0.023 (0.578)	0.129 (0.537)
MP2015	0.143 (0.124)	0.173 (0.240)	0.160 (0.199)	0.143 (0.124)	0.173 (0.240)	0.160 (0.199)
MP2016~	0.114 (0.126)	-0.070 (0.177)	0.040 (0.194)	0.114 (0.126)	-0.070 (0.177)	0.040 (0.194)
Bank-fixed effect	YES	YES	YES	YES	YES	YES
Cluster	Bank	Bank	Bank	Bank	Bank	Bank
R-squared	0.251	0.316	0.307	0.251	0.316	0.307
N	35	35	35	35	35	35

Table 5: Estimation Result: International-Standard Banks ($\geq 50\%$ Increase Group)

	(19)	(20)	(21)	(22)	(23)	(24)
d2018 - d2011	+50%	+50%	+50%	+50%	+50%	+50%
resulation	int'l	int'l	int'l	int'l	int'l	int'l
Δd	BM4	BM4-BM1	BM4-minBMn	BM4	BM4-BM1	BM4-minBMn
X(Supervision)						
SBM_N	2.05E-10 (2.79E-10)	7.08E-10 (4.79E-10)	5.39E-10 (4.68E-10)			
SBM_R				8.40E-10 1.145E-09	2.904E-09 (1.964E-09)	2.212E-09 (1.917E-09)
Y(Regulation)						
TotalCapitalRatio	-2.416 (6.558)	-2.761 (11.457)	-4.657 (11.208)	-2.416 (6.558)	-2.761 (11.457)	-4.657 (11.208)
Z(Interest Rate)						
ΔNII	1.225E-05 (1.390E-05)	3.079E-05 (2.091E-05)	2.688E-05 (2.727E-05)	1.225E-05	3.079E-05 (2.091E-05)	2.688E-05 (2.727E-05)
MP2013	0.158 (0.090)	0.224 (0.214)	0.209 (0.174)	0.158 (0.090)	0.224 (0.214)	0.209 (0.174)
MP2014	0.064 (0.300)	0.023 (0.578)	0.129 (0.537)	0.064 (0.300)	0.023 (0.578)	0.129 (0.537)
MP2015	0.143 (0.124)	0.173 (0.240)	0.160 (0.199)	0.143 (0.124)	0.173 (0.240)	0.160 (0.199)
MP2016~	0.114 (0.126)	-0.070 (0.177)	0.040 (0.194)	0.114 (0.126)	-0.070 (0.177)	0.040 (0.194)
Bank-fixed effect	YES	YES	YES	YES	YES	YES
Cluster	Bank	Bank	Bank	Bank	Bank	Bank
R-squared	0.251	0.316	0.307	0.251	0.316	0.307
N	35	35	35	35	35	35

5. Conclusion

This paper examines the determinants of changes in Japanese regional bank business models, focusing on the transition from the traditional regional bank model to alternative configurations identified in the clustering analysis of Kimura (2024). Using a fixed-effects framework, we evaluate the role of the Financial Services Agency's (FSA) supervisory stance as a driver of such transformations.

The empirical results yield three main findings. First, for domestically regulated banks, supervisory stance is significantly associated with movements away from the traditional regional bank model (BM4) and with shifts toward alternative business model clusters. This suggests that supervisory policy has acted as a catalyst for diversification in bank strategies. Second, however, we find no robust evidence that supervisory stance induces convergence toward the major bank-type model (BM1). Third, for internationally regulated banks, no statistically significant effects are detected, indicating limited explanatory power of supervisory factors in this segment.

Taken together, these findings imply that supervisory policy influences the *direction* of change only insofar as it encourages deviation from the status quo, but does not determine the *destination* of business model transformation. Instead, convergence toward specific alternative models—such as the major bank-type model—appears to be driven by broader macro-financial conditions and bank-specific strategic responses.

Finally, the evidence on the Bank of Japan's yield curve control phase suggests that monetary easing may have reinforced movements away from the traditional model, but did not systematically promote convergence toward the major bank-type model.

Overall, the results highlight the importance of distinguishing between *deviation* and *convergence* in analyzing structural change in banking, and underscore the complementary

roles of regulatory policy and market forces in shaping the evolution of financial intermediation.

Changes in the macro-financial environment—including prolonged monetary easing, declining profitability, demographic change, and technological innovation—created pressure for banks to reconsider their business models. In response, the FSA shifted its supervisory philosophy from promoting a uniform regional banking model toward encouraging each bank to develop a sustainable business model suited to its own circumstances. The empirical results suggest that this supervisory approach successfully encouraged business model transformation but did not prescribe a specific destination. Rather, the ultimate form of business model evolution was determined by broader market conditions and bank-specific strategic choices.

6. Limitations and Future Research

This study has several limitations that provide directions for future research.

First, although the empirical analysis employs lagged explanatory variables and controls for major regulatory and macroeconomic factors, endogeneity cannot be completely ruled out. In particular, supervisory policies may themselves respond to anticipated changes in banks' business models rather than influencing them exogenously. Future research could address this issue by exploiting exogenous policy shocks, natural experiments, or valid instrumental variables to strengthen causal identification.

Second, the supervisory stance of the Financial Services Agency (FSA) is proxied by the frequency with which the term business model appears in the FSA's supervisory policy documents. While this measure captures changes in the emphasis placed on business models in supervisory guidance, it may not fully reflect the intensity or effectiveness of supervisory interventions at the individual-bank level. Future research could construct more direct

measures of supervisory pressure by incorporating supervisory actions, on-site inspections, enforcement measures, or other supervisory communications.

Third, the analysis finds no statistically significant relationship for internationally active banks. Because the number of internationally active regional banks in Japan is limited, it is difficult to determine whether this result reflects limited statistical power or genuine differences in the effects of supervisory policy. Future studies using larger international samples or cross-country data could provide a more definitive assessment of heterogeneity across bank types.

Fourth, this study follows Ayadi et al. (2021) in assuming that banks' strategic choices are reflected in their financial indicators. Consequently, the analytical framework relies primarily on balance-sheet-based indicators and adopts a relatively simple classification based on the degree of retail versus market orientation on both the asset and liability sides of banks' balance sheets. Although this approach provides a tractable framework for identifying business models, future research could develop more comprehensive classifications by incorporating additional dimensions of bank behavior and organizational structure. For example, Mergaerts and Vander Vennet (2016) include indicators such as bank size and funding stability, while Smith et al. (2012), Motomura (2021), and Yoshida (2017) propose alternative conceptual and qualitative approaches. Other studies, such as Horie and Kawamukai (2002), Iwaki and Ogane (2019), and Blikle et al. (2023), suggest that regional characteristics, lending specialization, and portfolio composition may also represent important dimensions of bank business models.

Finally, this study focuses primarily on supervisory policy, regulatory factors, and profitability pressures. However, the banking industry has undergone broader structural changes, including digitalization, the entry of FinTech firms and other non-bank competitors, the establishment of internet-only banking subsidiaries, and strategic alliances between banks and technology firms. Incorporating these developments into future empirical analyses would provide a more

comprehensive understanding of the determinants of bank business model transformation.

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