Essays on empirical analyses of the Japanese banking behavior

日本における銀行行動に関する実証研究

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CHAPTER 1

Introduction

The global financial crisis (2008-2009) alerts the importance of banks' financial soundness as their financial health connects to financial stability deeply. It also highlights the pro-cyclicality phenomenon. Pro-cyclicality is an amplification of the business cycle. The unfavorable effects caused by the banks on the economy through their drastic reduction in lending and fire-sale externalities have led to adverse impacts on the financial system. These bank behaviors interact with the real sectors and amplify the business cycle, known as the pro-cyclicality problem, causing economic stagnation, prolongation of financial recovery, and, eventually, financial instability in the long term.

These happenings raise doubtfulness about the effectiveness of bank regulation in ensuring the financial soundness of banks. Bank capital requirements, referring to Basel I, II, and III, were implemented to promote a sufficient bank capital adequacy level for maintaining financial soundness. Banks mandate by law to fulfill at least the capital adequacy minimum of the capital requirement. Basel I was introduced in 1988 by the Basel Committee on Banking Supervision. Basel II was later developed and implemented in 2007 to supersede the Basel I accord. An ample capital buffer is an absorbent of losses in the real economy, especially during an economic downturn. Unfortunately, the global financial crisis prompted public skepticism about the efficiency of capital requirements in guiding banks to strengthen their capital to maintain banks' resilience, especially in emergencies. This doubtfulness has led to many debates over the "pro-cyclical nature" of Basel II guidelines. The main argument is that the regulation itself, namely Basel II, carries the features of "pro-cyclical" as it increases the sensitivity of bank evaluation on credit, further exacerbating the pro-cyclicality effect. In academia, works of literature attempting to draw conclusions and responses to the pro-cyclicality issues to provide some insights for designing more comprehensive capital regulations (Ayuso et al., 2004; Jokipii & Milne, 2008; Stolz & Wedow, 2011; Shim, 2012; Chen et al., 2014; Huang & Xiong, 2015).

Relating to pro-cyclicality, recent literature shows that economic policy uncertainty (EPU) has caused unfavorable effects, such as reduced bank lending and delays in projects and investments amid high economic policy uncertainty. These will hinder the operation of the real economy (Baker et al., 2016; Gulen & Ion, 2016; Berger et al., 2018; Gu & Hong, 2019). Economic policy uncertainty serves as an indicator of future outlooks and guides banks in their financial management. Moreover, the recent economic policy uncertainty-related literatures, even though still limited, show that economic policy uncertainties constrain bank credit and bring unfavorable economic effects. If the conditions go serious, it could undermine the economy. So, given the background mentioned above, it is not surprising that economic policy uncertainties will influence the direction of banks and bank behaviors.

Moreover, like firms, as the leading players in the economy, it is predictable that banks are also affected by the effects of economic policy uncertainties. In conjunction with the pro-cyclicality problem, revealed right after the global financial crisis, economic policy uncertainty is considered one of the new external factors that influence bank behaviors, subsequently affecting the real economy and stability of the financial system. Thus, we need to take this into concerns.

Since the global financial crisis, the public is also doubting the monitoring effectiveness of bank governance in limiting the over-risk-taking behavior of banks. Moreover, the public accused poor bank governance of failing to hold down aggressive risk-taking behavior and causing the global financial crisis. According to G30 Report, 2012, financial institutions' governance was insensitive to the dangers of risk-taking and failed to protect financial institutions, customers, shareholders, and society. Considered that ineffective bank governance is a more severe issue than corporate governance, as banks' behaviors are connected to the real economy closely. So, it is foreseeable that poor bank governance accompanied by monitoring failure will cause instability in the financial system. A considerable amount of banking literature provides evidence that the governance mechanism significantly influences bank risk-taking. In addition, the literature offered valuable

insights regarding various channels of moral hazard problems that banks encounter. (Caprio & Levine, 2002; Pathan, 2009; Beltratti & Stulz, 2012; Gropp & Kohler, 2010; Berger & Bouwman, 2013). Looking at the context of Japan, with many personnel rotations and unclear definitions of the execution and monitoring functions of boards, the criticism regarding the lagging of the Japanese governance system behind the international standard is infamous. Moreover, Japan is notorious for lacking independence in its governance system.

The impacts of the global financial crisis are far-reaching. Regulators and policymakers are constantly revising the regulation, specifically the Basel III implementation comprising a counter-cyclical buffer, stricter capital definitions, and higher quality capital maintenance to promote better bank resilience. Several financial crises have shown us how vulnerable the economy is and the breakout triggered by irresponsible bank risk-taking behavior of banks. Despite the revision of the regulations, aiming for financial soundness and better control over risk-taking behaviors, surprisingly, the increment number of fraud cases of banks is still continuously rising in Japan. For example, *Higashi-Nippon* Bank, under the Concordia Financial Group, was engaged in improper lending by charging inappropriate commitment fees. Around 1,000 cases with falsification charges, approximating 400 million Japanese yen, were detected. Regardless, *Michinoku* Bank in *Aomori* prefecture experienced receiving the business improvement order and still committed document falsification again. *Suruga* Bank in *Shizouka* prefecture also committed to the fraudulence of mortgage loans. These cases hinted to us that the aggressive risk-taking behavior of banks may still sprout, and this aggressive risk-taking behavior might lead to another financial crisis shortly.

This dissertation draws on practical implications by exploring the factors influencing bank behaviors, especially in capital management practice. It also contributes to different strands of research in bank behaviors, bank governance, and banking regulations by employing various methodological approaches to understand better the factors that influence bank behavior on capital management. Finally, this dissertation comprises factors like the business cycle, economic policy

uncertainty, bank governance, and banking regulations and compiles them into four chapters (Chapter 2 to Chapter 5).

The second chapter, "The cyclical patterns of capital Buffers: evidence from Japanese banks," focuses on analyzing the cyclical patterns of capital buffers under prevailing macroeconomic conditions. Specifically, this chapter investigates bank capital management practices. Previous evidence on capital management practices is mixed and cannot draw conclusive proof. Therefore, this chapter fills the gap by analyzing Japanese banks' capital management practices, aiming to provide empirical evidence. Moreover, the divergence of capital requirements setting (dual standards) and a long period of economic stagnation in Japan's economy offered the exploration of bank capital management practices in such unique settings.

Capital buffers are the difference between the bank's actual capital adequacy ratio and the level stipulated by the capital requirements. I use capital buffers in the analysis as the independent variable to control the divergence between domestic and internationally active banks. The main research aim of this chapter is to investigate the cyclical behavior of capital buffers, also known as the capital management practice.

There are two main cyclical behaviors. First, if capital buffers are negatively associated with a business cycle proxy, the real Japanese gross domestic product growth rate (GDP) in the analysis exhibits pro-cyclical behaviors. Such cyclical behavior implies that banks need to take the initiative to increase their capital buffers during economic upturns to encounter the higher risk taken. Moreover, raising capital during economic upturns is more cost-efficient than the downturn. Therefore, if banks employ such myopic behaviors, they may face difficulties during economic downturns, whereby credit risks are likely to increase. In addition, banks face challenges as they must write off bad debts, which will erode their capital. Raising capital is incredibly costly during an economic downturn; banks may dramatically reduce their asset sides by reducing the credit supply. These behaviors further

link to the pro-cyclicality problem. Some studies find that capital buffers behave pro-cyclically (Ayuso et at., 2004; Jokipii & Milne, 2008; Stolz & Wedow, 2011; Huang & Xiong, 2015).

Second, if a capital buffer is positively associated with a business cycle proxy, GDP, the capital buffer exhibits counter-cyclical behaviors. Such behavior is considered favorable cyclical behavior. Such cyclical behavior implies that banks are aware of their risk level during economic expansions and increase the sufficient amount of capital buffers to cover the potential future losses or, in other words, meet their risk level. Additionally, raising capital during economic upturns is much easier and cheaper. Such cyclical behaviors are considered forward-looking. Some studies find that capital buffers behave counter-cyclically (Jokipii & Milne, 2008; Gursoy & Atici,2012; Kontbay-Busun & Kasman, 2015).

Taking into account the unique features of Japan's sample, referring to long stagnation and diverse capital adequacy standards, I analyze the data of Japanese commercial banks from 2002 to 2012. I employ the partial adjustment model, widely used in previous research (Estrella, 2004; Jokipii & Milne, 2008; Francis & Osborne, 2010), considering that capital buffers adjust through a dynamic form, which means the adjustment of the capital buffer is not instantaneous. However, the partial adjustment model creates a potential endogeneity problem as we must include the lagged independent variable in the model. The lagged capital buffer in the right-hand side of the equation may correlate to disturbance terms and lead to biased estimations. Following previous research, I employed a 2-step system, Generalized Method of Moments (GMM) estimators, to deal with this endogeneity problem, as proposed by Blundell and Bond (1998), and correct the standard error, as offered by Windmeijer (2005) in the estimations.

Covering an extended period or an entire cycle of economics may lead to fruitful implications. However, with the introduction of a new regime of Basel III, I limit the estimations period until 2012 (2002-2012). The new regime of Basel III, with a different definition of capital adequacy ratios definitions and some core items in the capital adequacy ratios, may need extra clarification in the

interpretation of the analysis results. Moreover, the estimation period only covered part of the cycle, so it is hard to justify whether the cyclical behavior of capital buffers remains robust in the more protracted prolonged economic downturn of stagnation. Massive mergers and acquisitions (M&A) activities occurred between 2002 and 2004 in the Japanese banking industry. Thus, I recode and rerun the analysis estimations for robustness. Furthermore, the estimation period covered two significant crises: the non-performance loans and global financial crises. Therefore, I include two crisis dummies in the estimations. The first crisis dummy is a dummy equal to one for high-level non-performing loans (CRISIS DUMMY 1), and the second is a dummy equal to one for the global financial crisis (CRISIS DUMMY 2).

The main empirical results are as follows. First, there is no significant relationship between the capital buffers and the business cycle proxy (GDP) overall. I then find a negative and significant relationship between capital buffers and GDP by including an internationally active banks dummy. In other words, this result implies that the capital buffers of Japanese commercial banks behave pro-cyclically. Such a pattern is a negative myopic behavior. Second, I find a positive and significant relationship between capital buffers and the cross-term of internationally active banks and GDP, implying that capital buffers of internationally active banks behave counter-cyclically. Third, the positive signs of the cross-term between internationally active banks and GDP became negative during the crisis periods. This result implies that despite the capital buffers of internationally active banks behaving counter-cyclically, they lose their resiliency during crises.

The third chapter, entitled "Economic policy uncertainty and banks' target capital buffers," focuses on analyzing the impact of economic policy uncertainties on Japanese banks' target capital. Economic policy uncertainty (EPU) is an overall index developed by Baker et al. (2016) by applying text-mining techniques, extracting policy-related terms articles from prominent newspapers. This index has been widely used in the research area recently, and studies show that when EPU increases, causing

unfavorable effects on the economy (Berger et al., 2020; Berger et al., 2020; Gulen & Ion, 2016; Hu & Gong, 2019).

Recent studies empirically show that EPU affects bank behaviors (Berger et al., 2020; Hu & Gong, 2019). Chi and Li (2017) show that an increase in EPU will increase loan loss provisions as banks perceive the increment of credit risk in China. Ng et al. (2020) show that banks in the United States respond to increasing EPU by increasing loan loss provisions. These studies show that banks adjust their response to EPU. Capital level generally reflects its durability against unexpected events and increases the probability of survival in a financial crisis (Heid, 2007; Thakor, 2014).

Capital adjustment issues are one of the essential topics in the banking industry. However, except for Tran, Nguyen, and Hoang (2021), the empirical research on the effect of EPU on capital adjustment still needs to be explored. In corresponding to the recent evidence that economic policy uncertainties caused unfavorable economic outcomes, this chapter provides some valuable insights on the impact of economic policy uncertainties on bank capital buffer, aiming to contribute to the related banking literature.

Taking this as motivation, in chapter 3, I empirically analyze the impact of EPU on Japanese banks' target capital and the adjustment speed. Moreover, the effect of the varied contents in economic policy uncertainties on bank capital buffers is tested, for instance, fiscal, monetary, trade, and currency exchange. For extension analysis, I explore the impact of EPU on portfolio adjustments. I employ a partial adjustment model used in research (Estrella, 2004; Jokipii & Milne, 2008; Francis & Osborne, 2010) for the estimation. To test the effect of EPU on the target capital buffer, I define the target capital buffer by including EPU as the influence factor in estimating the target capital buffer level. I also consider that the adjustment speed may vary at different speeds depending on bank attributes and external environmental conditions rather than just constant. Thus, following De Young et al.,2018; Öztekin and Flannery, 2012, I define bank-specific, time-varying adjustment speed in the analysis. To alleviate the endogeneity problem in the partial adjustment model, I employ a 2-step system,

Generalized Method of Moments (GMM) estimators (Blundell and Bond 1998,) and standard error correction (Windmeijer, 2005). I use the estimations of Japanese commercial banks from 2002 to 2012. I limit the sample period until 2012 due to the implementation of Basel III, which is taking a stepwise implementation, considering the coverage of Basel III with a substantial change in the definition and calculation may lead to confusion in the interpretation of analysis results. For banks undergoing mergers and acquisitions (M&A), I recode them and treat them as new banks. For extension analyses to test the impact of EPU on portfolio adjustments, I employ the period from 2002 to 2018.

The main empirical results are as follows. First, banks respond to the increase of EPU by increasing their capital buffers. This result supports the notion that when EPU increases, banks are aware of their exposure to uncertainty risk. Thus, under the precautionary motive, banks increase capital buffers against any potential unexpected event. Second, when EPU increases, it also raises the capital adjustment speed. This result implies that banks are adjusting their capital buffers level towards the target capital buffers faster to maintain their soundness earlier. Third, fiscal, trade, and currency exchange policy uncertainties are the driving factors that increase the capital buffer level. Therefore, banks are working on enhancing their soundness by increasing their capital buffer level to alleviate the impacts of policy uncertainties. Lastly, results in extension analyses, which analyze the effects of EPU on portfolio adjustments, show that banks tend to hold more government bonds but lesser stock holdings in response to the increase of EPU. In the amid of high EPU, banks adjust their portfolio by shifting from high-risk assets, for example, stocks that carry a risk weight of 100%, to Japanese government bonds with zero risk weight to improve banks' financial soundness.

However, there is a potential endogeneity problem in the analysis. For instance, EPU may capture other uncertainties that do not belong to EPU and creates measurement error bias in the selection. Therefore, I need to employ instrument variables related to EPU that do not directly or indirectly affect the capital buffer. Following the previous works of literature, Gulen and Ion (2016), I employ

the residual policy uncertainty by regressing the Japanese EPU on the United States EPU as an instrumental variable for EPU. Alternatively, I also use a policy-related variable, the opposition party support rate developed by Ito (2016) serves as an instrumental variable to alleviate the endogeneity problem. The results reveal qualitatively robust.

The fourth chapter, entitled "Bank capital and bank governance," focuses on analyzing the relationship between banks' capital ratio and governance which comprises ownership structure and board characteristics. The global financial crisis has raised the question and skepticism on the effectiveness of monitoring roles by bank governance. As we know, banks are in the business of risk-taking, and as one of the market's leading players, accounting for the majority of bank funding and capital. The failure of bank governance by providing effective monitoring to hold down the excessive risk-taking behavior of banks will lead to massive societal costs. Regulators and policymakers are aware of the critical role of bank governance in monitoring (G30 Report,2012, Basel Committee, 2010).

In academia, vast banking literature provides evidence regarding the governance mechanism in risk-taking behaviors and provides some insights into these areas (Pathan, 2009; Beltratti & Stulz, 2012). Unfortunately, the evidence is mixed and inconclusive. Although the works of literature on the impact of bank governance on bank capital are still limited, some related literature provides valuable insights. For instance, Berger and Bouwman (2013) show that under the control of ownership, capital increases the probability of survival of small banks in the event of a crisis. In addition, Shehzad, Haan, and Scholtens (2010), under a better shareholder protection right, concentrated ownership enhances the capital adequacy ratio.

In response to the debates on the monitoring effectiveness of bank governance, this chapter provides supporting empirical evidence and draws some policy implications for engaging in a better bank board. Understanding how bank governance mechanisms affect the capital ratio is vital for regulators in capital requirement setting. I empirically analyze the data of Japanese commercial banks

from 2006 to 2013. The data comprises of bank governance comprises of ownership structure and board characteristics. Considering the long history of cross-shareholdings in Japan and its impact on the capital adequacy ratio through the link of the calculation of unrealized profits and losses, I include cross-shareholding as one of the factors that may influence the capital ratio. Board characteristics comprise board size and board composition. I limited the sample period until 2013 due to the introduction of "Abenomics" in December 2012, which consists of monetary easing, fiscal stimulus, and structural reforms. However, data until 2013 was employed as it covered most of the information from 2012 for both groups.

The main results are as follows. First, ownership structure, referring to institutional and foreign ownership, is positively correlated with capital ratio. This result implies that shareholders tend to enhance the level of capital ratio. In terms of theory and works of literature, shareholders are more risk-taker compared to managers. Moreover, with the outbreak of the global financial crisis, under the pressure of public noise, shareholders need to improve their capital ratios to fulfill their risk appetite. Second, no significant relationship between cross-shareholdings and capital ratios. This result may be due to the temporary relief program implemented by the Japanese Financial Services Agency on the exemption of the calculation of unrealized losses for some items and, therefore, netting off the effects. Third, there is a positive relationship between outside and independent directors and the capital ratio. This result may be because outside or independent directors are concerned about regulatory compliance by enhancing the capital ratio level to align with the business nature of banks in risk-taking.

However, like most governance studies, it encounters the endogeneity problem. For example, the reverse causality problem or the board characteristics that I investigate may correlate to other variables that I cannot account for, causing endogeneity. So, of course, an instrumental variable intrinsically related to governance variables but not correlated or related to the capital ratio is urgently

needed to alleviate the endogeneity problem. Thus, the result serves as ancillary evidence to support the interpretation.

The fifth chapter, entitled "Business improvement order and bank governance," focuses on the business improvement order issued against banks to demonstrate whether bank governance, specifically ownership structure and board characteristics, effectively prevents the commission of non-compliance. In response to the surging number of fraud cases after the global financial crisis, this chapter attempts to fill the gaps to analyze the board characteristics that can effectively reduce banks' non-compliance in the view of providing supporting evidence of having effective monitoring bank boards.

After the global financial crisis, regulators acknowledged the vital role of bank boards in preventing any misconduct or breaching, putting "heightened expectations" on bank boards for safe and sound operation (Office of the Comptroller of the Currency, 2014; Financial Stability Board, 2014). In Japan, the revised governance codes and the amended Companies Act in 2015 encourage banks to allocate more outside directors to increase board independence for effective monitoring to reduce non-compliance. Another highlight is that megabanks are taking the initiative to minimize cross-shareholdings in their banks' directions. Additionally, foreign shareholdings have risen sharply for the past decade and emerged as the largest investor group in some regional banks. Therefore, foreign investors can be effective monitors. Under the amended act for promoting board independence, reducing cross-shareholdings for better governance, and revising stricter capital regulations for promoting banks' financial soundness, we shall expect these steps to lead to effective monitoring to deal with fraud, breaching, or non-compliance in the banking industry. However, surprisingly, misconduct cases and fraudulent cases are still increasing. These conflicting contentions trigger continuing debates, and the effectiveness of the approaches or amendments is still a moot point.

The primary research motivation in this chapter is whether governance mechanisms, particularly ownership structure and board characteristics, matter in preventing banks' non-compliance and, if so,

what governance variables matter. This chapter studies regulatory enforcement actions, specifically business improvement orders, issued against Japanese commercial banks from 2004-2013 to present whether governance effectively prevents or alleviates banks' non-compliance. Empirically analyzing non-compliance is challenging in academia. Generally, non-compliance can only be observed once it is detected. However, because the detection is imperfect, even in the absence of the issuing of business improvement orders against banks, banks may still commit non-compliance. To alleviate this problem, I employ a bivariate probit model following Nguyen, Hagendroff, &Eshraghi (2016) and Wang (2013). Theoretically, the probability of non-compliance commission increases with the expected benefit and decreases with the expected cost of detection and penalization. Thus, the process of non-compliance undergoes two processes; the first is a commission of non-compliance, and the second is detection. Under the bivariate probit model, allow us to consider the two latent probabilities of interest, the probability of non-compliance commission and the probability of the detection of non-compliance, from the observed probabilities of detected non-compliance. This model gives a clearer picture regarding the commissioning of non-compliance and offers a precise understanding of the economics of non-compliance to deter non-compliance better.

The main results are as follows. First, a larger board size is associated with fewer cases of non-compliance detection and a lower likelihood of non-compliance detection. In other words, it helps in reducing the commission of non-compliance. This result implies that banks are in the high complexity sector due to the business nature of banks; thus, a giant board pool of expertise is beneficial to banks by providing expert advice, which in turn prevents banks from non-compliance commitment. Second, board composition, for instance, a higher percentage of outside directors with bank working experience and executive directors is associated with fewer non-compliance detection. This result implies that only outside directors backed up with bank working experience or executive directors considered better informed can timely prevent any potential breaching from alleviating the non-compliance.

I employ a bivariate probit model to understand non-compliance precisely. The evidence highlights that the bank board is essential in reducing non-compliance. However, like most governance-related studies, the analysis encounters potential endogeneity problems. Although I have included most of the relevant board characteristics variables, there may still be unobservable board characteristics related to non-compliance that I need to account for in future research. Furthermore, identifying the reverse causality problem between governance variables and bank non-compliance is problematic. Thus, I need to make this one of the essential topics in future research.

CHAPTER 2[1]

The cyclical patterns of capital buffers: Evidence from Japanese banks

This chapter explores the relationship between banks' choice of capital buffers and prevailing macroeconomic conditions. Considering the unique features of Japan's economy and diverse capital adequacy standards, I analyze the data of Japanese commercial banks from 2002 to 2012. I find a negative relationship between capital buffers and the business cycle phases but a positive relationship for internationally active banks. The negative signs were significant in magnitude and of higher significance when including crisis dummies. The findings suggest that the capital buffers of internationally active banks behave counter-cyclically; however, the capital buffer patterns became pro-cyclical during crises.

[1] This chapter is written based on the paper of Lai, Karen Kai Lin (2020). The cyclical patterns of capital buffers: Evidence from Japanese Banks, Hitotsubashi Journal of Commerce and Management 53, pp 49-68. https://hermes-ir.lib.hit-u.ac.jp/hermes/ir/re/30975/HJcom0530100490.pdf

2.1 Introduction

There has been much debate over the "pro-cyclical" nature of bank capital requirements since the 2004 release of the Basel II guidelines by the Basel Committee on Banking Supervision. During economic upturns, bank capital requirements would decrease, encouraging banks to take on risk. Consequently, banks would only extend credit by building sufficient capital for potential losses, even during economic upturns when increasing profits is relatively easy and it is cheaper to raise external capital. However, during economic downturns, borrowers are more likely to be downgraded, so banks must increase their capital. Since it is difficult for banks to raise external capital during recessions, they would reduce loans and dispose of assets to meet the regulatory minimum capital requirements (Repullo & Suarez, 2013; Borio & Zhu, 2012). The adoption of Basel II expects to take place gradually, but with the breakout of the global financial crisis, urging the implementation of Basel III. It called for improvements to macro-prudential regulations, particularly related to the pro-cyclicality issue. However, there was concern that the drastic regulatory changes and timing of the implementation might lead to non-convergence.

These interactions between the financial and real sectors, referred to as pro-cyclicality, can amplify business fluctuations and exacerbate financial instability. Therefore, addressing pro-cyclicality in the financial system may be essential to strengthening regulatory frameworks.

Previous research, such as that by Francis and Osborne (2010), suggests that capital requirements will undoubtedly influence banks' capital management practices. Banks can respond to the change in capital requirements and adjust their capital ratios in several ways. For example, they can alter their capital ratio by raising new capital, retaining a higher proportion of their earnings, or in terms of their risk-weighted assets, adjusting the on-and-off-balance sheet composition.

In dealing with the pro-cyclicality problem, capital management practice is undoubtedly crucial. In academia, however, the evidence on capital management practices is mixed. Nevertheless, some

previous studies (Ayuso et al., 2004; Jokipii & Milne, 2008; Stolz & Wedow, 2011; Shim, 2012; Chen & Hsu, 2014; Huang & Xiong, 2015) provide evidence that capital buffers behave in a pro-cyclical manner[2], while others show contrary results; that is, capital buffers act counter-cyclically (Jokipii & Milne, 2008[3]; Gursoy & Atici, 2012; Kontbay-Busun & Kasman, 2015). Unfortunately, these studies use data from different countries or regions in the U.S. and Europe, and there is little research using data from Asian countries.

Japan has dual standards for setting capital requirements. The capital adequacy minimum for domestic banks is four percent, while eight percent for internationally active banks. The different capital adequacy minimums create varying levels of regulatory pressure, which will further influence banks' capital decisions. This unique feature of the Japanese banking industry sheds light on their capital adjustment behavior. Policymakers are concerned about this behavior because capital buffer behavior will affect macroeconomic output in the long run. The analysis results will also assist in their ongoing effort to design more efficient regulations to deal with pro-cyclicality. These results may establish a benchmark for understanding how banks set their capital management practices in light of this divergence and the subsequent policy implications, particularly Basel III.

Japan is infamous for its long economic stagnation following the asset price bubble's collapse in late 1991 and early 1992. As a result, Japan experienced not only the "lost decade" but lost decades, or *ushinawareta nijyuunen* (Fukada, 2018), and the effects of the stagnation lingered until 2010. Therefore, realizing the accounting effects of the market crash are still ongoing despite undergoing more than 25 years.

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[2] For clarification, I refer to pro-cyclical co-movement or fluctuations as the correlation of a cycle variable. Thus, a negative (positive) coefficient of the business cycle in the buffer regressions indicates a counter- (pro-) cyclical fluctuation of capital buffers over the business cycle. The relationships suggest the pro- (counter-) cyclical behavior of capital buffers. The term pro-cyclical does not mean that the variable amplifies business cycle fluctuations.

[3] Pro-cyclical behavior of capital buffers was found in 15 EU countries in 2004 using an international bank database; however, others found counter-cyclical behavior using a sample limited to the RAM (10 countries that joined European Union in May 2004) in 2004.

Economic stagnation is more than just a phenomenon limited to Japan, considering the recent economic trend. After the Great Recession of 2007-2009, many commentators, economists, and governments of Western countries concluded the conditions of economic stagnation evident in developed countries. Many warned that developed countries are in danger of experiencing a "lost decade" or are becoming "enmeshed in a Japanese-style deflationary outcome" (Chan, 2012). Conditions in the G7 reflect the trend of stagnation, with low-interest rates and limited inflation rates informing their economic conditions. The research on capital management practices lacks conclusive evidence due to heterogeneous results. However, the long-term economic stagnation in Japan creates an optimal setting to evaluate banks' capital decisions.

To knowledge, there is no conclusive evidence of banks' capital decisions under such economic conditions. This chapter attempts to address this gap by investigating the extent of pro-cyclicality problems in Japan during the long period of economic stagnation. I use data from Japanese commercial banks from 2002 to 2012. This chapter aims to understand banks' diverse capital management practices better. In addition to the sample period, I employ two crisis dummies with different attributes to further explore the cyclical pattern of capital buffers. First, I explore the relationship between banks' choice of capital buffers and macroeconomic conditions while controlling for other factors that affect banks' capital management practices. Second, I extend the previous research on banks' responses to changes in regulatory capital requirements to evaluate the extent to which these responses depend on bank-level characteristics and macroeconomic conditions. These issues are vital to a clearer picture of banks' behavior, which is essential for policy considerations and revisions to create a more comprehensive regulatory regime. Moreover, the results of this study establish a benchmark for banks' capital decisions for developed countries, which is currently informed by the trend of economic stagnation. Finally, this chapter contributes to the existing literature by examining the behavior of capital buffers under an expanded range of diversion in capital adequacy minimums during long-term economic stagnation.

The main results are as follows. First, negative and significant relationships between capital buffers and the phases of the business cycle (GDP) were found with the inclusion of an internationally active bank dummy. In other words, the capital buffers of Japanese commercial banks behave pro-cyclically, informing the adoption of myopic capital management practices. Second, positive and significant relationships between capital buffers and the business cycle phases appear for internationally active banks. Third, in the overall sample period, I find positive signs for internationally active banks, indicating the counter-cyclical behavior of capital buffers, suggesting the forward-looking capital management practice. Finally, these positive signs (cross term of INTER and GDP) lose resiliency during a crisis. As a result, the capital buffer of internationally active banks behaves pro-cyclically during crises.

This result supports the notion that internationally active banks are under higher regulatory pressure and therefore have a stronger incentive to maintain ample capital buffers and adopt forward-looking capital management practices. However, the counter-cyclical pattern of capital buffers for internationally active banks is unsustainable during crisis periods.

The remainder of this chapter is as follows. First, section 2.2 presents the institutional background of capital management practice, the Basel accord, and the dual capital requirements. Second, section 2.3 offers a literature review and hypothesis development. Next, following the data and methodology in section 2.4, empirical results are in section 2.5. Finally, the conclusion is in section 2.6.

2.2 Institutional background

In this literature review, I first explain the cyclical behavior of capital buffers. Second, I address the relationship between the cyclical behavior of capital buffers and the Basel Accords. Finally, the last subsection provides some institutional background on the dual capital adequacy standards and economic conditions.

2.2.1 Capital management practices

Recent studies investigate the cyclical behavior of capital buffers. However, they find conflicting results, making the evidence on the cyclical pattern of capital buffers inconclusive. The cyclical behavior of capital buffers is mainly either pro-cyclical or counter-cyclical.

Suppose capital buffers are negatively associated with a business cycle proxy. In that case, the capital buffers exhibit pro-cyclical behaviors. Banks must build up their capital buffers for the additional risk arising from portfolio expansion during economic upturns. Conversely, during economic downturns, banks face challenges as capital costs rise dramatically, and their capital buffers erode due to the write-off of bad debts. These behaviors are considered short-sighted or myopic. Nevertheless, some of the literature finds available evidence of pro-cyclical behavior in buffers (Bikker & Metzemakers, 2004; Ayuso et al., 2004; Linquist, 2004; Jokipii & Milne, 2008; Stolz & Wedow, 2011; García-Suaza et al., 2012, Shim., 2012; Saadaoui, 2014; Chen & Hsu, 2014; Huang & Xiong.; 2015) after controlling for other bank-level buffer determinants such as size, risk profile, and the cost of capital.

However, some studies find that capital buffers behave counter-cyclically (Jokipii & Milne, 2008; Gursoy & Atici, 2012; Kontbay-Busun & Kasman, 2015). If capital buffers are positively associated with a business cycle proxy, then capital buffers will behave counter-cyclically. In this case, banks will increase their capital levels during economic upturns or relatively favorable economic conditions. The timing of these increases to cover potential future losses makes them relatively easy and cheap. This counter-cyclical behavior is considered forward-looking. Banks adopt this forward-looking capital management practice over the long term; then, banks should fulfill the "counter-cyclical buffer" requirement in Basel III relatively quickly. Some of the studies that analyzed samples across countries find variations in the cyclical patterns of capital buffers, while others find that cyclical patterns diverge depending on bank size or other characteristics (e.g., Jokipii & Milne, 2008; Vu &

Turnell, 2015[4]; Carvallo et al., 2015[5]).

While some studies find significant relationships between capital buffers and a business cycle proxy, the banks' characteristics led to the conclusion that capital buffers may be only moderately counter-cyclical or moderately pro-cyclical. Banks with low capitalization facing the pressure of low capital do not reduce loan supply during downturns (Stolz & Wedow, 2011). This behavior is contrary to myopic behavior.

2.2.2 The Basel Accord

The Basel Accords set capital requirements to maintain banks' soundness. Basel I was established in 1988. In 2004, the Basel Committee on Banking Supervision proposed revisions to capital regulations, the Basel II, which came into force in 2007. In Japan, Basel I was implemented in 1992. Japan implemented Basel II at the end of 2006.

Contrarily to Basel I, the capital charges of Basel II are based on the quality of the asset rather than the type of asset. As a result, banks can choose from several approaches. The standard system is based on the borrower's public ratings by attributing specific risk weights to each rating class. Alternatively, banks can choose the internal ratings-based approach (IRB), which allows them to employ their internal rating systems to weigh the creditworthiness of their debtors. In Basel I, the total capital charges were 8% of risk-weighted assets, and all credit assets received the same weight, regardless of the financial soundness of their debtors. This revision increased the sensitivity of the risk weighting system and led to a more sophisticated risk asset evaluation.

The revision yielded an obvious microeconomic benefit by reducing potential regulatory arbitrage. However, increasing the sensitivity of the risk weighting system (credit risk) will cause the capital

[4] In Australia, they find evidence of pro-cyclical behavior for large banks and counter-cyclical behavior for smaller banks.

[5] Using a sample of 13 Latin American and Caribbean countries from 2001 to 2012, the authors find that only capital buffers in Bolivia, Brazil, Mexico, Panama, and Venezuela behave pro-cyclically.

required to become more cyclical. Consequently, banks might face capital management problems, especially during an economic downturn. Banks may face difficulty raising capital during a downturn, and banks will simultaneously face a challenging situation in which capital costs are likely to increase. However, their equity capital will decrease due to write-offs in loan portfolios. The condition worsens if banks force to reduce their lending due to capital constraints. This pro-cyclicality could severely impact the macroeconomy, in which the cycle will amplify and delay the recovery of financial stability. Several studies document the pro-cyclical effect of Basel II on the business cycle (Gordy & Howells, 2006; Heid, 2007; Hakenes & Schnabel, 2011).

2.2.3 Dual capital requirements

Japan has a dual set of capital requirements, one for domestic banks and another for uniform international standards. For the former, the capital requirement is four percent, while for the latter, the capital requirement is eight percent.

Japan has experienced difficult long-term economic conditions, including the "lost decade" (1991 to 2001) and effects that have lingered well into the 21st century. Thus, the term coined by Fukada (2018), *ushinawareta nijyuunen* (lost decades), refers to Japan's long period of economic stagnation.

In summary, I consider long-term economic conditions as the background and the existence of dual capital minimums in the analysis. I employ the partial adjustment framework to explore the cyclical patterns of capital buffers in Japanese commercial banks and the influence of the dual capital requirements on determining the level of capital buffers.

2.3 Literature review and hypothesis development

2.3.1 Capital management practices

In this chapter, I examine Japanese commercial banks' cyclical patterns of capital buffers. The focus is on determining whether the capital buffers in Japanese commercial banks behave counter-

cyclically, which triggers financial pro-cyclicality. Generally, there are two cyclical patterns in capital buffers.

First, I find a positive coefficient of the business cycle in the buffer regression. In that case, the capital buffer is counter-cyclical, considered prudent, and forward-looking. This positive relationship implies that during an economic upturn, when banks tend to expand their asset portfolios while simultaneously facing an increase in the potential risks, banks increase their capital buffers in response to the incremental rise in risks because the cost of capital is low. As a result, banks increase their capital buffers more than average or beyond the optimal level to account for the risks arising from their lending expansion. In addition, a high level of capital buffers will also help attenuate the potential loss effect during a downturn. Thus, when the risk (credit risk) materializes during an economic recession, banks can utilize these higher capital buffers to maintain their financial soundness.

By contrast, if I find a negative coefficient of the business cycle in the buffer regression, we can surmise that the capital buffer is pro-cyclical, considered myopic, and short-sighted. This negative relationship implies that during an economic downturn, when resources are scarce and the cost of capital is high, under the critical situation, banks need to build up their capital buffers to meet the capital requirement standard or decrease their assets by cutting credits dramatically. Banks engaging in this myopic behavior will significantly expand their asset portfolios but build up their capital buffers at low levels during an economic expansion. However, a higher level of capital expansion addresses the incremental increase in their risks. If banks reduce credit dramatically, they might provoke a financial pro-cyclicality problem, referring to the business cycle amplification.

To delve deeper into the issue of whether the cyclical pattern of capital buffers varies under different capital requirements, I differentiate between the banks that employ domestic and uniform international standards. Moreover, considering that economic conditions are the leading indicator, I divide the analysis into several time frames, including crisis dummies.

For internationally active banks, I expect a greater level of counter-cyclical behavior in capital buffers since they have higher regulatory pressures, giving them a higher incentive to maintain this cyclical pattern.

Hypothesis 1: The capital buffer positively correlates with the cyclical indicator.

Hypothesis 2: The capital buffer for internationally active banks has a stronger positive correlation with the cyclical indicator than domestic banks.

2.4 Data and methodology

2.4.1 Partial adjustment model

I test the determinants of capital buffers through a dynamic model. Many researchers, including Ayuso et al. (2004), Estrella (2004), Jokipii and Milne (2008), and Francis and Osborne (2010), have adopted this simple partial adjustment model. I employ in this chapter (Equation (1))

$$BUF_{i,t} - BUF_{i,t-1} = \theta\left(BUF_{i,t}^{*} - BUF_{i,t-1}\right) \qquad (1)$$

Where θ is a positive adjustment parameter, *i* indexes banks, and *t* indexes time in this partial adjustment model, the model assumes that banks take time to adjust their capital buffer levels, which means that this adjustment is not instantaneous. Hence, bank *i* only partially reaches its optimal capital buffer $BUF_{i,t}^{*}$, during the period between *t*-1 to *t*. θ reflects the speed of adjustment. If θ equals zero, it means no adjustment, and if θ is equal to 1, the bank makes a total adjustment within one period. Because I use half-yearly data, one period is half a year. Therefore, a faster speed of adjustment (a value greater than θ) will lower the adjustment cost.

The optimal capital buffer level $BUF_{i,t}^{*}$, is not observable. Thus, I approximate the optimal capital buffer level $BUF_{i,t}^{*}$ as a function of the *N* explanatory factors.

$$BUF_{i,t}^{*} = \delta' X_{n,i,t} \qquad (2)$$

Where X is a vector of N explanatory factors that determine its target capital ratio, and δ is a vector of parameters, where $\delta' = (\delta_1 \ldots\ldots \delta_n)$. Then, combining (1) and (2) gives the following model of a bank's choice of capital buffer:

$$BUF_{i,t} = (1 - \theta)BUF_{i,t-1} + \delta' X_{n,i,t} \qquad (3)$$

Where $X_{n,i,t}$ is a vector of variables that influence bank *i*'s optimal buffer at time *t*, and $(1 - \theta)$ reflects the costs of adjustments. The idea behind this specification is to evaluate the effect of such variables on the accumulation of capital buffers (Jokipii & Milne, 2008; Stolz & Wedow, 2011; Carvallo *et al*., 2015).

The introduction of a lagged dependent variable in the right-hand side variables in Eq. (3) creates an endogeneity problem since the lagged dependent variable might correlate with the disturbance term. To solve this problem, I employ the Difference Generalized Method of Moments (Difference GMM) estimator developed by Arellano and Bond (1991) for the coefficients in the equation above, in which the lagged levels of regressors are the instruments for the equation in the first differences. However, as Blundell and Bond (1998) show, these instrumented variables lead to weak instruments and might result in downward-biased estimates of parameters and the loss of asymptotic efficiency. Therefore, Blundell and Bond (1998) developed a System Generalized Method of Moments (System GMM) estimator that includes levels of lagged differences as instruments for the equation. On this issue, Arellano and Bover (1991) and Blundell and Bond (1998) suggest differencing the instruments instead of the regressors to make them exogenous to the fixed effects, leading to a shift from the difference GMM to the system GMM estimator, which is a joint estimation of the equation in levels and first differences. I, therefore, use a two-step system of GMM estimators with Windmeijer (2005) to correct the standard error.

2.4.2 Sample

The primary data source is the Nikkei Financial Quest database. The sample period is the fiscal year 2002 to the fiscal year 2012 on a half-yearly basis. Therefore, the period of analysis covers 22 half-yearly data sets. This study covers the implementation period of Basel I and Basel II. It is restricted to unconsolidated reports, as banks' observed behavior on a sole basis is one of the main objectives of this study.

I limit the sample period to 2012 due to the introduction of Basel III, considering that the inclusion of the new capital regulation with different calculations and requirements may lead to confusion regarding the interpretation of the analysis results. Moreover, the estimation period covered only part of the economic cycle. It covers a relatively favorable economic period; thus, it is difficult to conclude whether and how banks behave during more prolonged economic downturns. The estimation period also includes when the non-performing loans peaked in the Japanese banking sector and the Lehman shocks of 2008. I recognize that data spanning an entire economic cycle is a better estimation method; however, data limitations prevent us from proceeding further. The data consist of city banks, regional banks, and Tier 2 regional banks. I removed institutions subject to government intervention and those with less than five observations within the period from the sample[6]. The sample yielded a sample size of 1795 observations. In addition, I collected the data on GDP growth from the Department of National Accounts Japan's quarterly estimation reports and banks' financial data from NEEDS Financial QUEST.

2.4.3 Explanatory variables

According to Estrella (2004) and Ayuso et al. (2004), the adjustment cost significantly affects buffer holdings. Therefore, banks face adjustment costs in adjusting toward their optimum capital

[6] For banks involved in M&A activities, I applied recoding. Again, the results are consistent with baseline results.

buffer levels. Estrella (2004) and Ayuso et al. (2004) test this cost using a lag of capital buffers (BUF) as a proxy for this cost. Suppose the bank faces adjustment costs toward the optimum capital buffer level. In that case, I should find a significant and positive relationship between capital buffers and the lag of capital buffers.

I use the ratio of after-tax earnings to book equity (ROE) as a proxy of the direct opportunity costs of holding equity capital (Ayuso et al., 2004; Bikker & Metzemakers, 2004; Stolz & Wedow, 2005; Jokipii & Milne, 2008). Since the cost of raising equity capital is high, I thus expect a negative relationship between capital buffers and ROE.

Capital reduces the likelihood of bankruptcy and financial distress costs, including the legal bankruptcy process and the loss of charter value (Keeley, 1990; Estrella, 2004). Stolz and Wedow (2011) and Francis and Osborne (2010) use the ratio of total risk-weighted assets over total assets (RISK). Following Francis and Osborne (2010), to avoid any potential endogeneity, in which risk-weighted assets scale the dependent variable, I define RISK in a lagged form in the specification, representing the previous regulatory measure of asset risk. Haq et al. (2014), using a sample of banks across 15 Asia-Pacific countries, find positive relationships between bank capital and bank risk. A positive relationship between RISK and capital buffers reveals that banks are attempting to mitigate the expected cost of failure. Conversely, a negative relationship may indicate moral hazard behavior.

In addition, I consider loan loss provision as an indicator of banks' internal risk estimation that reflects their managerial assessment of the losses embedded in their portfolio. Following Francis and Osborne (2010), I define the ratio of loan loss provisions to total assets (LLP) as the proxy of banks' own internal estimation of risk. A positive relation might be consistent with the interpretation that banks attempt to attenuate the expected costs of failures, while a negative relationship would be consistent with moral hazard behavior.

According to the too big to fail (TBTF) hypothesis, big banks will keep relatively low capital buffers compared to small banks because larger banks expect to benefit from government rescue

measures when they face difficulties. In addition, larger banks generally have more significant investments and better portfolio diversification opportunities. Thus, with the power of diversification, such banks require less capital than small banks, which may reduce the cost of financing capital. Additionally, big banks can take advantage of the perception of a safety net for depositors, which allows them to maintain lower capital ratios or capital buffers. Numerous studies use the log of total assets (SIZE) to represent the size of banks when testing the TBTF hypothesis (Ayuso et al., 2004; Jokipii & Milne, 2008; Francis & Osborne, 2010). While the sign of SIZE can be either positive or negative, several prior studies find a negative relationship between SIZE and capital buffers.

The capital composition will influence the banks' ability to absorb losses. Thus, Francis and Osborne (2010) include the ratio of Tier 1 capital to total capital (TIER1) as a proxy for banks' capital quality. Banks with a more significant percentage of high-quality capital are considered financially sound and will tend to hold lower capital buffers. So, I expect a negative relationship between capital buffers and TIER 1.

Information about the changes in capital levels is observable in the market, which creates other sources of pressure for the banks to adjust their capital level. It is harder to measure banks' capital management in light of the influential role of rating agencies (which have the same information as the regulator), influencing banks' funding costs. Therefore, banks with a low capital buffer will be under pressure from sources besides the regulator in responding to their capital adjustment. In other words, the different sources of stress (e.g., market forces and rating agencies) may outweigh the capital requirement in influencing banks' choice of capital adjustment. Haq et al. (2014), using a sample of banks in 15 Asia-Pacific countries, provide evidence that market discipline complements bank capital. Following Nier and Baumann (2006) and Haq et al. (2014), I address this possibility by controlling for the impact of market discipline by including a measure of market discipline. I use a ratio of Negotiable Certificate of Deposits to Total Deposits (NCD) as the proxy of market discipline since the deposit insurance scheme does not cover negotiable certificates of deposit. Schaeck and

Cihák (2012) show that competition creates incentives for more excellent capital retention; that is, market competition increases the level of capital holdings. Valencia and Bolanos (2018) include market concentration as a variable in their study on the effect of competition and business cycles on bank capital buffers internationally. I use the square of the ratio of the total loans of each bank to the total loans of all banks in given years (CONC) as a proxy for market concentration. I expect a positive relationship between capital buffers and CONC.

After determining the factors influencing capital buffers, I focus on gross domestic product (GDP) growth as a variable. GDP is a popular cyclical indicator in previous research. Prior studies tried to answer whether capital buffers pro-cyclically or counter-cyclically over the cyclical indicator. There are several earlier studies on bank capital management (Ayuso et al., 2004; Jokipii & Milne, 2008), with GDP (the year-on-year growth rate of gross domestic product) as a proxy variable for the business cycle. If banks build up their (target) capital buffers during a boom (positive correlation), they are forward-looking[7]. Conversely, it is myopic when banks decrease their (target) capital buffers during a boom (negative correlation)[8].

2.5 Empirical results

2.5.1 Capital management practices

In Table 2.4, I show the results of baseline specification for the overall sample, including domestic standard and internationally active banks. The coefficient on the lagged buffer (BUF (-1)) is statistically significant in all specifications, revealing the presence of substantial adjustment costs for banks to change their capital buffers to their target amounts. The coefficients range from 0.65 to 0.75, which suggests that Japanese commercial banks adjust their capital buffers by about 25% half yearly.

[7] During an economic upturn, the credit risk of lending and the cost of raising capital is relatively low. As a result, banks increase revenues by expanding their asset portfolios, meanwhile maintaining sufficient target capital ratios. Such behavior is considered forward-looking.

[8] During an economic downturn, whereby the amortization of non-performing loans tends to increase rapidly, raising capital is costly, causing banks in a very critical situation and may force them to reduce lending drastically. Such behavior is considered myopic.

Thus, their optimal capital buffer levels are about 50% annually.

At first glance, Table 2.4, column 1, indicates no significant relationship between the capital buffer and GDP growth. I then introduced a dummy equal to one for internationally active banks (INTER) and the cross term of INTER and GDP. Table 2.4, row 2 shows that capital buffer is statistically significant and positively correlated with the cross-term of INTER and GDP. In other words, it behaves counter-cyclically. Despite the GDP coefficient showing a negative sign (-0.03), the overall marginal effect of GDP on the capital buffers of internationally active banks remains positive (-0.03+0.07=0.04). A one percent increase in GDP will lead to an approximate 0.04% increase in the capital buffer.

In Table 2.4, column 2, and column 3, the results are robust under different estimation specifications, suggesting that the counter-cyclical behavior of the capital buffers of internationally active banks is persistent. However, I find no significant relationships between domestic banks. One of the possible interpretations of this counter-cyclical behavior of capital buffers for internationally active banks might be related to the dual capital requirements in Japan. The average capital buffer of internationally active banks is around 6.00%, slightly lower than the average capital buffer of the whole sample (7.00%), revealing that different standards in capital requirements do create different levels of pressure to build up capital buffers. Under stricter standards, internationally active banks maintain lower capital buffers than domestic ones. Internationally active banks may face higher regulatory pressure to fulfill the international standard capital requirements subject to Basel regulations. Thus, those banks have higher incentives to build up capital buffers during relatively favorable economic conditions in anticipation of unexpected losses or shocks to avoid the breach of regulatory minimums. Another possible interpretation of this positive and significant relationship between GDP and the capital buffer of internationally active banks may be due to the different customers and revenue sources, leading to the sensitivity of the capital adjustments of internationally active banks to macroeconomic conditions.

SIZE is robust through all regressions. The positive and significant SIZE coefficient across all specifications shows that concern about TBTF does not exist in the Japanese banking sector. These results are surprisingly inconsistent with previous research implying that large banks maintain a higher level of capital than smaller banks. One possible explanation may be that larger banks are likely to be involved in a broader range of businesses. Thus, to ensure their soundness, larger banks are likely to maintain a higher capital buffer level. In addition, internationally active banks are generally larger and involved in international operations. As a result, larger international active banks will likely maintain higher capital buffers. ROE also reveals a positive and significant coefficient inconsistent with previous research. I am still determining the factors causing this positive sign. One possible explanation for this relationship may be that banks use retained earnings to adjust their capital buffer level (Cohen & Scatigna, 2016).

The coefficient of NCD is significantly positive across all specifications, consistent with previous research, revealing that market discipline affects the retention of capital buffers. However, market concentration proxied by CONC does not involve capital buffers in statistical terms.

2.5.2 Crises dummies

Finally, I add crisis dummies to explore the effect of different economic conditions on capital buffers. CRISIS DUMMY 1 represents the first period of 2002-2004 when the level of non-performing loans in the Japanese banking sector peaked, and central Japanese banks' capital adequacy ratios were at their lowest. CRISIS DUMMY 2 represents the second period, 2008-2009, when economic conditions fluctuated due to the global financial crisis in 2008. I also included the cross-term of INTER and each time dummy[9].

Table 2.5, columns 1 and 3, indicate strongly negative and significant relationships between capital

[9] CRISIS DUMMY 1 and CRISIS DUMMY 2 dropped from the analysis due to collinearity.

buffer and cross term of INTER*CRISIS DUMMY 1, suggesting that the capital buffers of internationally active banks behaved pro-cyclically in this period. The result in columns 1 and 3 implies that a one percent increase in GDP will lead to around a 1.25% decrease in capital buffers. The overall marginal effect of GDP on the capital buffers of internationally active banks was negative during this period. Since 1988, the Japanese government has injected funds into banks by purchasing subordinate bonds and preferred stocks to encourage banks to write off non-performing loans. Given the history, one possible explanation of this negative relation is that major Japanese banks suffered severe damage to their financial soundness and were in the transition period to restore their financial health when the economy recovered. Thus, in this challenging situation, banks needed more room to strengthen their capital buffers during that period, as writing off non-performing loans was the primary target. The non-performing loans problem ended in 2005 when banks met the target of reducing non-performing loans by half (4%) (See Figure 2.2).

In Table 2.5, columns 2 and 4, I find that the capital buffer is statistically significant and negatively correlated with the cross term of INTER*CRSIS DUMMY 2. In other words, it behaves pro-cyclically. The result in columns 2 and 4 imply that a one percent increase in GDP will lead to around a 1.90% decrease in capital buffers. As a result, the overall marginal effect of GDP on the capital buffers of internationally active banks was negative during this period.

The cross term of INTER*GDP in table 2.4, columns 2 and 3, which covered the whole sample period, implies that the counter-cyclical behavior of capital buffers, however, the counter-cyclical patterns are offset by the effects of the global financial crisis. Counter-cyclical behavior did not continue once banks achieved a certain capital buffer level. Therefore, I only find positive signs on the cross term of INTER*GDP for part of the sample period. However, I see no positive signs on the cross term of INTER and the crisis dummies. This result indicates that a loss in resiliency during crises or shocks to Japanese commercial banks results in pro-cyclical behavior, raising concerns about their financial soundness during crisis periods.

CRISIS DUMMY 1 period, whereby the Japanese banking sector suffered from maintaining its financial soundness due to severe damage from high levels of non-performing loans. However, surprisingly, the cross-term INTER*CRSIS DUMMY 2's magnitude indicates that the global financial crisis period was more considerable compared to CRISIS DUMMY 1's magnitude. Thus, these results imply that despite the relatively small effect of the global financial crisis on Japan's economy compared to other countries, it still prompted a negative pro-cyclical pattern in capital adjustment.

For a robustness check, I employ both GDP_A and GDP_P considering that GDP_P might be a better alternative measure of GDP. Table 2.6, row 2, columns 1 and 2 show that capital buffers positively and significantly correlate with GDP_A. Moreover, the capital buffers are statistically significant and positively correlated with the INTER dummy and the cross term of INTER*GDP_A. This result further confirms the results in Table 2.4. However, Table 2.6, column 3 shows I find no significant relationships when using GDP_P. Using the second lag AR (2) as an instrument is invalid in this analysis. Therefore, I cannot draw definitive conclusions.

2.6 Conclusions

Overall, Japanese commercial banks maintain capital ratios well above the capital requirements because banks maintain high capital buffers in anticipation of potential losses or shocks and avoid breaching regulatory minimums, which may impose considerable costs in the case of regulatory intervention. However, financial intermediaries face some constraints and trade-offs in their capital adjustment process. Moreover, financial intermediaries expose to external pressure due to market and economic conditions, which influence their behavior.

In this chapter, I employ a dynamic empirical model adopted from prior studies to analyze the determinants of banks' capital buffers. One of the focuses of this study was the dual capital adequacy requirements in Japan and how the diverging standards influence the behavior of capital buffers. The

capital buffers of internationally active banks behave counter-cyclically in the baseline specifications. The positive signs of the cross-term between INTER and GDP indicate that internationally active banks built up capital buffers during favorable economic conditions. The pro-cyclical behavior of capital buffers does not dominate the capital buffer adjustment in the overall sample period estimations. Japanese commercial banks, specifically internationally active banks, built their capital buffers during relatively favorable economic conditions. During an economic upturn, when capital financing costs are low, Japanese commercial banks increase their capital buffers to prepare for potential losses, which are likely to increase during an economic downturn. Additionally, banks can utilize their built-up capital during economic downturns to cover losses.

Another significant result relates to the crisis dummies. The results reveal that Japanese commercial banks show pro-cyclical behavior in their capital adjustment during the distress and recovery periods. I found counter-cyclical behavior in internationally active banks for the whole sample period. However, counter-cyclical behavior needs to be more assertive in response to crises. The effects of the financial crisis offset the counter-cyclical patterns of capital. In response to the crises, banks adopted the pro-cyclical behavior of capital buffers. The inconsistent patterns in capital buffers show that economic conditions doubtless affect the capital management practices of Japanese commercial banks. Of note is that the effect for domestic banks shows no significant positive sign, regardless of whether I analyze a crisis period or the overall period. This result indicates that the weaker counter-cyclical behavior of capital buffers is more of a generalized problem in domestic banks.

In summary, the counter-cyclical behavior of capital buffers indicates forward-looking capital management practices only found in internationally active banks. However, inconsistent patterns in capital adjustments and a counter-cyclical pattern of capital adjustment for internationally active banks during crises suggest a remaining need to promote and strengthen the counter-cyclical capital adjustments with regulatory measures. The new Basel III requirement that promotes financial

soundness and stability with high-quality capital, namely the counter-cyclical buffer requirement, should be strengthened. Another concern is that the domestic banks show no significant results or patterns in capital adjustments. I leave research into the capital requirements to justify the optimum setting of capital requirements for the future.

The business cycle amplifies the pro-cyclicality problem, especially during a downturn, and prolongs the recovery of financial stability from a crisis. Thus, regulators, policymakers, and academics worldwide are still searching for coping methods. The economic conditions of Japan, specifically the long-term economic stagnation, allowed for analysis in a unique context. The results provide insight into the extent of banks' capital decisions during a long period of economic stagnation. Moreover, they offer new directions for banks' capital decisions in developed countries currently trapped in economic stagnation. Specifically, the insights on whether to implement stricter capital adjustments for domestic banks and how regulators can help banks promote counter-cyclical patterns in capital buffers, even during a crisis, to maintain financial stability. Moreover, these findings can assist policymakers and regulators in dealing with pro-cyclicality as they design more efficient and comprehensive capital regulations.

TABLE 2.1: DEFINITION OF VARIABLES

Variables	Description	Sources
Dependent variables		
BUF (%)	Capital buffer	Nikkei Needs Financial Quest
	Capital adequacy ratio minus minimum capital adequacy requirements	
	Variations in the computations of capital buffer	
	Internationally Active Banks: 8 percentage points deducted from the capital ratio	
	Domestic Banks: 4 percentage points deducted from the capital ratio	
Key independent variables		
BUF(-1)	Lagged capital buffer	Nikkei Needs Financial Quest
GDP (%)	Growth rate in real Japanese gross domestic product (Semi-Annual)	The homepage of Cabinet Office of Japan
GDP_A (%)	Growth rate in real Japanese gross domestic product (Annual)	The homepage of Cabinet Office of Japan
GDP_P (%)	Growth rate in real Japanese gross domestic product (according to prefecture)	The homepage of Cabinet Office of Japan
CRISIS DUMMY 1	Dummy equal to one for a high level of non-performing loans (2002-2004)	Nikkei Needs Financial Quest
CRISIS DUMMY 2	Dummy equal to one for the global financial crisis (2008-2009)	Nikkei Needs Financial Quest
INTER	Dummy equal to one for an internationally active bank	Nikkei Needs Financial Quest
INTER*GDP	Intercept between INTER and GDP	Nikkei Needs Financial Quest
INTER*CRISIS DUMMY 1	Intercept between INTER and CRSIS DUMMY 1	Nikkei Needs Financial Quest
INTER*CRSIS DUMMY 2	Intercept between INTER and CRSIS DUMMY 2	Nikkei Needs Financial Quest
Control Variables		
SIZE	Log of total assets	Nikkei Needs Financial Quest
LLP (%)	Ratio of loss provisions to total assets	Nikkei Needs Financial Quest
RISK(%)	Lagged ratio of risk-weighted assets to the sum of total assets	Nikkei Needs Financial Quest
NCD (%)	Ratio of negotiable certificate of deposits to total deposits	Nikkei Needs Financial Quest
TIER 1 (%)	Ratio of Tier1 capital to total capital	Nikkei Needs Financial Quest
ROE (%)	Return on equity	Nikkei Needs Financial Quest
CONC (%)	Square of the ratio of total loans of each bank to the total loans of all banks	Nikkei Needs Financial Quest
CONC_P (%)	Square of the ratio of each bank's total loans to the total loans of all banks in a particular area or prefecture	Nikkei Needs Financial Quest

TABLE 2.2a: DESCRIPTIVE STATISTICS (SEMI-ANNUAL)

	N	Mean	Std. Dev.	p25	p50	p75	Min	Max
Dependent variables								
BUF (%)	1795	6.86	2.67	4.99	6.33	8.64	1.11	21.36
BUF (Internationally active bank)	261	6.00	3.77	3.18	4.63	7.50	1.11	15.05
BUF (Domestic bank)	1534	7.01	2.41	5.26	6.52	8.69	1.58	21.36
Key Independent variables								
GDP(%)	22	0.42	2.07	0.10	0.90	1.90	-6.89	2.92
CRSIS DUMMY 1 (2002-2004)	6	0.26	1.68	0.00	0.00	1.00	0.00	1.00
CRSIS DUMMY 2 (2008-2009)	4	0.18	2.13	0.00	0.00	0.00	0.00	1.00
Control variables								
SIZE	1795	14.55	1.04	13.82	14.60	15.18	12.09	18.89
LLP (%)	1795	1.10	0.48	0.73	-0.99	1.36	0.42	2.61
RISK (%)	1795	52.37	7.49	47.12	52.52	57.44	27.20	101.18
NCD (%)	1795	2.01	3.11	0.00	0.90	3.05	0.00	42.97
TIER 1 (%)	1795	90.53	11.45	84.43	90.27	96.46	49.88	189.54
ROE (%)	1795	2.27	3.67	1.51	2.53	4.04	-19.21	8.85
CONC (%)	1795	0.42	1.17	0.10	0.20	0.36	0.00	12.96
RISK(%)	1795	52.37	7.49	47.12	52.52	57.44	27.20	101.18
INTER	261	0.15	0.35	0.00	0.00	0.00	0.00	1.00

TABLE 2.2b: DESCRIPTIVE STATISTICS (ANNUAL)

	N	Mean	Std. Dev.	p25	p50	p75	Min	Max
Dependent variables								
BUF (%)	1127	6.68	2.90	4.76	6.23	8.56	-1.73	24.45
Key Independent variables								
GDP_A	11	0.73	1.90	0.50	1.40	2.00	-3.40	3.20
GDP_P	11	0.78	2.98	-0.69	1.06	2.42	-9.15	10.93
Control variables								
SIZE	1127	14.60	1.16	13.77	14.58	15.19	12.08	18.90
LLP (%)	1127	1.22	0.75	0.72	1.02	1.47	0.17	6.30
RISK (%)	1127	52.77	7.67	47.42	52.97	57.75	27.20	92.95
NCD (%)	1127	2.27	4.79	0.00	0.74	2.87	0.00	49.96
TIER 1 (%)	1127	91.66	21.97	84.10	90.46	97.02	49.88	100.00
ROE (%)	1127	-1.91	32.37	1.77	3.55	5.28	-50.00	36.70
CONC (%)	1127	10.57	14.68	1.70	8.44	13.10	0.00	218.49

TABLE 2.3: CORRELATION

	BUF	GDP	ROE	SIZE	LLP	RISK	NCD	TIER1	CONC
BUF	1								
GDP	0.010	1							
ROE	0.188	0.181	1						
SIZE	0.174	-0.013	0.149	1					
LLP	0.263	-0.091	0.166	0.233	1				
RISK	-0.168	-0.029	-0.048	-0.127	-0.287	1			
NCD	0.243	-0.022	0.067	0.486	0.162	-0.070	1		
TIER1	-0.079	-0.235	-0.188	0.043	0.027	0.011	0.028	1	
CONC	0.058	-0.021	0.028	0.520	0.101	-0.045	0.262	0.215	1

TABLE 2.4: ESTIMATIONS RESULTS: DETERMINANTS OF CAPITAL BUFFERS, 2002 H1-2012H2

	Expected Signs	(1)	(2)	(3)
(1) BUF(-1)	+	0.339 ***	0.301 ***	0.295 ***
		(0.046)	(0.045)	(0.045)
(2) GDP	+/−	-0.016	-0.033 **	
		(0.012)	(0.014)	
(3) INTER	+/−		-1.345 ***	-1.342 ***
			(0.268)	(0.269)
(4) INTER*GDP	+/−		0.070 **	0.052 *
			(0.032)	(0.031)
(5) ROE	−	0.028 ***	0.025 ***	0.023 ***
		(0.010)	(0.009)	(0.008)
(6) SIZE	−	0.198 *	0.363 ***	0.392 ***
		(0.102)	(0.118)	(0.122)
(7) LLP	+/−	0.195	0.162	0.196
		(0.149)	(0.148)	(0.147)
(8) RISK	+/−	-0.019	-0.026	-0.025
		(0.029)	(0.029)	(0.029)
(9) NCD	+	0.083 **	0.092 **	0.091 **
		(0.040)	(0.041)	(0.041)
(10) TIER1	−	0.010 *	0.002	0.004
		(0.006)	(0.007)	(0.006)
(11) CONC	+	-0.063	-0.006	-0.026
		(0.078)	(0.078)	(0.072)
N		1795	1795	1795
AR(1)		0.000	0.000	0.000
AR(2)		0.107	0.098	0.199
Hansen Test		0.575	0.505	0.545
Year		Yes	Yes	Yes

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Figures in parentheses are robust heteroskedasticity standard errors. The Hansen is a test of the over-identifying restrictions for the GMM estimator. AR (1) and AR (2) indicate first and second-stage autocorrelations. The independent variable is the capital buffer, BUF. The explanatory variables are as follows:- BUF(-1) is the lag of the bank's capital buffer; GDP is the growth in gross domestic products; INTER is a dummy variable that takes 1 for an internationally active bank; ROE is the return on equity; SIZE is the log of total assets; PROVISION is the loan loss provisions; RISK(-1) is the lagged ratio of risk-weighted assets to the sum of total assets; NCD is the ratio of negotiable certificate of deposits to total deposits, TIER 1 is the ratio of Tier1 capital to total capital, and CONC is the square of the ratio of total loans of each bank to the total loans of all banks. The above explanatory variables estimate a one-period lag. BUF and RISK use the lag terms from two periods prior to one period (i.e., three periods prior) and all the aforementioned explanatory variables as operating variables. Only BUF (-1) is specified as the first-period lag is specified because the independent variable is BUF.

TABLE 2.5: ESTIMATION RESULTS: CYCLICAL PATTERN OF CAPITAL BUFFER WITH THE DIFFERENT TIME FRAMES DUMMIES

	(1)		(2)		(3)		(4)	
(1) BUF(-1)	0.284	***	0.293	***	0.280	***	0.289	***
	(0.048)		(0.046)		(0.046)		(0.045)	
(2) GDP	-0.013		-0.024	**				
	(0.012)		(0.012)					
(3) INTER	-1.009	***	-1.027	***	-1.007	***	-1.028	***
	(0.306)		(0.259)		(0.308)		(0.261)	
(4) INTER*CRISIS DUMMY 1 (2002-2004)	-1.242	***			-1.256	***		
	(0.283)				(0.287)			
(5) INTER*CRISIS DUMMY 2 (2008-2009)			-1.882	***			-1.877	**
			(0.234)				(0.235)	
(7) ROE	0.025	***	0.030	***	0.025	***	0.028	***
	(0.009)		(0.009)		(0.008)		(0.008)	
(8) SIZE	0.396	***	0.352	***	0.401	***	0.358	***
	(0.111)		(0.118)		(0.109)		(0.119)	
(9) LLP	0.180		0.167		0.183		0.175	
	(0.143)		(0.151)		(0.141)		(0.152)	
(10) RISK	-0.024		-0.028		-0.024		-0.029	
	(0.028)		(0.029)		(0.029)		(0.028)	
(11) NCD	0.091	**	0.094	**	0.092	**	0.095	**
	(0.038)		(0.039)		(0.038)		(0.040)	
(12) TIER1	0.004		0.002		0.004		0.003	
	(0.007)		(0.007)		(0.007)		(0.007)	
(13) CONC	-0.039		0.012		-0.041		0.008	
	(0.075)		(0.079)		(0.074)		(0.078)	
N	1795		1795		1795		1795	
AR(1)	0.000		0.000		0.000		0.000	
AR(2)	0.222		0.089		0.298		0.181	
Hansen Test	0.524		0.458		0.588		0.506	
YEAR	Yes		Yes		Yes		Yes	

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Figures in parentheses are robust heteroskedasticity standard errors. The Hansen is a test of the over-identifying restrictions for the GMM estimator. AR (1) and AR (2) indicate first and second-stage autocorrelations. The independent variable is the capital buffer, BUF. The explanatory variables are as follows: - BUF (-1) is the lag of the bank's capital buffer; GDP is the growth in gross domestic products; INTER is a dummy variable that takes 1 for an internationally active bank; CRISIS DUMMY 1 is a dummy equal to 1 for the period in which the Japanese banking sector recorded a high level of non-performing loans (2002-2004). CRISIS DUMMY 2 is a dummy equal to 1 for the global financial crisis (2008-2009). ROE is the return on equity; SIZE is the log of total assets; PROVISION is the loan loss provisions; RISK(-1) is the lagged ratio of risk-weighted assets to the sum of total assets; NCD is the ratio of negotiable certificate of deposits to total deposits, TIER 1 is the ratio of Tier1 capital to total capital, and CONC is the square of the ratio of total loans of each bank to the total loans of all banks. The above explanatory variables estimate a one-period lag. BUF and RISK use the lag terms from two periods prior to one period (i.e., three periods prior) and all the aforementioned explanatory variables as operating variables. Only BUF (-1) is specified as the first-period lag is specified because the independent variable is BUF.

TABLE 2.6: ROBUSTNESS CHECK

	(1)		(2)		(3)		(4)	
(1) BUF(-1)	0.735		0.735		0.734		0.711	
	(0.045)	***	(0.043)	***	(0.044)	***	(0.048)	***
(2) GDP_A	1.300		1.273					
	(0.334)	**	(0.317)	***				
(3) GDP_P					0.011		-0.018	
					(0.018)		(0.020)	
(4) INTER			-1.116				-1.155	
			(0.191)	***			(0.202)	***
(5) INTER*GDP_A			0.623					
			(0.065)	***				
(6) INTER*GDP_P							0.322	
							(0.061)	***
(7) ROE	0.011		0.012		0.011		0.012	
	(0.002)	***	(0.002)	***	(0.002)	***	(0.002)	***
(8) SIZE	0.140		0.218		0.141		0.250	
	(0.040)	***	(0.052)	***	(0.040)	***	(0.052)	***
(9) LLP	-0.006		-0.023		-0.005		-0.033	
	(0.101)		(0.082)		(0.100)		(0.089)	
(10) RISK	0.001		-0.016		0.001		-0.014	
	(0.015)		(0.014)		(0.015)		(0.014)	
(11) NCD	0.037		0.046		0.038		0.051	
	(0.014)	***	(0.013)	***	(0.014)	***	(0.014)	***
(12) TIER1	0.005		0.004		0.005		0.005	
	(0.002)	**	(0.002)	*	(0.002)	**	(0.003)	*
(13) CONC_P	0.002		0.002		0.002		0.002	
	(0.004)		(0.003)		(0.004)		(0.004)	
N	1127		1127		1127		1127	
AR(1)	0.000		0.000		0.000		0.000	
AR(2)	0.001		0.326		0.001		0.004	
Hansen Test	0.020		0.027		0.026		0.009	
YEAR	Yes		Yes		Yes		Yes	

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Figures in parentheses are robust heteroskedasticity standard errors. The Hansen is a test of the over-identifying restrictions for the GMM estimator. AR (1) and AR (2) indicate first and second-stage autocorrelations. The independent variable is the capital buffer, BUF. The explanatory variables are as follows:- BUF(-1) is the lag of the bank's capital buffer; GDP_A is the annual gross domestic products growth; GDP_P is the prefecture gross domestic product; INTER is a dummy variable that takes 1 for an internationally active bank; ROE is the return on equity; SIZE is the log of total assets; PROVISION is the loan loss provisions; RISK(-1) is the lagged ratio of risk-weighted assets to the sum of total assets; NCD is the ratio of negotiable deposits to total deposits; TIER 1 is the ratio of Tier 1 capital to total capital, and CONC_P is the square of the ratio of each bank's total loans to the total loans of all banks in particular areas or prefectures. The above explanatory variables estimate a one-period lag. Therefore, BUF and RISK use the lag terms from two periods prior to one period (i.e., three periods prior) and all the aforementioned explanatory variables as operating variables. Only BUF (-1) is specified as the first-period lag is specified because the independent variable is BUF.

FIGURE 2.1: CAPITAL BUFFERS AND THE GROWTH IN GROSS DOMESTIC PRODUCT

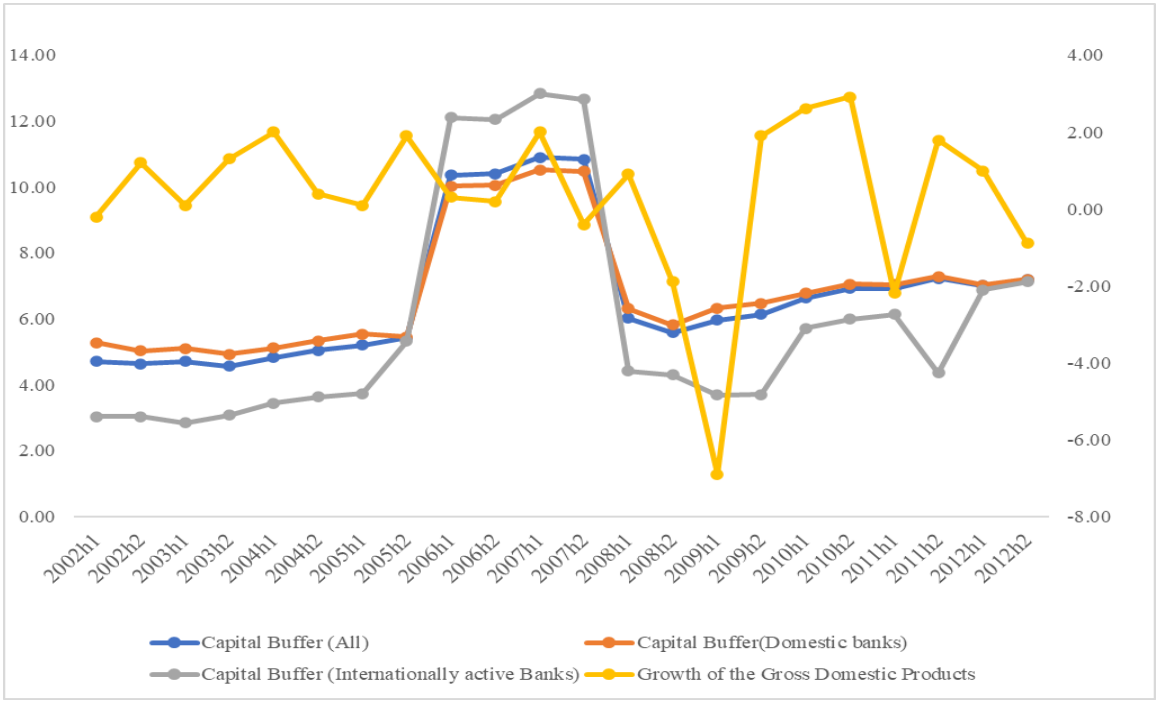
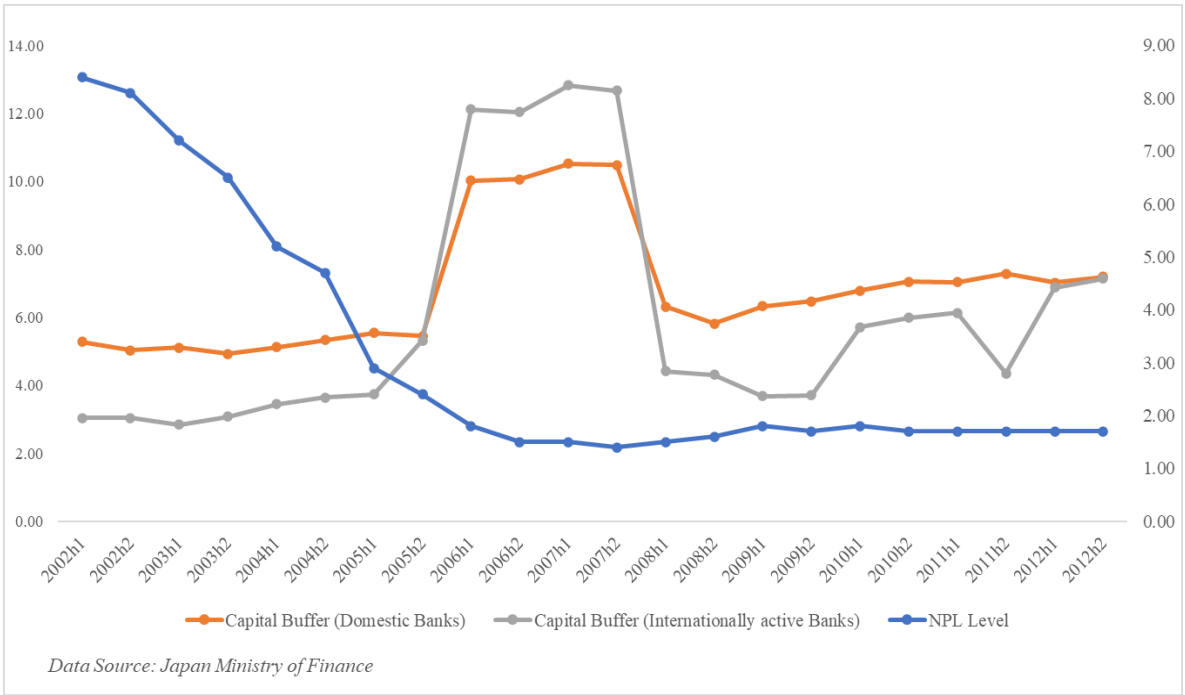


FIGURE 2.2: CAPITAL BUFFERS AND NON-PERFORMING LOANS LEVEL



Data Source: Japan Ministry of Finance

CHAPTER 3[10]

Economic policy uncertainty and banks' target capital buffers

In this chapter, I empirically analyze the impact of economic policy uncertainties (EPU) on Japanese banks' target capital. The estimation results show that bank capital buffers increase when EPUs increase. In addition, as economic policy uncertainty rises, the speed at which banks adjust their capital buffers toward their target increases. Moreover, fiscal, trade, and currency exchange policy uncertainties are the driving forces for incrementing the target capital buffer. Finally, for extension analyses, banks hold more government bonds but fewer stock holdings when EPU increases.

[10] This chapter is written based on the paper of Lai, Karen Kai Lin (2022). Economic policy uncertainty and banks' target capital buffers, scheduled to be published in Japan Finance Association, JJF-forthcoming 2022-001.「経済政策の不確実性と銀行のターゲット・資本バッファーに関する検証」http://jfa.main.jp/journal/paper/JJF-forthcoming2022-001-pre.pdf

3.1. Introduction

Economic policy uncertainty (EPU) has recently attracted attention (Bloom, 2009; Bloom et al., 2018). Baker et al. (2016) developed the EPU index by employing articles from prominent newspapers' policy-related terms and applying text-mining techniques. With this overall index, the impact of EPU on the real economy has been widely studied in recent research (e.g., Berger et al., 2020; Gulen & Ion, 2016).

Studying capital adjustment issues is considered one of the most important fields for the banking industry. Considering the potential impacts of EPU on the economy, the research of EPU on capital adjustment is undoubtedly worthy of study. Thus, this chapter aims to empirically analyze the impact of EPU on banks' target capital buffers and the impact of EPU on the speed of adjustment of banks' capital buffers by employing Japanese banks' data from 2002-2012. For clarification, the capital buffer represents the bank's actual capital adequacy ratio and the level stipulated by the capital adequacy ratio regulation, namely, the capital requirement.

The speed of adjustment here refers to the speed that a bank uses to achieve its target capital buffer level from its actual capital buffer level in a specific period. In other words, the speed of the difference between the target capital buffer level and the actual capital buffer level will dissipate over a given period. In general, the slower the speed of adjustment, the higher the adjustment cost is expected since there is an adjustment cost involved in eliminating the difference between the target and actual capital buffers. However, the adjustment of the capital buffer is dynamic. Thus, in this chapter, I estimate the speed of adjustment of the capital buffer based on the partial adjustment model.

A substantial number of previous studies show that business cycle indicators and other general macroeconomic factors influence banks' capital management (Lai, 2020; Valencia & Bolanos, 2018). In contrast, except for Tran, Nguyen, and Hoang (2021), the empirical research on the impact of EPU on bank capital management is limited. The banking industry is heavily regulated. Some economic

policies are bank-related, for example, the financial revitalization program of the early 2000s, where the policies stipulated temporary measures to facilitate small and medium financing during the global financial crisis, and so forth. These economic policies reveal that the policy change directly affects the banking industry. Moreover, EPU serves as an indicator of future outlooks and guidelines for banks, and this may affect banks' target capital buffers in response to that outlook. So, the research on how banks respond to EPU is considered crucial.

Many bank failures during the global financial crisis alerted us that maintaining a sufficient capital buffer is crucial (Caruana, 2012; Bui et al., 2017). In addition, calls for reducing portfolio risk, urging banks to increase their stock and retained earnings, and the requirement for incrementing Tier 1 capital, which constitutes high-quality capital, are also gaining much emphasis. From the macroeconomic perspective, a sufficient capital buffer maintains the bank's soundness and stabilizes the financial system. Thus, capital buffers play a pivotal role in banks. Given the background mentioned above, we shall expect the effect of EPU on bank capital buffers. Therefore, the impact of EPU on target capital buffers and the speed of adjustment is significant to be analyzed.

The main results are as follows. First, EPU and the bank capital buffer reveal a positive and significant coefficient relationship. This relationship implies that banks maintain higher target capital buffers when EPU increases. From the perspective of precautionary motive, this positive relation is reasonable. Banks increase their target capital buffers as they find it necessary to improve their soundness when EPU increases.

Second, as I delved further into the content of EPU, the estimation results show that bank capital buffers correlate to fiscal policy uncertainty, trade policy uncertainty, and currency exchange policy uncertainty positively and significantly. In contrast, monetary policy uncertainty shows no statically significant relationship. These analysis results indicate that the increment of uncertainty levels in

fiscal, trade, and exchange rate policies are the fundamental driving forces for banks to build up their capital buffers.

For example, implementing economic stimulus measures associated with financial deterioration increased fiscal policy uncertainty. The Trans-Pacific Partnership (TPP) negotiations of agreements caused a high level of uncertainty and were reflected in the increased trade policy uncertainty. Therefore, as a measure in response to these high EPU indexes, banks are rational in increasing their capital buffers (Baker, Bloom, & Davis, 2019)[11].

Third, when EPU increases, the adjustment in bank capital buffers indicates a faster speed. One of the potential explanations is that high EPU accompanies it as banks are maintaining their health by adjusting their capital buffers toward the target earlier to mitigate any potential financial regulatory intervention costs they may face.

A unique aspect of this study is that it emphasizes the effect of EPU on banks' target capital buffers. Estrella (2004), using a sample of banks in Spain, covered the period from 1986 to 2004 and found that bank capital buffers are negatively correlated with business cycle indicators, whereby a 1% increase in GDP growth will reduce the capital buffer by 17%. Since then, several studies (Lai, 2020; Valencia & Bolanos, 2018) have been conducted from the perspective of procyclicality. These studies empirically test the effect of the business cycle and capital management for the past decade. Compared to other research focusing on general macroeconomic factors, this chapter fills the gap that focuses on the study of the effect of EPU on bank capital buffers, which has yet to receive sufficient attention.

Other recent studies have provided some insights concerning the analyses in this chapter. Berger et al. (2020) reported that banks would hold more liquid assets in response to the rising EPU. Bordo

[11] https://www.wita.org/wp-content/uploads/2019/09/The-extraordinary-rise-in-trade-policy-uncertainty-_-VOX-CEPR-Policy-Portal.pdf

et al. (2016) reported that in response to high EPU, banks are to reduce risk exposures through adjustments in lending, thus, harming overall lending in the United States. Hu and Gong (2019), employing bank data from 19 countries, empirically showed a negative relationship between EPU and bank lending. Lee et al. (2017) showed that banks are sensitive to the rising EPU and will adjust bank leverage according to economic conditions. Using data intended for banks in China, Chi and Li (2017) empirically showed that EPU raises the credit risk of lending and negatively impacts banks' assets as a whole. Finally, Ng et al. (2020) showed that banks in the United States increase loan loss provisions (allowances) when EPU increases.

The result in this chapter contributes to the primary research. First, this chapter empirically analyzes the impact of EPU on bank capital buffers, which play a significant role in the financial system's stability. Concerning the prior study, which focused on general uncertainty rather than EPUs, Valencia (2016) reports that banks maintain higher capital ratios in general uncertainty. Third, Li and Qiu (2021) find that EPU negatively affects firms' target leverage, but the study focused on general firms rather than using banks as a sample. Finally, Matousek et al. (2020) report that a higher level of EPU can lead to the undercapitalization of financial firms at some future point. However, the study is limited to the case of severe market decline. Unlike prior studies that focused on general measures of uncertainty and using firms as the sample, this chapter is unique because it empirically demonstrates the impact of EPU on banks' target capital buffers. Furthermore, this chapter also considers broader market conditions.

Second, in this chapter, I empirically analyze the impact of EPUs on the speed of bank capital adjustment. As noted above, a substantial number of works of literature that analyze the speed of bank capital adjustment focused on the procyclicality issue. However, a niche number of studies focus on the effect of EPU. Therefore, this chapter's results provide new insights for policymakers and financial authorities on economic issues in dealing with the procyclicality problem. Finally, this

chapter considers constant and varied-adjustment speeds (EPU-varied). To the knowledge, the prior studies on varied adjustment speeds are limited to the research of De Young et al. (2018) and Öztekin and Flannery (2012).

The remainder of this chapter is as follows. First, present an overview of the EPU index of Japan in section 3.2. Next, literature reviews and hypothesis development are in section 3.3. Then, data and methodology are in section 3.4. Followed by presenting empirical results in section 3.5, and finally, section 3.6 summarizes the conclusions.

3.2 Institutional background

3.2.1 EPU index in Japan

Using a text mining technique, extracting policy-related terms from published articles in prominent newspapers, Baker et al. (2016) developed the EPU index. Moreover, it is standardized by weighing the number of articles. Therefore, the EPU index is considered a comprehensive index representing the real economy in terms of levels. Baker et al. (2016) categorized the related policy terms extracted from the published articles into E terms (Economics), P terms (Policy), and U terms (Uncertainty) based on the ten prominent newspapers starting from January 1985 until the present. They will count if at least one of the terms belongs to the articles' three categories. Hence, the higher (lower) the number of articles, the more it will relate to the more significant (lower) levels of the EPU index. Each article is standardized to one standard deviation. To align the deviation between the relative number of articles, they weighted the average following the volume and then adjusted it to an average of 100[12].

[12] The most frequently appearing P terms in articles were listed. Two indices were created and compared by human and computer classification to check the validity of the P term list. For an explanation of how the U.S. EPU index was constructed using the P term set with the highest correlation (correlation = 0.86) between the two. See (https://www.rieti.go.jp/jp/publications/summary/16030010.html).

Following Baker et al. (2016) and Arbatli et al. (2019), they developed and improved Japan's EPU index using the same method. Baker et al. (2016) developed the EPU index of Japan based on articles published in two prominent newspapers (*Asahi Shinbun and Yomiuri Shinbun*). Arbatli et al. (2019) improved the EPU index of Japan by additionally employing articles published in another two prominent newspapers on top of the two leading newspapers used by Baker et al. (2016). Thus, Arbatli et al. (2019) improved the EPU index of Japan by employing articles published by four prominent newspapers (*Asahi Shinbun, Yomiuri Shinbun, Nihon Keizai Shinbun, Mainichi Shinbun*) compared to Baker et al. (2016). The latter developed the EPU index of Japan only based on two leading newspapers.

In addition, Arbatli et al. (2019) matched the E and U terms translated into English in each published newspaper article and traced out the high frequency of used terms. For example, the P term refers to the 15 terms that were selected while developing the EPU index of the United States and were translated into Japanese. One of the unique features of the Japan EPU index developed by Arbatli et al. (2019) is that they developed the EPU subcategories. They divided the subcategories into fiscal, monetary, trade, and currency-exchange policy uncertainty indexes.

Specifically, based on Japan's EPU index developed by Arbatli et al. (2019), refer to in Figure 3.1, several important political and economic events in Japan have occurred since 2000, whereby the level of EPU turned out at a high level. For example, considering the events or policies related to banks, in May 2002, to accelerate the disposal of non-performing loans, the financial reconstruction program (*Takenaka* plan) was established. Moreover, an economic recession caused by the global financial crisis also recorded a high level of EPU in Japan.

3.3 Literature review and hypothesis development

3.3.1 EPU and banks' target capital buffers

As mentioned above, recent empirical studies using the EPU index were developed based on extracting text from newspaper articles. For example, Gulen and Ion (2016) found that EPU significantly negatively impacts investment and employment. Furthermore, Bloom et al. (2018) reported that EPU suppresses the gross domestic product and the real economy in the United States. Referring to the studies mentioned above, banks, as one of the leading players in the real economy and important credit suppliers, are expected to be affected by the effect of EPU.

Recent empirical studies conducted regarding the effect of EPU on bank behavior, for example, Berger et al. (2020) showed that when EPU increases, banks tend to hold more liquid assets in response to the unfavorable effect of EPU. In addition, banks with higher risk exposure tend to hold or possess more liquid assets relative to banks with lower risk exposure in response to the rising EPU. Using data from 19 cross countries, Hu and Gong (2019) showed that EPU hinders bank credit growth, but the effect varies across banks (in terms of bank size, liquidity, and portfolio). Previous studies have empirically shown that EPU affects bank behavior; thus, we shall expect the effect of EPU on bank capital management practices. Since the global financial crisis, the call for suppressing excessive risk-taking behavior, controlling risky lending, and increasing high-quality capital, such as Tier 1 capital, has strengthened.

In general, the level of the capital adequacy ratio is an indicator of bank soundness. The capital level also serves as an indicator that represents its durability against unexpected future events. Heid (2007) reported that capital buffers play an important role, especially in the case of changes in the risk weighting system, for example, the calculation method and the changes in the capital adequacy ratio. F. Using a sample that compromises developed and developing countries, Cohen and Scatigna (2016) found that banks with higher capital ratios or high profits tend to expand their credit supply

even during a recession or crisis. Valencia (2016) empirically shows that banks hold higher capital ratios when uncertainty is high. It is rational because when banks face uncertainty, forward-looking banks are likely to increase their target capital positions out of a reserve (precautionary) motive to strengthen their soundness.

Using a sample of banks in China, Chi and Li (2017) showed that an increase in EPU will lead to an increase in bank credit risk and harm credit size. The analysis results indicate that banks may increase reserves or loan loss provisions with the increment of credit risk and foresee the increment of non-performance loans in the future. As a result, banks may decrease loans from the asset side or reduce risk-weighted assets by shifting to safer assets such as government bonds with zero risk weight. Therefore, banks have to make some adjustments in response to the increasing EPU. Berger et al. (2020) show that EPU harms bank lending[13]. Ng et al. (2020) empirically showed that in response to the increasing EPU, banks in the United States tend to increase loan loss provisions. The calculations of loan loss provisions are lumped together and reflected in Tier 2 capital, increasing the amount of the numerator in the capital ratio. Thus, the increment of loan loss provisions will increase capital buffers levels. These adjustments will influence the capital buffer level. Based on the above-mentioned empirical studies, I propose the following hypothesis:

Hypothesis 1: As EPU increases, bank capital buffers may increase.

3.3.2 EPU and adjustment speed of target capital buffer

In the aftermath of the global financial crisis, the voices of requesting banks to strengthen their capital are increasing. Indeed, with the introduction of Basel III, banks must now comply with financial regulations with higher capital ratios based on stricter capital adequacy definitions.

[13] Following Berger et al. (2020), I analyzed the impact of EPUs on either channel (banking behavior) using Japanese data. Please refer to session 3.4.4. EPU and portfolio adjustments (other items in capital buffers) for details of result and explanation.

Therefore, as EPU increases, the risk of potential government intervention through financial regulation of banks is likely to increase. Therefore, banks would be better able to maintain bank health and mitigate the unfavorable effects of the business cycle and EPU if they adjust their target capital buffers sooner rather than later.

Cohen and Scatigna (2016) conducted a cross-country analysis using 101 large-scale banks as sample data. These large-scale banks comprise banks from developed and developing countries. They found that banks are prompt to adjust their capital ratios by utilizing or accumulating retained earnings instead of adjusting their asset size. Retained earnings are one of the direct channels for adjusting the capital ratio. Therefore, utilizing the retained earnings for adjustment is expected to increase the speed of adjustment[14].

Japanese banks show a steady trend in their capital buffer level. Shimizu (2005) employed Japanese banks as a sample and analyzed capital adjustment under the Basel II (2007–2012) regime. Shimizu (2005) reported that Japanese banks achieve their target capital ratios faster through an adjustment from the numerator and equity side rather than via an adjustment from the denominator and assets side. Therefore, I conjecture the following hypothesis:

Hypothesis 2: As EPU increases, banks may adjust their target capital buffer faster.

3.4 Data and methodology

3.4.1 Partial adjustment model

I analyzed the determinants of capital buffers using a dynamic model. Many researchers (Ayuso et al., 2004; Estrella, 2004; Jokipii & Milne, 2008; Francis & Osborne, 2010; Valencia & Bolanos,

[14] Market frictional factors, such as an increase in funding and financial intermediation costs, could cause firms temporarily deviate from their target leverage. Indeed, high adjustment costs reduce the speed of adjustment to target leverage for firms in general (Lemmon et al., 2008; Flannery & Rangan, 2006). Laying out previous studies on the impact of EPUs on firms' capital structure, it is also possible that EPUs harm the speed of adjustment of banks' capital buffers. From this perspective, hypothesis 2 is also considered worthy of analysis.

2018) have adopted this partial adjustment model. Thus, following previous studies, the estimation equation is as follows:

$$BUF_{i,t} - BUF_{i,t-1} = \alpha\left(BUF^{*}_{i,t} - BUF_{i,t-1}\right) + u_{i,t} \quad (1)$$

Here, *i* index banks, and *t* indexes time. $BUF_{i,t}$ is denoted as the capital buffer level of bank *i* at time *t*. $BUF^{*}_{i,t}$ is denoted as the target capital buffer level (optimum capital buffer level) of bank *i* at time *t*. $BUF_{i,t-1}$ is denoted as the lagged capital buffer of bank *i* at time *t-1*. $u_{i,t}$ is the distributed error term at an independent and identical distribution with zero mean. α (0< α < 1) is the constant term. α measures or represents the adjustment parameter of the actual level to the target level of the capital buffer. Here $\phi \equiv (1-\alpha)$ represents the speed of adjustment (adjustment cost). If α is getting larger, indicating a slower adjustment speed, implying higher adjustment costs. This partial adjustment model assumes that banks take time to adjust their capital buffer levels, which means that this adjustment is not instantaneous.

The optimal capital buffer level $BUF^{*}_{i,t}$, is not observable. Thus, I approximate the optimal capital buffer level $\mathrm{BUF}^{*}_{\mathrm{i,t}}$ as a function of *N* explanatory factors. The $BUF^{*}_{i,t}$ estimation equation is defined as follows (Jokipii & Milne, 2008; Stolz & Wedow, 2011):

$$BUF^{*}_{i,t} = \kappa X_{i,t-1} + \theta EPU_{t-1} \quad (2)$$

Here, $X_{i,t-1}$ denotes a set of explanatory variable vectors of bank *i* at time *t-1*. I considered the effect of EPU that may influence the target capital buffer. Thus, I added EPU as one of the factors considered to influence the level of the target capital buffer. EPU_{t-1} is the EPU index at time *t-1* (see section 3.3.2 for explaining the conversion of EPU indexes from monthly to half-yearly data). Combining (1) and (2) provides the following estimation equation:

$$BUF_{i,t} = (\alpha\kappa)X_{i,t-1} + (\alpha\theta)EPU_{t-1} + (1-\alpha)BUF_{i,t-1} + u_{i,t} \quad (3)$$

By estimating equation (3), we can obtain $\widehat{\alpha\kappa}$, $\widehat{\alpha\theta}$, $1-\hat{\alpha}$. By dividing $\hat{\alpha}$ for each of the $\widehat{\alpha\kappa}$ and $\widehat{\alpha\theta}$, we can obtain $\hat{\kappa}$ and $\widehat{\theta}$. Based on these values, $BUF^{*}_{i,t}$ can be calculated. Note that $\hat{\alpha}$ may adjust at

different speeds depending on bank attributes and external environmental conditions. Therefore, following De Young et al. (2018) and Öztekin and Flannery (2012), we define α as a variable (bank-specific, time-varying) adjustment rate, defined as follows:

$$\alpha_{i,t} = \Lambda Z_{i,t-1} \tag{4}$$

$\alpha_{i,t} = \Lambda Z_{i,t-1} = \Lambda_{i,t}^{X} X_{i,t-1} + \Lambda_{t}^{EPU} EPU_{t-1}$. $Z_{i,t-1}$ consists of bank attributes variables and macro factors. $X_{i,t-1}$are bank attributes variables. EPU_{t-1} is the EPU at the end of period t-1. Λ^{X} and Λ^{EPU} are the coefficient vectors. Using this definition, I redefine equation (1), and we obtain the following equation (5).

$$BUF_{i,t} - BUF_{i,t-1} = \Lambda \cdot Z_{i,t-1}\left(BUF_{i,t}^{*} - BUF_{i,t-1}\right) + \varepsilon_{i,t} \tag{5}$$

Furthermore, if the explained variable is $\Delta BUF_{i,t} \equiv BUF_{i,t} - BUF_{i,t-1}$, $DEV_{i,t} \equiv BUF_{i,t}^{*} - BUF_{i,t-1}$, by rearranging equation (5), we can obtain the following equation:-

$$\Delta BUF_{i,t} = \Lambda \cdot Z_{i,t-1}(DEV_{i,t}) + \varepsilon_{i,t} \tag{6}$$

The right-hand side of equation (3) contains a lagged explained variable in the estimation equation. Since the explained variable may correlate with the error term, an endogeneity problem may arise. To account for the endogeneity problem, I use the two-step System Generalized Method of Moments (System GMM) developed by Blundell and Bond (1998), an estimation method that places no specific restrictions on the distribution of the disturbance term.

As pointed out that two-step estimation is subject to under-bias. I applied a two-step System GMM with small-sample correction (corrected standard error) by Windmeijer (2005).

I estimate equation (5) with Ordinary Least Square. In both estimations, I include year and bank fixed effects. From the above, the result of table 3.3 is the econometric model corresponding to equation (3). Moreover, the results in table 3.4 correspond to equation (5), the EPU-varied adjustment speed estimation.

3.4.2 Sample

In this chapter, I use the semi-annual data of each bank for ten years period from 2002 to 2012. Regarding capital adequacy regulations, the sample period covered two regulation regimes, Basel I (until 2006) and Basel II (from 2007 to 2012). The data comprises listed and unlisted banks in Japan and utilized unconsolidated financial data. I limited the sample period until 2012 due to the new regime, the so-called Basel III, which is stepwise in regulatory change. The impact of the new regulations may have caused potential confusion in the interpretation of the empirical results. The sample in this study covers city banks, regional banks, and second regional banks. Banks that received public fund injections and bank samples with less than five observations were eliminated from the sample. Banks undergoing mergers and acquisitions (M&A) were treated as new banks[15]. The financial data of the banks used in the analysis were obtained from Nikkei NEEDS-Financial QUEST. The gross domestic product was obtained from the homepage of the cabinet office of Japan. The EPU index and Japanese volatility index (VXJ) were downloaded from websites[16]. The downloaded EPU data are monthly; thus, I converted the data to half-yearly data to match financial data. For the fiscal month of March, the average monthly EPU from October of the previous year to March of the existing was calculated (first half-yearly). For the fiscal month of September, the average monthly EPU from April to September of the current year was calculated (second half-yearly). I winsorized only the TIER 1 variables to deal with abnormal values at 1%.

3.4.3 Explanatory variables

According to Estrella (2004) and Ayuso et al. (2004), the adjustment of bank capital is not instantaneous but in dynamic form. Therefore, banks usually face adjustment costs when adjusting their current capital buffer level toward the optimum capital buffer level. To analyze the adjustment

[15] For the merged list, please refer to Appendix A.
[16] For EPU data, refer to (http://www.policyuncertainty.com/japan_monthly.html). For VXJ data, refer (http://www-mmds.sigmath.es.osaka-u.ac.jp/structure/activity/vxj_ Obtained from method.php?id=1).

cost, following the previous research (Estrella, 2004; Ayuso et al., 2004), I employ lagged capital buffer (BUF-1) as the proxy variable for adjustment cost. Therefore, we shall expect a significant and positive relationship between the lag of capital buffers and capital buffers.

For EPU, I use the natural logarithm of the value of the EPU indicator developed by Arbatli et al. (2019) and convert monthly data to semi-annual data. For example, if the fiscal month is in March, the average monthly data from October of the previous year to March of the current year will be calculated. Likewise, for the fiscal month of September, the average monthly data from April to September for the current year will be calculated.

Arbatli et al. (2019) collated and translated the Japanese-published and published articles into English. They then confirmed the terms in English and Japanese and derived a list of high-frequency terms [17] .Arbatli et al. (2019) extended the index by further developing fiscal (EPU_FISCAL), monetary (EPU_MONETARY), trade (EPU_TRADE), and currency exchange uncertainty policy (EPU_EXCHANGE).

Besides the adjustment costs, banks face opportunity costs, particularly the cost of holding equity capital. Following previous research (Ayuso et al., 2004; Bikker & Metzemakers, 2004; Stolz & Wedow, 2005; Jokipii & Milne, 2008), I employ return on equity (ROE), defined as the ratio of after-tax earnings to book equity to equity capital as the proxy variable for the opportunity cost of holding equity capital. As a result, I expect a significant and negative relationship between return on equity and capital buffers.

The financial distress costs, like the legal bankruptcy process and loss of charter value, can be alleviated, and the bankruptcy likelihood can be reduced by holding more capital (Keeley, 1990; Estrella, 2004). The ratio of total risk-weighted assets over total assets (RISK) is used by most of the works of literature (Stolz & Wedow (2011); Francis & Osborne (2010). Considering the potential

[17] See (https://www.rieti.go.jp/jp/publications/rd/116.html) for the list of terms of each policy.

endogeneity concerns, following Francis and Osborne (2010), I employ lagged RISK as the proxy variable of regulatory measure of asset risk. If significant and positive relationships were found between RISK and capital buffers, banks are making efforts to mitigate the expected cost of failure. In contrast, negative relationships between RISK and capital buffers were found hinting moral hazard behavior.

Loan loss provision indicates banks' managerial assessment of the risk embedded in their portfolio risk. I use the ratio of loan loss provisions to total assets (PROVISION) to proxy banks' own internal estimation of risk (Francis & Osborne, 2010). If significant and positive relationships were found between PROVISION and capital buffers revealing that banks are attempting to alleviate the expected failure costs. In contrast, a negative relationship between PROVISION and capital buffers indicates moral hazard behavior.

Generally, big banks tend to maintain a relatively lower level of capital buffers than small banks based on the too big to fail (TBTF) hypothesis. The notion of a lower capital buffer level is because big banks expect to take advantage of the government's rescue measures in case of difficulties. Moreover, big banks usually cover a wider area of investment and consider having better divarication power than small banks. Thus, with such advantages, big banks tend to hold lower capital buffers. Not to mention, big banks are eligible for the benefit of a safety net for depositors, which further supports them in holding lower capital buffers. Previous studies use the log of assets (SIZE) to represent the size of banks for the TBTF hypothesis testing (Ayuso et al., 2004; Jokipii & Milne, 2008; Francis & Osborne, 2010). The sign of SIZE can be either positive or negative. Therefore, as per the TBTF hypothesis, I expect a negative relationship between SIZE and capital buffers.

The ability to the losses absorbance depends on the composition of capital. If banks holding a large portion of quality capital tend to hold lower capital buffers, they are considered financially sound. Following Francis and Osborne (2010), I employ the ratio of tier 1 capital to total capital (TIER 1) as

the proxy variable of banks' capital quality. A negative relationship between TIER 1 and capital buffers shall be expected.

Since the information about bank capital levels is accessible in the market and rating agencies, these have created other pressures that may influence the bank capital level other than regulatory pressure. These pressures are considered influential in banks' capital adjustment and may outweigh the influences from capital adjustments in adjusting banks' capital. Therefore, I follow Haq et al. (2014) and Nier and Baumann (2006) by employing the ratio of Negotiable Certificate of Deposits to Total Deposits (NCD) as the proxy variables for market discipline. Note that, under the deposit insurance scheme, the Negotiable Certificate of Deposits is not under the coverage of deposit insurance, making it fit as a proxy variable for the market discipline. If market discipline is effective enough to influence the adjustment of capital choice, I expect a positive and significant relationship between capital buffers and NCD.

Market competition (Schaeck & Cihák, 2012) and market concentration (Valencia & Bolanos, 2018) are considered factors that increase the incentives for more excellent capital retention and capital holdings following the previous studies. Therefore, following Valencia and Bolanos (2018), I use the square ratio of each bank's total loans to all banks' total loans in given years (CONC) as a proxy for market concentration in the analysis. As a result, I expect a positive and significant relationship between capital buffer and CONC.

Researcher thoroughly studies the influence of the business cycle on capital management as proven by the works of literature (Ayuso et al., 2004; Jokipii & Milne, 2008). We can divide the patterns of capital buffers over the business cycle from the prior literature into pro-cyclically or counter-cyclically. When banks accumulate (target) capital buffers during a boom (positive correlation), they are considered forward-looking.[18]. Conversely, this is myopic if banks decrease

[18] During an economic upturn, the credit risk of lending and the cost of raising capital is relatively lower. As a result, banks increase revenues by expanding their asset portfolios and increasing their capital buffer to maintain sufficient target capital

their (target) capital buffers during a boom (negative correlation)[19]. Following Ayuso et al. (2004) and Jokipii and Milne (2008), I use the quarter-on-quarter growth rate of the gross domestic product as the proxy variable for the business cycle indicator. Besides the cycle indicator, Cook and Tang (2010) report that different phases of business cycle fluctuations affect the speed of capital structure adjustment. For example, they show that firms adjust their capital faster in economic booms than in economic busts. Following Cook and Tang (2010), I use the Japanese volatility index, VXJ, as a control variable for business cycle fluctuations. I summarize the definitions of the above variables in Table 3.5.1.

3.5 Empirical results

3.5.1 EPU and banks' target capital buffers

Table 3.2 shows the descriptive statistics of the main explanatory variables. The average value of the capital buffer was 6.86%. The average capital buffer for internationally active banks (6.00%) was lower than that of domestic banks (7.01%)[20]. Internationally active banks require a higher capital adequacy level and therefore undergo higher regulatory pressure and maintain a lower capital buffer level than domestic banks. However, both internationally active and domestic banks maintain considerably high capital buffers. The number of observations is 1778. For the analysis of EPU-varied adjustment speed, based on equation (6) in this chapter, the number of observations was 1552.

Table 3.3 presents the estimation results of the effect of EPU on bank capital buffers based on equation (3) of the partial adjustment model. Column 1 shows the results of the sole EPU, and column

ratios. Such behavior is considered forward-looking in their capital management practice.

[19] During an economic downturn, whereby the amortization of non-performing loans tends to increase rapidly, the raising of capital is costly, causing banks in a very critical situation, and banks may force to reduce their lending drastically. Such behavior is considered myopic. Lai (2020) reports that target capital ratios positively correlate with the business cycle only for international banks for Japanese banks.

[20] Bui et al. (2017) report that if banks maintain a moderate rate of increment in target capital ratios, even taking into account the point of the recession, it is still sufficient to maintain the health of the financial system as a whole. However, they also report that if banks' capital levels are too high, it may hamper the loan supply.

2 analyzes the EPU and the inclusion of other explanatory variables. Lagged buffers (BUF (-1)) in the first row of columns 1 and 2 show positive and statistically significant coefficients. This result is consistent with previous research (Estrella, 2004; Ayuso et al., 2004), implying the existence of cost adjustment toward the target capital buffer level. Row 1 of column 2 presents the constant adjustment speed at 65. 50% ($\phi \equiv 1 - \alpha$, α = 1-0.345 = 0.655) toward the target capital buffer.

Row 2 of column 2 presents the primary concern of the estimations, the EPU coefficient. The EPU coefficient is 1.149, and it is positive and statistically significant. The EPU coefficient of 1.149 reflects the estimations of $\alpha\theta$ in equation (3). The sensitivity of EPU to the target capital buffer is defined as θ. Therefore, by dividing $\alpha\theta$ by α, ($\frac{\alpha\theta}{\alpha} = \frac{1.149}{0.655} = 1.754$), θ can be derived. By using the average value of the capital buffer at 6.86%, implying that a doubling of EPU will raise 8.342% of the target capital buffer[21]. This result is reasonable in relating to the notion that when EPU increases, banks are exposed to uncertainty risk, for example, unforeseen regulatory interventions, which may lead to enormous regulatory costs. Thus, banks will increase their capital adequacy ratios to strengthen their soundness. The result supports hypothesis 1[22].

Rows 3 to the subsequent row of table 3.3 presents the estimation results of the control variables. Row 3, SIZE, the bank size proxy, show a positive and statistically significant coefficient, which is inconsistent with previous research. This result implies that large banks maintain a higher level of

[21] The mean value of the capital buffer is 6.860. The sensitivity of EPU when EPU is doubling is 1.216 (EPU's sensitivity × ln2=1.754×0.693=1.216). By multiplying the mean value of the capital buffer and EPU's sensitivity when EPU is doubling, we can derive 8.342%. Referring to the calculation of De Young et al. (2018), the mean value of capital buffer × EPU's sensitivity when EPU is doubling= 6.860× 1.216 =8.342%. In terms of standard deviation, where the standard deviation of EPU is 0.277, a standard deviation of the increment of EPU increase implies 1.149×0.277=0.318 percentage points increase in target capital buffer.

[22] Based on Öztekin and Flannery (2012), I evaluate the direct and overall effects by considering the indirect effect. To measure the indirect effect of EPU on the target capital buffer via their respective explanatory variables (e.g., bank attributes), I regress each of the coefficients, $X_{i,t-1}$, on EPU_{t-1}. Using these slope coefficients ($\frac{\partial X_{i,t-1}}{\partial EPU_{t-1}}$), I then multiply with the obtained coefficients, $\alpha\kappa_F$ that previously estimated and presented in column 2, table 3.3, and $\sum \alpha\kappa_F$ ($\frac{\partial X_{i,t-1}}{\partial EPU_{t-1}}$) is derived. This calculation reveals that the indirect effect of the EPU on the target capital buffer is -0.7037 (p=0.3392) and combined with the direct effect of 1.149 (p=0.000), the total effect of the EPU on the target capital buffer is 0.4454 (p=0.000). The sensitivity of the EPU to the target capital buffer is θ. Therefore, θ = ($\frac{\alpha\theta}{\alpha} = \frac{0.445}{0.655} = 0.680$).

capital than smaller banks because larger banks are likely to be involved in a broader range of businesses. Thus, they will likely maintain a higher capital buffer level to ensure soundness. In addition, internationally active banks are generally larger and involved in international operations. As a result, larger international active banks will likely maintain higher capital buffers.

Row 6, NCD, the proxy of market discipline, reveals positive and statistically significant coefficients. This result is consistent with the previous research (Nier & Baumann, 2006). This relationship implies that banks increase their capital buffers under effective market discipline.

Row 7, TIER 1, shows a positive and statistically significant coefficient. This result is consistent with previous studies (Francis & Osborne, 2010), implying that banks strengthen their loss absorption capacity and increase high-quality capital for financial resilience.

Finally, in row 11, VXJ is shown to be negative and statistically significant. This relationship negatively impacts the target capital buffer when volatility is high. This result is related to previous studies (Ayuso et al., 2004; Jokipii & Milne, 2008). Banks consider general macro factors when adjusting their capital buffer levels. For example, the economic growth rate and economic cycles.

AR1 and AR2 represent the first- and second-stage autocorrelations, respectively. Table 3.3 shows that AR (1) was rejected in all analysis results. AR (2) was not rejected. There is no autocorrelation in the second stage. The overidentification and the Hansen tests are not rejected in all analyses in Table 3.3, showing valid instrumental variables.

3.5.2 EPU and adjustment speed of target capital buffers

As mentioned in section 3.4.1, I estimated the constant adjustment speed under the assumption and presented the empirical results in Table 3.3. In this section, I present the estimation results of EPU varied adjustment speed estimation by employing a more refined analytical approach. To measure the varied adjustment speed, we need to calculate the difference between the target capital buffer and lagged capital buffer, as $DEV_{i,t} \equiv BUF^{*}_{i,t} - BUF_{i,t-1}$. Referring to equation (2) in this

chapter, $BUF^*_{i,t}$, can be derived. With the calculated $BUF^*_{i,t}$, DEV can be derived. By employing $DEV_{i,t}$, in equation (6) in this chapter, I can estimate the EPU varied adjustment.

Referring to row 1, column 1, and column 2 of table 3.4, the cross-term coefficients (DEV*EPU) are positive and statistically significant in both columns. The results show that EPU raises the adjustment speed of the target capital buffer. The coefficient of cross term, DEV*EPU, is 0.338. Based on this number implies that a doubling of EPU leading an increase of 23.42% in adjustment speed[23]. This result supports hypothesis 2, suggesting that as EPU increases, the banks are keen on maintaining their soundness by adjusting faster, so earlier toward the target capital buffer[24].

3.5.3 EPU subcategories and banks' target capital buffers

Table 3.5 presents the empirical results of the EPU subcategories. This section focuses on the first to the fourth column. The first column shows the results of EPU_FISCAL, the second shows the results of EPU_MONETARY, the third shows the results of EPU_TRADE, and the fourth shows the results of EPU_EXCHANGE. Referring to column 1, EPU_FISCAL enters a positive and statistically significant coefficient. This relationship implies that banks will increase their capital buffers when fiscal policy uncertainties (EPU_FISCAL) increase. From a precautionary perspective, one of the possible explanations for this may be that the increase in fiscal policy uncertainties tends to prompt banks to maintain the banks' soundness and liquidity level. Thus, banks may want to alleviate the impact of the increment of fiscal policy uncertainties by raising bank capital buffers. In addition,

[23] By multiplying the coefficient of EPU *DEV by ln2 when EPU is doubling, that is coefficient of EPU *DEV x ln2 =0.338 x 0.693 = 0.234 = 23.42% is derived. Following the calculation in footnote 21, the direct effect is 0.338(p=0.000), and the indirect effect is -0.754(p=0.000), so the overall total effect is -0.417 (p=0.000).

[24] One possible channel for adjusting the capital adequacy ratio is adjusting retained earnings (Cohen & Scatigna, 2016). For banks, retained earnings are a direct means of adjusting their capital adequacy ratios. For example, banks could increase their retained earnings by increasing the earnings from higher loan-to-interest rates or by providing advisory services to other business lines. Alternatively, a decrease in operating expenses can also increase retained earnings. Cohen and Scatigna (2016) find that rather than adjusting capital ratios through expanding banks' lending or asset growth, banks often adjust capital ratios through retained earnings. As a result, banks can adjust their capital buffer toward the target capital buffer quickly through sufficient retained earnings, so banks can maintain their soundness when EPU increases.

banks may intend to shift risky assets with higher risk weights to safer assets, such as government bonds that carry zero-risk weight in their adjustment strategies (portfolio adjustments). As a result, the denominator value tends to reduce and, as a whole, increases the capital buffer level.

Referring to column 2, monetary policy uncertainties (EPU_MONETARY) are positive but insignificant. This relationship indicates that monetary policy uncertainties are not the driving force that affects bank capital buffers. This result may be due to negative interest rates, zero interest rate policies, and low-interest rates, whereby the changes in interests in magnitudes are too small (too marginal) to affect bank capital buffers. Referring to the third column, trade policy uncertainties (EPU_TRADE) enter a positive and statistically significant coefficient. This relationship suggests that banks increase their capital buffers when trade policy uncertainties increase. The increase in trade policy uncertainties may impact enterprises and further affect banks' financial soundness via the spillover effect. Banks will strengthen their equity capital position to mitigate or alleviate the possible spillover effect from firms or enterprises caused by trade policy uncertainty on banks. Indeed, Caldara et al. (2020) report that increased uncertainty about trade policy reduces firms' economic and investment activity. Crowley, Meng, and Song (2018) also report that increased uncertainty about trade policy reduces new market entry.

Referring to column 4, exchange policy uncertainty (EPU_EXCHANGE) is positive and statistically significant. One of the possible explanations may be that changes in exchange policy uncertainties are frequent and excessive, causing the adjustment strategies to take place in a systematic and ad hoc manner. In fact, in Figure 1, in August 2011, the exchange policy uncertainties index recorded 600 points, the highest level in the past decade. Therefore, strengthening the capital position against foreign currency exchange policy uncertainty may be one of the measures to maintain the soundness of the bank.

The above results indicate that high uncertainty regarding fiscal, trade, and currency exchange policy are the specific driving forces for banks to build up their capital buffers. AR1

and AR2 represent the first-and second-stage autocorrelations, respectively. Table 3.5 shows that AR (1) was rejected in all analysis results. AR (2) in Table 5 was not rejected. There is no autocorrelation in the second stage. The overidentification and the Hansen tests are not rejected in all analyses in Table 3.5, showing valid instrumental variables.

3.5.4 EPU and portfolio adjustments (extension)

For the extension of analyses, I explore the possible mechanisms behind the adjustment for banks to achieve portfolio rebalancing amid high EPU.[25] .Several studies have shown that high EPU influences decisions in portfolio adjustment (Berger et al., 2020; Hu & Gong, 2019). Therefore, this extension session is to identify the possible channels through which banks may react to the higher EPU level in their portfolio adjustment, as those effects will pass on to the real economy.

Note that Japanese banks can hold equity stakes in nonfinancial firms[26] Thus, the unique characteristics of the Japanese banking sector provide a practical testing ground for examining the effects of EPU on the rebalancing between Japanese government bonds (JGB) and stocks with different risk weights for the capital ratio (0% for JGB but 100% for stocks). Additionally, Japan has "dual standards" for setting capital requirements, unlike other countries. The capital adequacy minimum for banks under the international standard is 8%, and 4% for those under the domestic standard. The different minimums of capital adequacy ratios create varying levels of regulatory pressure, which further influence banks' capital decisions.

To estimate the impact of EPU on adjustment components, I estimated the following model with bank fixed effects (α_i):

$$(Portfolio)_{i,t} = \beta_1 EPU_t + \gamma \cdot X_{i,t-1} + \delta \cdot Macro_t + \alpha_i + \epsilon_{i,t} \quad \text{(E. 1)}$$

[25] As Juelsrud and Wold (2020) discuss, I use the term "portfolio rebalancing" as the channel of substituting low-risk assets for high-risk assets to explain the increase in capital ratios.
[26] For the Japanese banking industry survey, see Uchida (2020).

Where i indexes a bank, and t indicates the year. The dependent variables are the adjusting components (*Portfolio*). SEC is the ratio of total securities to total gross assets, where total gross assets are defined as the sum of total assets and allowance for loan losses. Japanese banks can hold stocks, and the data on Japanese government and local government bonds (*JGB*), stocks (*STOCK*), and other securities (*OTH_SEC*)[27]. The risk weight for the capital ratio is 0%, 100%, and between 20% and 150%, respectively. *(LOAN)* is defined as the ratio of total loans to total gross assets. *(RWA)* is defined as the total risk-weighted assets ratio to the total gross assets. *(EC)* is defined as the ratio of equity capital to total gross assets. I applied the cluster standard errors in the estimations.

Following previous research, such as Valencia and Bolanos (2018) and Hu and Gong (2018), I include a set of bank-specific variables ($X_{i,t-1(or\ t)}$)[28]. The set of control variables, including bank size (*SIZE*; logarithm of total assets), capital ratio (*CR*), market discipline (*NCD.*; the ratio of negotiable deposits to total deposits), return on equity (*ROE*), and concentration (*CONC*; the square of the ratio of loans of each bank to the total loan of all banks). I could not control for year-fixed effects due to collinearity with the EPU index. Thus, I employed the volatility index of Japan (*VXJ*) and growth rates of real GDP (*GDP*) that serve as controls for any heterogeneity in a year and separate the impact of EPU from other confounding factors.

The data were sourced from the Nikkei NEEDS-Financial QUEST database. The sample included both city and regional banks (i.e., commercial banks in Japan) based on an unconsolidated basis, and it spanned fiscal years 2002 to 2018 yearly[29].This study covers the implementation period of Basel I, Basel II, and Basel III.

[27]I evaluate other securities on a market value basis and reflect in risk-weighted assets. Therefore, except for government bonds, other securities are not considered risk-free.
[28] Refer to Tables E.1 and E.2 for definitions of variables and descriptive statistics of extension analyses.
[29] Japan had undergone massive mergers and acquisitions (M&As) and absorption in banking industries during 2001–2002. I tracked and backed every single M&A with huge increments (more than 20% of their asset growth). Therefore, I treat it as another bank for the next fiscal year to moderate the data jumping.

To investigate the heterogeneous effects of capital requirements in response to the effect of EPU, we estimate the following equation:

$$(Portfolio)_{i,t} = \beta_2 EPU_t \times INTER_{i,t} + \beta_3 INTER_{i,t} + \gamma \cdot X_{i,t-1} + \delta \cdot Macro_t + \alpha_i + \epsilon_{i,t} \quad \text{(E.2)}$$

Where *INTER* is a dummy variable that takes one for internationally active banks; otherwise, it is zero (i.e., domestic banks). The coefficient of β_2 in equation (E.2) on the cross-term of *EPU* and *INTER* captures how internationally active banks react differently to policy uncertainty from domestic ones. Our focus is on the coefficient of β_2. I investigate whether the heterogeneous effects of capital requirements will lead to different bank behaviors in portfolio adjustment amid the high EPU.

Table E3.3 presents the baseline results. The coefficient of EPU in column 1 is insignificant, consistent with Berger et al. (2020). For further analysis, I employed the breakdown of different kinds of securities. The Japanese government bonds (*JGB*) held in column 2 increase when EPU elevates. However, the holding of stocks (*STOCK*) in column 3 and other securities (*OTH_SEC*) in column 4 decreases when EPU elevates. The shift is because banks opt to shift to safer assets, for example, government bonds with zero risk weight rather than stocks with higher risk weight. These results support the notion that banks adjust the asset side in response to the high EPU, specifically by reducing the risk-weighted assets. In terms of economic significance, the estimations indicate that a doubling of the level of EPU is associated with more holding of government bonds equivalent to 19.27% and with a decline of holding stocks equivalent to 78.44% evaluated at the mean value, respectively (Gulen & Ion, 2016).

Surprisingly, the loans *(LOAN)* in column 5 reveal positive and significant coefficients. This relationship implies that credit supply increases when EPU increases. To confirm the results, I employed the breakdown of different types of loans. The loans to Small and Medium-sized enterprises *(SME)* in column 6 reveal reductions. While loans to large enterprises *(LARGE)* in column 7 reveal increments when EPU elevates. Large enterprises are generally less risky than small and medium

enterprises. Thus, the results indicate that a reduction in risk-weighted assets accompanies the growth of credit supply. In terms of economic significance, the estimations indicate that a doubling of the level of EPU is associated with an increment in credit growth for the next fiscal year, equivalent to 1.15% evaluated at the mean value. In addition, the estimation shows a decrement in equity capital in column 9 during high EPU. One potential explanation is that, as banks generally utilize retained earnings in building up their capital, the expected profits reduce when EPU elevates, leading to a decrement in equity financing[30].

Taking advantage of the natural setting of divergence in capital requirements, I further analyzed the effect of EPU under dual standards of capital requirements in Japan[31].Row 1 in Table E3.4 is the cross-term of EPU with INTER capturing the heterogeneous effects under the dual standards of capital requirements. In columns 1 and 3, the coefficients show negative and significant coefficients. This result implies that compared to domestic banks, internationally active banks are taking active action in reducing securities, mainly in stocks, amid the high EPU relative to domestic banks. Additionally, internationally active banks vigorously expand their credit supply amidst high EPU, as revealed in column 5. In terms of loan allocation, internationally active banks align with domestic banks. The results indicate that internationally active and domestic banks vigorously reduce risk weights by allocating their loans to lower-risk borrowers. Such as loans to high credit rating borrowers, which carry about 20% to 50% of risk weights, rather than SMEs, which carry 75% of risk weights when EPU increases.

Japanese banks react to higher EPU by holding safer assets, such as government bonds, but holding less of stocks and other (risky) securities, accompanied by reducing risk-weighted assets. Banks

[30] Cohen and Scatigna (2016) show that banks utilized their retained earnings in the capital ratio adjustment. This result implied that retained earnings play an essential role in the capital ratio adjustment. Shimizu (2015) shows that Japanese banks tend to adjust the composition of portfolios to achieve the target risk-weighted assets level.

[31] Since the 1990s, many Japanese banks have shifted from international to domestic standards. I acknowledged that potential endogeneity problems might occur in such cases. However, note that the number of internationally active banks remained steady throughout 2019 after the massive M&A in 2001. Note that we limit our sample from the fiscal year 2002 to the fiscal year 2018.

extend loans to large companies but reduce loans to SMEs when EPU elevates. Further analysis of Japan's dual standards of capital requirements led to different results. Internationally active banks tend to reduce the holding of stocks with higher risk weights in adjusting their portfolio compared to domestic banks.

As for the conclusion, in response to EPU, banks tend to increase the holding of government bonds but reduce stocks. Banks extend more loans to large companies but reduce loans to SMEs when EPU elevates. Further analyses show the heterogeneous effects of EPU on rebalancing under the dual standards of Japanese capital adequacy ratios. Thus, elevating the capital requirement might affect the portfolio rebalancing of banks.

3.5.5 Robustness check

In this section, I further alleviate endogeneity problems using two distinct approaches.

3.5.5a Residual policy uncertainty

To address the endogeneity problem that may arise in the analyses. I attempt to alleviate the potential endogeneity concern by employing several alternative measures. First, EPU may capture other uncertainties that do not belong to EPU, leading to measurement error bias in estimations. Gulen and Ion (2016) used the residual policy uncertainty by regressing the U.S. and Canadian policy uncertainty to reduce the bias due to measurement error. Following Gulen and Ion (2016), I used the residual policy uncertainty by regressing the Japanese policy uncertainty index on U.S. policy uncertainty. It is necessary to contemplate the similarities between the Japanese and U.S. economies.

Considering the extensive trading activities between Japan and the United States, one would expect that the two countries would have a deep connection between their economies while sharing shocks that affect general economic uncertainty in Japan. Therefore, after purging general economic uncertainty shocks that affect both economies, the residual policy uncertainty should be a cleaner

measure of policy-related uncertainty. Estimating the following equation using the monthly EPU indexes of Japan and the United States derived the residual policy uncertainty:

$$EPU(JAPAN)_t = \gamma + \beta_1 EPU(US)_t + \varepsilon_t \quad (7)$$

$EPU(JAPAN)_t$ and $EPU(US)_t$ is the EPU index developed by Baker et al. (2016) based on newspaper coverage and articles. ε_t is the residual that eliminates the shock caused by general economic uncertainty for Japan and the United States. I attempted to remove the confounding forces between Japan and the United States. I ran the above regression and denoted the derived residuals as $PEPU\_RESID_t$. I then replaced the EPU with $PEPU\_RESID_t$ to re-run the regression.

Referring to Table 3.6, column 1, row 2, when I use PEPU_RESID, I find a significantly positive effect of EPU on bank capital buffers. This estimation result is consistent with the baseline estimation results[32].

3.5.5b Instrumental variables

Using instrumental variables is common in most studies to alleviate the endogeneity problem. To employ a valid instrumental variable, I needed to find variables that significantly influence policy uncertainty but do not directly or indirectly affect banks' capital buffers through other channels[33]. Following the literature, I employed policy-related variables and opposition party support rate as instrumental variables developed by Ito (2016). I ran the following regression:

$$EPU(JAPAN)_t = \gamma + \beta_1 OPP_t + \varepsilon_t \quad (8)$$

[32] PEPU_RESID is considered an exogenous EPU index and alleviates problems due to measurement error. However, on the other hand, omitted variables problem may occur.

[33] The coefficient on opposition support is positive and statistically significant with EPU. Furthermore, the first level of F value exceeds the threshold value of 15.0, considered a threshold value (Stock & Yogo, 2005), thus confirming that it is a valid instrumental variable.

OPP is the expected value derived from the equation (7) regression. I averaged the monthly expected value and transferred it to the half-yearly data. I denoted the derived expected value as $PEPU\_OPP_t$. I then replaced the EPU with $PEPU\_OPP_t$ to re-run the regression.

Referring to Table 3.6, column 2, row 3, the coefficient of PEPU_OPP is positive and statistically significant. This estimation result is consistent with the baseline estimation results. Since the capital adequacy requirements imposed on domestic Japanese banks differ from those imposed on internationally active banks, the regulatory pressure level is considered different. Thus, for robustness checking, I included the domestic bank dummy, DOM, in the analysis. Referring to Table 3.6, column 3, row 4, the coefficient of EPU is positive and statically significant, consistent with the baseline estimation results in table 3, column 2. Furthermore, referring to Table 3.6, column 3, row 5, the coefficient of DOM is positive and statistically significant, indicating that domestic banks tend to maintain a higher target capital buffer level than internationally active banks. Furthermore, to test whether the baseline results hold when EPU reaches the extremely high level, I construct EPU_HIGH, the intersection term of a dummy of the fourth quartile EPU and EPU level, for the estimation. Column 4 row 6 show that EPU is positive and statistically significant, which is consistent with the baseline results in table 3.3 and further confirms the results

3.6 Conclusion

Empirical studies that focus on the effect of economic policy uncertainty on a firm's decision-making or aggregate loan supply have accumulated. However, empirical studies focusing on the effect of economic policy uncertainty on bank behavior still need to be completed. Therefore, empirical studies on the impact of economic policy uncertainty on banking behavior are essential to bring new insights and lead to decisive conclusions. In addition, empirical studies on economic policy uncertainties are considered new to the research field and are undoubtedly worth studying and exploring. Following the 2008 global financial crisis, economic policy uncertainties gained attention

in research areas, and relations between business cycle indicators and capital management practices have been widely empirically tested. In contrast, this study attempts to fill this gap by empirically testing the impact of economic policy uncertainty on capital buffers and their adjustment speed.

The main estimation results are summarized below. First, economic policy uncertainty correlates with bank capital buffers positively. Fiscal, trade, and currency exchange policy uncertainty are the main driving forces that lead to this positive correlation. Among others, fiscal policy uncertainty and trade policy uncertainty are driving factors. However, I find no significant relationship between monetary policy uncertainty. This result suggests that the impact on a bank's capital buffer depends on the category or content of economic policy uncertainty. Second, the estimation results show that economic policy uncertainty increases the adjustment speed of bank capital. Given the high uncertainty of future outlooks, banks must increase their adjustment speed to maintain their banks' soundness.

However, there are some limitations to this study and future research questions. First, despite this study attempting to trace indirect possible channels or mechanisms, other possible channels or mechanisms may need to be covered. Second, some of the economic policy uncertainties may be advantageous to banks, while some are disadvantageous to the standing of banks. However, the advantages and disadvantages cannot be disentangled or identified. Third, there is still room to explore better instrumental variables to improve the estimation method. Finally, other uncertainties, such as the macroeconomic uncertainty of Rossi and Sekhposyan (2015), may have more impact on bank capital than policy uncertainty. Regarding these, I leave this as future research questions or topics.

TABLE 3.1: DEFINITION OF VARIABLES

Variables	Description	Source
Dependent variables		
BUF (%)	Capital buffer Capital adequacy ratio minus minimum capital adequacy requirements	Nikkei Needs Financial Quest
$\Delta BUF_{i,t} \equiv BUF_{i,t} - BUF_{i,t-1}$	Difference between capital buffer and lagged capital buffer	Nikkei Needs Financial Quest
Key independent variable		
Economic Policy Uncertainty	Natural logarithm of monthly data converted to semiannual data	http://www.policyuncertainty.com/japan_monthly.html
EPU	Economic Policy Uncertainty	Arbatli et al. (2019)
EPU_US	U.S. economic policy uncertainty	Arbatli et al. (2019)
OPP	Natural logarithm of opposition support	Ito (2016)
EPU_FISCAL	Fiscal policy uncertainty	Arbatli et al. (2019)
EPU_MONETARY	Monetary policy uncertainty	Arbatli et al. (2019)
EPU_TRADE	Trade policy uncertainty	Arbatli et al. (2019)
EPU_EXCHANGE	Currency exchange policy uncertainty	Arbatli et al. (2019)
$DEV_{i,t} \equiv BUF^{*}_{i,t} - BUF_{i,t-1}$	Difference between target capital buffer and lagged capital buffer	Nikkei Needs Financial Quest
Instrument variable		
PEPU_RESID	Error term for economic policy uncertainty based on equation (7)	http://www.policyuncertainty.com/japan_monthly.html
PEPU_OPP	Natural logarithm of predicted opposition support based on equation (8)	Ito (2016)
EPU_HIGH	Fourth quartile EPU dummy and EPU cross-term	Arbatli et al. (2019)
Control variables		
SIZE	Natural logarithm of total assets	Nikkei Needs Financial Quest
LLP (%)	Ratio of loss provisions to total assets	Nikkei Needs Financial Quest
RISK(%)	Lagged ratio of risk-weighted assets to the sum of total assets	Nikkei Needs Financial Quest
NCD (%)	Ratio of negotiable certificate of deposits to total deposits	Nikkei Needs Financial Quest
TIER1 (%)	Ratio of Tier1 capital to total capital	Nikkei Needs Financial Quest
ROE (%)	Ratio of net income after tax/shareholders' equity (equity capital)	Nikkei Needs Financial Quest
CONC (%)	Square of the ratio of total loans of each bank to the total loans of all banks	Nikkei Needs Financial Quest
GDP (%)	Growth rate in real Japanese gross domestic product (Semi-Annual)	The homepage of Cabinet Office of Japan
VXJ	Volatility Index of Japan	http://www-mmds.sigmath.es.osaka-u.ac.jp/structure/activity/vxj_method.php?id=1
DOM	Domestic bank dummy	Nikkei Needs Financial Quest

TABLE 3.2: DESCRIPTIVE STATISTICS

	N	Mean	Std. Dev.	p25	p50	p75	Min	Max
Dependent variables								
BUF (%)	1778	6.860	2.651	5.000	6.340	8.640	1.110	18.790
BUF (Internationally active bank)	261	6.000	3.774	3.180	4.630	7.500	1.110	15.050
BUF (Domestic bank)	1517	7.008	2.376	5.270	6.530	8.690	1.580	18.790
$\Delta BUF_{i,t} \equiv BUF_{i,t} - BUF_{i,t-1}$	1552	0.102	1.805	-0.165	0.080	0.370	-8.970	11.310
Key Independent variable								
EPU	22	4.602	0.277	4.350	4.653	4.836	4.159	5.048
EPU_US	22	4.702	0.329	4.367	4.774	5.024	4.078	5.227
OPP	22	4.656	0.215	4.513	4.676	4.782	4.243	5.065
EPU_FISCAL	22	4.617	0.382	4.235	4.618	4.967	4.066	5.321
EPU_MONETARY	22	4.624	0.347	4.303	4.613	4.868	4.019	5.228
EPU_TRADE	22	4.328	0.440	3.997	4.179	4.522	3.759	5.395
EPU_EXCHANGE	22	4.574	0.311	4.356	4.513	4.730	4.170	5.363
$DEV_{i,t} \equiv BUF^{*}_{i,t} - BUF_{i,t-1}$	1552	-0.089	2.664	-1.885	0.521	1.614	-13.794	5.824
Instrument variable								
PEPU_RESID	1778	-0.001	0.060	-0.044	0.006	0.031	-0.105	0.114
PEPU_OPP	1778	4.662	0.017	4.650	4.662	4.674	4.627	4.694
EPU_HIGH	1778	1.418	2.237	0.000	0.000	4.836	0.000	5.048
Control variables								
SIZE	1778	14.550	1.034	13.819	14.597	15.181	12.086	18.886
LLP (%)	1778	1.098	0.482	0.723	0.989	1.359	0.415	2.606
RISK (%)	1778	52.323	7.382	47.123	52.511	57.376	27.196	90.429
NCD (%)	1778	2.007	3.113	0.000	0.897	3.051	0.000	42.972
TIER 1 (%)	1778	90.497	11.457	84.415	90.238	96.455	49.877	189.541
ROE (%)	1778	2.283	3.623	1.510	2.524	4.027	-19.207	8.854
CONC (%)	1778	0.422	1.179	0.097	0.203	0.356	0.000	12.957
GDP(%)	22	0.435	1.981	-0.200	0.902	1.898	-6.894	2.919
VXJ	22	3.201	0.283	3.074	3.160	3.372	2.652	4.108

TABLE 3.3: EPU AND BANKS' TARGET CAPITAL BUFFER

	Expected Signs	(1)	(2)
BUF (-1)	+	0.391 ***	0.345 ***
		(0.046)	(0.046)
EPU	+	0.614 **	1.149 ***
		(0.243)	(0.315)
SIZE	−		0.226 **
			(0.090)
LLP	+/−		-0.156
			(0.139)
RISK	+/−		-0.027
			(0.029)
NCD	+		0.066 **
			(0.032)
TIER1	−		0.016 ***
			(0.005)
ROE	−		0.013
			(0.009)
CONC	+		-0.062
			(0.068)
GDP	+/−		-0.008
			(0.014)
VXJ	−		-0.678 ***
			(0.176)
Observations		1778	1778
AR(1)		0.000	0.000
AR(2)		0.236	0.176
Hansen test		0.158	0.169
Year dummy		Yes	Yes

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Figures in parentheses are robust heteroskedasticity standard errors. The Hansen is a test of the over-identifying restrictions for the GMM estimator. AR (1) and AR (2) indicate first and second-stage autocorrelations. The independent variable is the capital buffer, BUF. The explanatory variables are as follows:- BUF is the lagged capital buffer; EPU is economic policy uncertainty; SIZE is the natural logarithm of total assets; LLP is the ratio of loan loss provisions to total assets; RISK is the ratio of risk assets to total capital; NCD is the ratio of certificates of deposit to total deposits; TIER1 is the ratio of TIER1 capital to risk assets; ROE is the ratio of net income after taxes to shareholders' equity (equity capital); CONC is the square of the number of loans to total loans for each bank; GDP is the growth rate of the gross domestic product, and VXJ is the volatility index in Japan. The above explanatory variables estimate a one-period lag. BUF and RISK use the lag terms from two periods prior to one period (i.e., three periods prior) and all the aforementioned explanatory variables as operating variables. Only BUF (-1) is specified as the first-period lag is specified because the independent variable is BUF.

TABLE 3.4: EPU AND THE ADJUSTMENT SPEED OF TARGET CAPITAL BUFFER

	(1)	(2)
DEV*EPU	0.147 ***	0.338 ***
	(0.004)	(0.067)
DEV*SIZE		0.063 ***
		(0.011)
DEV*LLP		0.027
		(0.024)
DEV*RISK		0.008 ***
		(0.001)
DEV*NCD		-0.016 ***
		(0.004)
DEV*TIER1		0.001
		(0.001)
DEV*ROE		-0.001
		(0.003)
DEV*CONC		-0.030 ***
		(0.010)
DEV*GDP		-0.040 ***
		(0.009)
DEV*VXJ		-0.716 ***
		(0.088)
Observations	1552	1552
Fixed effect	Yes	Yes
Year dummy	Yes	Yes
R-squared	0.719	0.748

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Figures in parentheses are standard errors. The independent variable is the difference between the equity capital buffer and the lagged equity capital buffer, △BUF. In contrast, DEV differs between the target capital buffer and the lagged capital buffer. All explanatory variables lag one period; DEV*SIZE is the intersection of DEV and the natural logarithm of total assets; DEV*LLP is the intersection of DEV and the ratio of allowance for loan losses to total assets; DEV*RISK is the intersection of DEV and the ratio of risk assets to total assets; DEV*NCD is the intersection of DEV and the ratio of negotiable certificates of deposit to total deposits; DEV*TIER1 is the intersection of DEV and the ratio of TIER1 capital to risk assets; DEV*ROE is the intersection of DEV and net income after taxes to shareholders' equity (equity); DEV*CONC is the intersection of DEV and the square of the ratio of the number of each bank's loans to total loans; DEV*GDP is the intersection of DEV and the gross domestic product growth rate; DEV*VJX is the intersection of DEV and the volatility index in Japan.

TABLE 3.5: SUBCATEGORIES OF EPU AND CAPITAL BUFFER

	(1)	(2)	(3)	(4)
BUF (-1)	0.345 ***	0.327 ***	0.331 ***	0.336 ***
	(0.044)	(0.047)	(0.044)	(0.043)
EPU_FISCAL	0.836 ***			
	(0.188)			
EPU_MONETARY		0.255		
		(0.159)		
EPU_TRADE			0.518 ***	
			(0.136)	
EPU_EXCHANGE				1.038 ***
				(0.215)
SIZE	0.215 **	0.249 ***	0.217 **	0.239 ***
	(0.094)	(0.092)	(0.099)	(0.088)
LLP	-0.147	-0.166	-0.133	-0.177
	(0.138)	(0.136)	(0.136)	(0.136)
RISK	-0.027	-0.030	-0.032	-0.028
	(0.027)	(0.030)	(0.028)	(0.027)
NCD	0.070 **	0.065 **	0.068 **	0.069 **
	(0.031)	(0.033)	(0.028)	(0.032)
TIER1	0.017 ***	0.016 ***	0.016 ***	0.015 ***
	(0.005)	(0.005)	(0.005)	(0.005)
ROE	0.014	0.010	0.010	0.010
	(0.010)	(0.009)	(0.009)	(0.009)
CONC	-0.061	-0.069	-0.054	-0.056
	(0.071)	(0.068)	(0.071)	(0.069)
GDP	-0.009	0.014	0.074 ***	-0.013
	(0.015)	(0.013)	(0.025)	(0.016)
VXJ	-0.622 ***	-0.161	0.202	-0.259
	(0.162)	(0.124)	(0.176)	(0.157)
Observations	1778	1778	1778	1778
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.175	0.112	0.071	0.133
Hansen test	0.132	0.309	0.256	0.268
Year dummy	Yes	Yes	Yes	Yes

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Figures in parentheses are robust heteroskedasticity standard errors. The Hansen is a test of the over-identifying restrictions for the GMM estimator. AR (1) and AR (2) indicate first and second-stage autocorrelations. The independent variable is the capital buffer, BUF. The explanatory variables are as follows:- BUF is the lagged capital buffer; EPU is economic policy uncertainty; EPU_FISCAL is fiscal policy uncertainty; EPU_MONETARY is monetary policy uncertainty; EPU_TRADE is trade policy uncertainty; EPU_EXCHANGE is exchange rate policy uncertainty; SIZE is the natural logarithm of total assets; LLP is the ratio of loan loss provisions to total assets; RISK is the ratio of risk assets to total capital; NCD is the ratio of certificates of deposit to total deposits; TIER1 is the ratio of TIER1 capital to risk assets; ROE is the ratio of net income after taxes to shareholders' equity (equity capital); CONC is the square of the number of loans to total loans for each bank; GDP is the gross domestic product growth rate, and VXJ is the volatility index in Japan. The above explanatory variables estimate a one-period lag. Therefore, BUF and RISK use the lag terms from two periods prior to one period (i.e., three periods prior) and all the aforementioned explanatory variables as operating variables. Only BUF (-1) is specified as the first-period lag is specified because the independent variable is BUF.

TABLE 3.6: ROBUSTNESS CHECK

	(1)	(2)	(3)	(4)
BUF (-1)	0.366 ***	0.217 ***	0.290 ***	0.330 ***
	(0.044)	(0.035)	(0.048)	(0.044)
PEPU_RESID	3.172 ***			
	(0.632)			
PEPU_OPP		12.910 ***		
		(2.904)		
EPU			1.016 ***	
			(0.296)	
DOM			1.334 ***	
			(0.263)	
EPU_HIGH				0.064 **
				(0.025)
SIZE	0.218 **	0.354 ***	0.397 ***	0.247 **
	(0.084)	(0.111)	(0.099)	(0.096)
LLP	-0.157	-0.209	-0.109	-0.169
	(0.127)	(0.149)	(0.137)	(0.134)
RISK	-0.024	-0.009	-0.034	-0.029
	(0.027)	(0.023)	(0.027)	(0.028)
NCD	0.068 **	0.067 *	0.082 ***	0.065 *
	(0.032)	(0.035)	(0.029)	(0.033)
TIER1	0.014 ***	0.014 ***	0.008	0.017 ***
	(0.004)	(0.005)	(0.005)	(0.005)
ROE	0.010	0.012	0.015	0.009
	(0.009)	(0.009)	(0.009)	(0.010)
CONC	-0.038	-0.141 *	-0.009	-0.060
	(0.063)	(0.078)	(0.071)	(0.074)
GDP	0.115 ***	-0.009	-0.013	0.061 **
	(0.029)	(0.015)	(0.013)	(0.025)
VXJ	0.489 **	-0.158	-0.562 ***	0.192
	(0.191)	(0.143)	(0.178)	(0.196)
Observations	1778	1778	1778	1778
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.336	0.233	0.193	0.208
Hansen test	0.241	0.043	0.162	0.236
Year dummy	Yes	Yes	Yes	Yes

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Figures in parentheses are robust heteroskedasticity standard errors. The Hansen is a test of the over-identifying restrictions for the GMM estimator. AR (1) and AR (2) indicate first and second-stage autocorrelations. The independent variable is the capital buffer, BUF. The explanatory variables are as follows:- BUF is the lagged capital buffer; PEPU_RESID is the error term of the economic policy uncertainty based on equation (7); PEPU_OPP is the natural logarithm of the predicted opposition support based on equation (8); EPU is the economic policy uncertainty; DOM is the domestic banks' dummy; EPU_HIGH is the intersection of the EPU dummy and EPU in the fourth quartile; SIZE is the natural logarithm of total assets; LLP is the ratio of loan loss reserves to total assets; RISK is the ratio of risk assets to total capital; NCD is the ratio of certificates of deposit to total deposits; TIER1 is the ratio of TIER1 equity capital to risk assets, and ROE is the ratio of TIER1 capital to risk assets. ROE is the ratio of net income after taxes to shareholders' equity (equity capital); CONC is the square of the ratio of each bank's loans to total loans; GDP is the growth rate of the gross domestic product; and VXJ is the volatility index in Japan. The above explanatory variables estimate a one-period lag. BUF and RISK use the lag terms from two periods prior to one period (i.e., three periods prior) and all the aforementioned explanatory variables as operating variables. The first-period lag is specified only for BUF (-1) because the independent variable is BUF.

TABLE E3.1: DEFINITION OF VARIABLES

Variables	Description	Source
Dependent variables		
1. SEC	Ratio of total securities to gross total assets. Gross total assets is defined as the sum of total assets and allowance for loan losses	Nikkei Needs Financial Quest
2. JGB	Ratio of government bonds and local government bonds to total gross total assets	Nikkei Needs Financial Quest
3. STOCK	Ratio of stock to gross total assets	Nikkei Needs Financial Quest
4. OTH_SEC	Ratio of other securities to gross total assets	Nikkei Needs Financial Quest
5. LOAN	Ratio of total loan to gross total assets	Nikkei Needs Financial Quest
6. RWA	Ratio of risk-weighted assets to gross total assets	Nikkei Needs Financial Quest
7. EC	Ratio of equity capital to total assets	Nikkei Needs Financial Quest
8. SME	Ratio of loan to small and medium enterprises to gross total assets	Nikkei Needs Financial Quest
9. LARGE	Ratio of loans to large enterprise to gross total assets	Nikkei Needs Financial Quest
Key Independent variable		
10. EPU	Natural log of the arithmetic average value of the EPU index in Japan over the12 months of the fiscal year in Japan	Arbalti et al.(2019), Baker, Bloom, and Davis (BBD 2016) http://www.policyuncertainty.com/japan_monthly.html
Instrument variable		
11. PEPU_OPP	Natural log of the arithmetic average value of the politic polarization derived from equation (3) over the 12 months	Ito(2016)
Control variables		
12. SIZE	Log of total assets	Nikkei Needs Financial Quest
13. CR	Ratio of bank capital to the sum of risk-weighted assets	Nikkei Needs Financial Quest
14. NCD	Ratio of negotiable deposits to total deposits	Nikkei Needs Financial Quest
15. ROE	Return on equity	Nikkei Needs Financial Quest
16. CONC	Square of the ratio of total loans of each banks to the total loans of all banks	Nikkei Needs Financial Quest
17. VXJ	Volatility Index of Japan	http://www-mmds.sigmath.es.osaka-u.ac.jp/structure/activity/vxj.php
18. GDP	Growth of gross domestic products	The homepage of Cabinet Office of Japan
19. INTER	Dummy denotes 1 for the bank under the internatinal standard, 0 for the bank	Nikkei Needs Financial Quest

TABLE E3.2: SAMPLE DESCRIPTIVE STATISTICS

Variables	N	Mean	Std. Dev	P25	P50	P75	Min	Max
1. SEC	1989	24.077	7.738	18.694	23.700	29.253	0.001	50.008
2. JGB	1945	12.594	5.457	8.562	12.054	15.995	0.316	34.795
3. STOCK	1979	1.953	1.370	1.028	1.603	2.458	0.000	9.815
4. OTH_SEC	1971	4.471	3.372	2.098	3.925	5.995	0.000	29.243
5. LOAN	1991	64.473	8.268	59.271	65.462	70.269	13.773	87.717
6. RWA	1724	50.356	8.640	44.585	50.663	55.911	18.182	88.287
7. EC	1881	5.030	1.659	4.093	4.881	5.773	0.729	27.224
8. SME	1846	48.945	12.473	40.044	50.051	57.843	6.310	82.241
9. LARGE	1778	31.350	17.930	19.503	30.795	43.509	-33.679	89.677
10. EPU	17	4.629	0.228	4.469	4.670	4.798	4.201	4.962
11. PEPU_OPP	17	4.632	0.066	4.573	4.620	4.684	4.525	4.756
12. SIZE	1989	14.772	1.192	13.984	14.738	15.426	12.024	19.234
13. CR	1989	10.706	4.075	9.060	10.210	11.580	2.170	102.280
14. NCD	1989	3.330	5.850	0.000	1.544	4.104	0.000	52.238
15. ROE	1989	1.854	16.479	2.597	4.079	5.790	-317.843	39.883
16. CONC	1989	0.051	0.304	0.000	0.001	0.004	0.000	3.071
17. VXJ	17	3.155	0.242	3.003	3.116	3.272	2.781	3.711
18. GDP	17	0.830	1.570	0.300	1.200	1.900	-3.400	3.300
19. INTER	1989	0.161	0.368	0.000	0.000	0.000	0.000	1.000

TABLE E3.3: THE EFFECTS OF EPU ON KEY ADJUSTING COMPONENTS OF BANKS' CAPITAL RATIO

	Key components								
		Types of securities				Types of loans			
	(1) SEC	*(2) JGB*	*(3) STOCK*	*(4) OTH_SEC*	*(5) LOAN*	*(6) SME*	*(7) LARGE*	*(8) RWA*	*(9) EC*
1. EPU	0.240	2.429 ***	-1.532 ***	-1.042 ***	0.778 *	-2.121 ***	2.152 **	-3.048 ***	-0.690 ***
	(0.505)	(0.438)	(0.105)	(0.225)	(0.397)	(0.535)	(0.876)	(0.550)	(0.082)
2. SIZE	-1.555	-3.352 **	-0.256	3.805 ***	-6.237 ***	-9.562 ***	9.331 **	-11.540 ***	0.769 **
	(1.999)	(1.433)	(0.189)	(1.075)	(1.734)	(2.302)	(3.805)	(2.146)	(0.355)
3. CR	0.452 ***	0.450 ***	-0.058 ***	-0.010	-0.490 ***	-0.903 ***	1.196 ***	-1.296 ***	
	(0.157)	(0.161)	(0.018)	(0.064)	(0.124)	(0.127)	(0.197)	(0.291)	
4. NCD	0.157 **	0.139 ***	-0.038 ***	0.049	-0.065	-0.104	0.192	-0.040	0.019
	(0.068)	(0.048)	(0.008)	(0.058)	(0.056)	(0.076)	(0.123)	(0.093)	(0.013)
5. ROE	0.009	-0.001	0.000	0.006	0.000	-0.003	-0.002	-0.008	0.013 ***
	(0.011)	(0.007)	(0.001)	(0.004)	(0.005)	(0.009)	(0.013)	(0.009)	(0.004)
6. CONC	-13.680 ***	-9.348 ***	-0.632 ***	-2.744 **	-1.210	-0.162	1.798	-23.130	-0.137
	(2.004)	(0.883)	(0.165)	(1.351)	(1.339)	(2.713)	(4.391)	(61.220)	(0.323)
7. VXJ	2.224 ***	3.048 ***	-0.068	-1.720 ***	0.886	0.479	-0.688	0.324	-0.485 ***
	(0.630)	(0.408)	(0.063)	(0.333)	(0.540)	(0.594)	(1.151)	(0.660)	(0.125)
8. GDP	0.512 ***	0.592 ***	-0.014 *	-0.144 ***	-0.286 ***	-0.187 ***	0.362 ***	-0.420 ***	0.035 ***
	(0.066)	(0.052)	(0.007)	(0.038)	(0.058)	(0.062)	(0.114)	(0.078)	(0.010)
Constant	33.820	36.060 *	13.810 ***	-41.300 **	155.800 ***	208.600 ***	-128.300 **	244.600 ***	-1.741
	(29.930)	(21.140)	(2.877)	(16.170)	(26.260)	(34.750)	(57.420)	(31.430)	(5.333)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.113	0.184	0.362	0.148	0.182	0.315	0.221	0.363	0.247
Observations	1,989	1,945	1,979	1,971	1,991	1,846	1,778	1,724	1,881

The table shows the results of the relationship between economic policy uncertainty and banks' portfolio adjustment. EPU denotes the natural log of the arithmetic average of Japan's overall economic policy uncertainty at the annual level. SIZE is the year-lagged log value of total assets. CR is the lagged capital ratio. NCD is the lagged ratio of negotiable deposits to total deposits. ROE denotes the return on equity. CONC denotes the square ratio of each bank's total loans to all banks' total loans. VXJ denotes the volatility index of Japan. GDP denotes the growth of the gross domestic product. Standard errors clustered at the bank level and t-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE E3.4: THE HETEROGENEOUS EFFECTS OF EPU FOR THE BANKS UNDER DUAL STANDARDS ON KEY ADJUSTING COMPONENTS

		Types of securities				Types of loans			
	(1) SEC	*(2) JGB*	*(3) STOCK*	*(4) OTH_SEC*	*(5) LOAN*	*(6) SME*	*(7) LARGE*	*(8) RWA*	*(9) EC*
1. EPU×INTER	-3.408 **	0.000	-1.613 ***	-0.390	2.068 *	3.813 ***	-3.850	1.718	-0.328
	(1.335)	(1.017)	(0.310)	(0.850)	(1.249)	(1.419)	(2.347)	(1.505)	(0.225)
2. EPU	0.820	2.427 ***	-1.274 ***	-0.944 ***	0.421	-2.714 ***	2.809 ***	-3.133 ***	-0.636 ***
	(0.568)	(0.475)	(0.102)	(0.266)	(0.486)	(0.647)	(1.033)	(0.558)	(0.089)
3. INTER	17.290 ***	-0.055	7.587 ***	2.935	-10.770 *	-17.29 ***	18.280 *	-9.065	1.570
	(6.241)	(4.838)	(1.416)	(3.968)	(5.616)	(6.590)	(10.900)	(8.099)	(1.055)
4. SIZE	-1.271	-3.358 **	-0.201	3.965 ***	-6.451 ***	-9.637 ***	9.544** **	-11.860 ***	0.786 **
	(1.973)	(1.429)	(0.192)	(1.056)	(1.784)	(2.323)	(3.850)	(2.108)	(0.356)
5. CR	0.456 ***	0.450 ***	-0.053 ***	-0.014	-0.492 ***	-0.92 ***	1.207 ***	-1.301 ***	
	(0.158)	(0.162)	(0.017)	(0.064)	(0.123)	(0.126)	(0.195)	(0.293)	
6. NCD	0.163 **	0.139 ***	-0.036 ***	0.050	-0.068	-0.109	0.197	-0.038	0.020
	(0.068)	(0.049)	(0.007)	(0.058)	(0.056)	(0.076)	(0.124)	(0.092)	(0.013)
7. ROE	0.009	-0.001	-0.001	0.006	0.000	-0.00213	-0.003	-0.008	0.013 ***
	(0.011)	(0.007)	(0.001)	(0.004)	(0.005)	(0.009)	(0.013)	(0.009)	(0.004)
8. CONC	-13.580 ***	-9.346 ***	-0.564 ***	-2.770 **	-1.254	-0.291	1.798	-24.740	-0.125
	(1.920)	(0.870)	(0.177)	(1.349)	(1.341)	(2.712)	(4.382)	(62.570)	(0.324)
9. VXJ	2.300 ***	3.046 ***	-0.048	-1.685 ***	0.832	0.456	-0.645	0.270	-0.479 ***
	(0.631)	(0.409)	(0.062)	(0.333)	(0.544)	(0.595)	(1.156)	(0.665)	(0.126)
10. GDP	0.517 ***	0.592 ***	-0.012 *	-0.143 ***	-0.289 ***	-0.192 ***	0.369 ***	-0.425 ***	0.035 ***
	(0.066)	(0.052)	(0.007)	(0.038)	(0.058)	(0.062)	(0.113)	(0.079)	(0.010)
Constant	26.380	36.180 *	11.650 ***	-44.350 ***	161.000 ***	212.7 ***	-134.800 **	249.800 ***	-2.268
	(29.450)	(21.170)	(2.964)	(15.710)	(26.890)	(34.770)	(57.570)	(30.940)	(5.381)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.122	0.184	0.4	0.154	0.188	0.321	0.224	0.365	0.249
Observations	1,989	1,945	1,979	1,971	1,991	1,846	1,778	1,724	1,881

The table shows the heterogeneous effects of economic policy uncertainty. EPU denotes the natural log of the arithmetic average of Japan's overall economic policy uncertainty at the annual level. EPU×INTER denotes the interaction between EPU and INTER. SIZE is the year-lagged log value of total assets. CR is the lagged capital ratio. NCD is the lagged ratio of negotiable deposits to total deposits. ROE denotes the return on equity. CONC denotes the square ratio of each bank's total loans to all banks' total loans. VXJ denotes the volatility index of Japan. GDP denotes the growth of the gross domestic product. Standard errors clustered at the bank level and t-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE E3.5: ROBUSTNESS CHECK

	Key components								
		Types of securities				Types of loans			
	(1) SEC	*(2) JGB*	*(3) STOCK*	*(4) OTH_SEC*	*(5) LOAN*	*(6) SME*	*(7) LARGE*	*(8) RWA*	*(9) EC*
1. PEPU_OPP	1.040	11.030 ***	-2.169 ***	-6.587 ***	3.715 ***	-0.668	-2.773	-7.594 ***	-2.048 ***
	(1.727)	(1.544)	(0.232)	(0.783)	(1.297)	(1.458)	(2.428)	(1.642)	(0.253)
2. SIZE	-1.334	-0.826	-1.285 ***	2.529 **	-5.424 ***	-10.770 ***	10.170 ***	-14.100 ***	0.213
	(2.033)	(1.468)	(0.211)	(1.006)	(1.806)	(2.399)	(3.856)	(2.114)	(0.324)
3. CR	0.444 ***	0.449 ***	-0.084 ***	-0.005	-0.490 ***	-0.961 ***	1.284 ***	-1.342 ***	
	(0.159)	(0.158)	(0.020)	(0.065)	(0.126)	(0.134)	(0.202)	(0.297)	
4. NCD	0.158 **	0.133 ***	-0.031 ***	0.051	-0.066	-0.090	0.173	-0.027	0.020
	(0.067)	(0.047)	(0.009)	(0.057)	(0.056)	(0.074)	(0.120)	(0.092)	(0.012)
5. ROE	0.010	-0.001	0.000	0.005	0.000	-0.002	-0.004	-0.007	0.013 ***
	(0.011)	(0.006)	(0.001)	(0.004)	(0.005)	(0.009)	(0.013)	(0.009)	(0.004)
6. CONC	-13.630 ***	-9.276 ***	-0.464 ***	-2.842 **	-1.181	0.230	1.204	-22.600	-0.145
	(2.037)	(1.063)	(0.172)	(1.263)	(1.322)	(2.856)	(4.557)	(60.420)	(0.299)
7. VXJ	2.240 ***	2.798 ***	-0.416 ***	-1.373 ***	0.776	-0.322	0.494	0.042	-0.588 ***
	(0.541)	(0.379)	(0.064)	(0.265)	(0.472)	(0.478)	(0.847)	(0.560)	(0.104)
8. GDP	0.510 ***	0.577 ***	-0.043 ***	-0.123 ***	-0.293 ***	-0.248 ***	0.453 ***	-0.448 ***	0.045 ***
	(0.061)	(0.051)	(0.008)	(0.035)	(0.053)	(0.053)	(0.096)	(0.073)	(0.010)
Constant	26.860	-40.320 *	33.320 ***	2.098	130.500 ***	222.900 ***	-122.500 *	304.100 ***	13.070 **
	(33.780)	(24.140)	(3.696)	(16.280)	(29.940)	(39.660)	(64.290)	(32.660)	(5.329)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.112	0.197	0.194	0.171	0.185	0.306	0.217	0.355	0.235
Observations	1,990	1,946	1,980	1,972	1,992	1,847	1,779	1,725	1,882

The table shows the results of the instrumental variable method by Gullen and Ion (2016). PEPU_OPP denotes the natural log of the arithmetic average of the predicted value of approval ratings for opposition parties derived from equation (3). SIZE is the year-lagged log value of total assets. CR is the lagged capital ratio. NCD is the lagged ratio of negotiable deposits to total deposits. ROE denotes the return on equity. CONC denotes the square ratio of each bank's total loans to all banks' total loans. VXJ denotes the volatility index of Japan. GDP denotes the growth of the gross domestic product. Standard errors clustered at the bank level and t-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

FIGURE 3.1 THE MAIN EVENTS OF EPU (2002 H1–2012 H2)

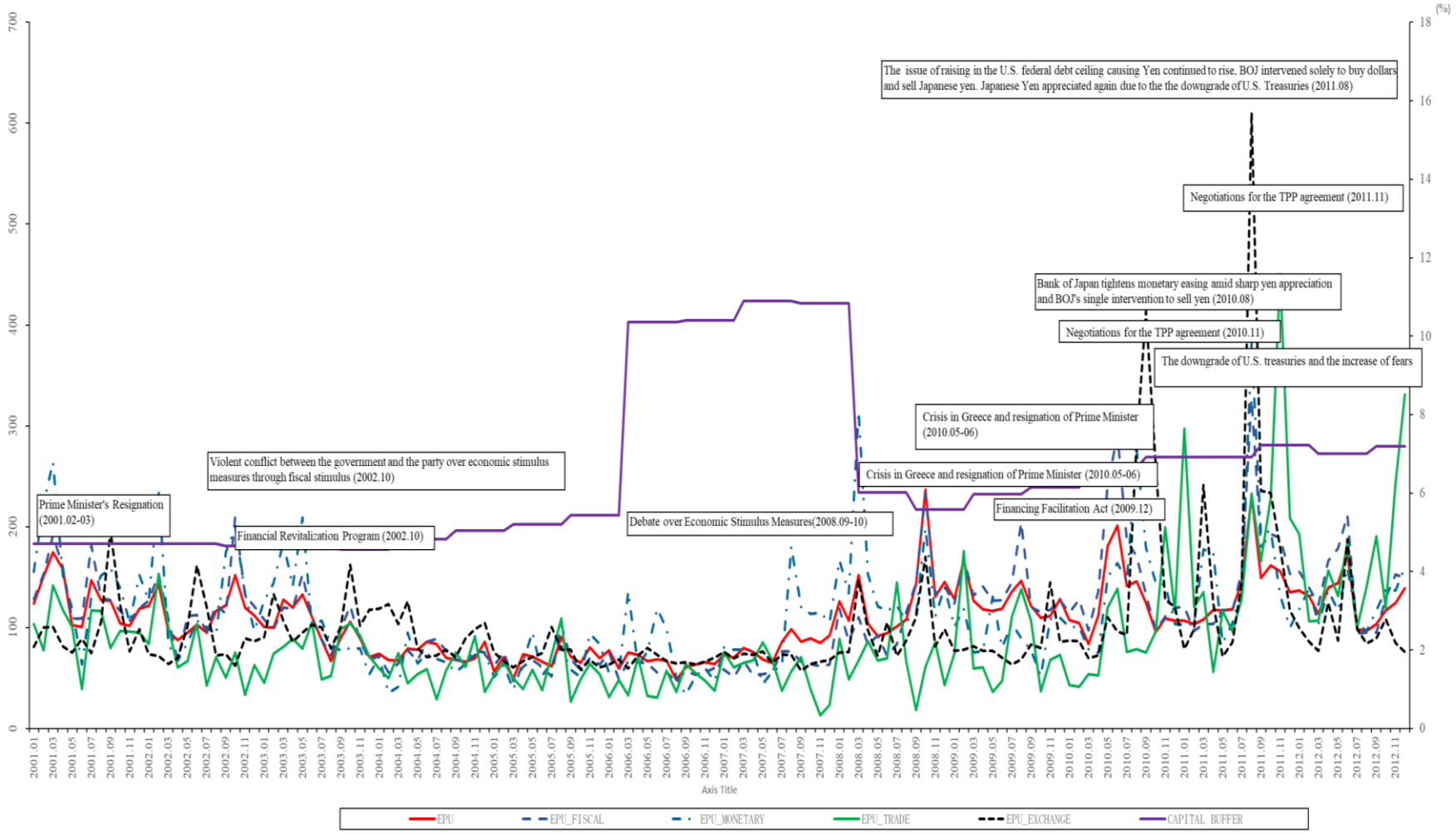
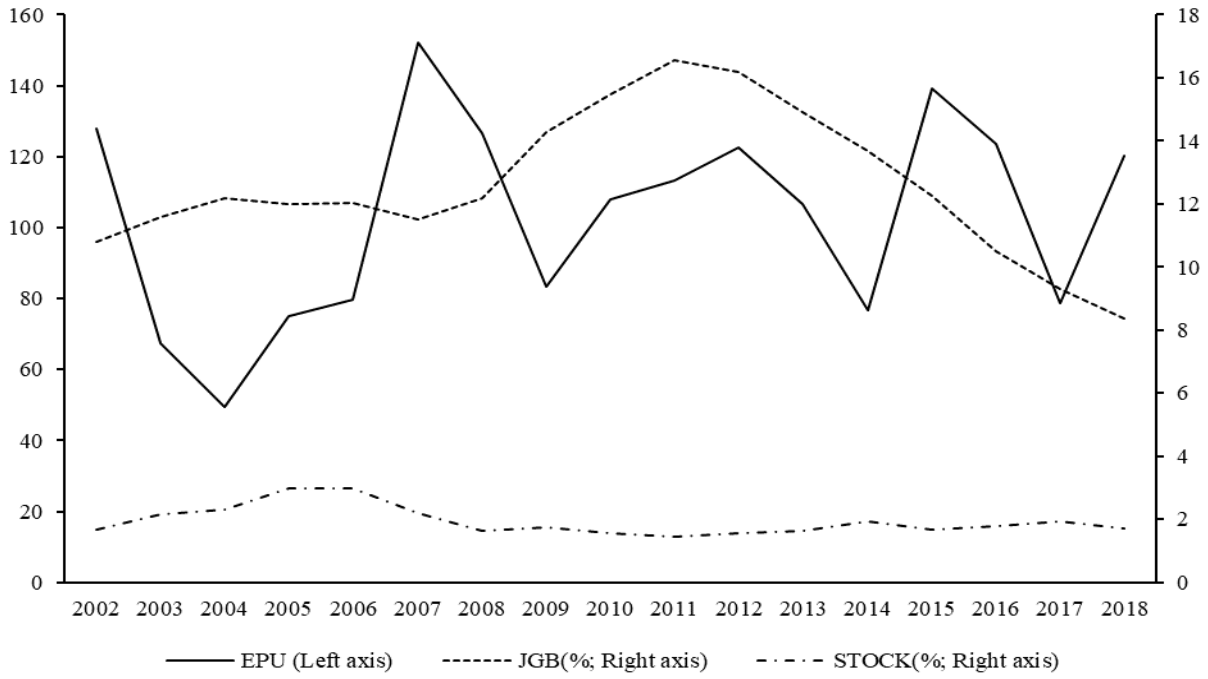


FIGURE E3.1 EPU AND THE HOLDING OF GOVERNMENT BONDS AND STOCKS BY JAPANESE BANKS



CHAPTER 4

Bank capital ratio and governance: evidence from Japanese banks

In this chapter, I explore the relationship between banks' capital ratio and governance, specifically focusing on (i) ownership structure and (ii) board characteristics. First, I analyze the Japanese commercial banks' data from 2006 to 2013. The results show that ownership structures (institutional and foreign ownership) are positively associated with capital ratios. Further, banks with a higher ratio of outside and independent directors, which implies a high level of board independence, are positively associated with capital ratios. In contrast, banks with higher executive ratio, which indicates a lower level of board independence, is negatively associated with capital ratios.

4.1 Introduction

Banks are widely recognized as agile, risk-taking, opaque in lending, and operate in a heavily regulated sector. Thus, bank governance is considered differently than those of corporations. Given the banks' unique features, influenced by their role in financial intermediation and deposit-taking, banks do not need the permission of depositors and bondholders to determine their portfolio or risk profile. However, they account for the majority of bank funding and capital. Banks are in the business of risk-taking and are considered highly leveraged organizations. However, like non-financial firms, banks are also afflicted by issues such as board failures, weaknesses in internal control, conflicts of interest, and agency problems.

The board of directors is considered "the highest point" of an organization's internal governance system (Fama & Jensen, 1983) and is recognized as the first line of defense (Weisbach, 1988; Hermalin & Weisbach, 2003). In banking, financial institution governance often reveals a set of arrangements that approve of risky strategies (G30 Report, 2012). The failure of bank governance is a more severe problem than corporate governance because banks link to real sectors and markets closely; bank failure caused by poor governance will lead to severe instability of the financial system. Hence, the efficiency of bank governance is worth analyzing.

The recent financial crisis triggers the question of the ability of capital to protect banks. Thus, public noise for more bank capital tends to be stronger after financial crises, explicitly requiring banks to operate with more capital to improve social efficiency. In this regard, many proposals emphasize the implementation of capital regulation to avoid future crises. Before the recent financial crisis, the Basel Committee acknowledged the importance of bank governance. According to "Enhancing Corporate Governance of the Banking Industry" by the Basel Committee in 2006 mentioned, bank boards are an essential part of banking regulatory reform. Basel Committee reiterated that bank governance differs in their superseded version, entitled "Principles for enhancing corporate

governance" in 2010. This principle demands protecting the interests of depositors, shareholders, and other stakeholders, such as supervisors, governments, and bondholders, by broadening the duty of bank boards. Recommended means of strengthening the board include appointing more competent directors and emphasizing the risk management function. Additionally, the governance of financial institutions was insensitive to the dangers of risk-taking and financial instabilities and, thus, failed to protect financial institutions, customers, shareholders, and society at large (G30 Report, 2012).

A vast body of banking literature provides evidence that the governance mechanism significantly influences bank risk-taking behavior and highlights various channels of moral hazard problems that banks encounter. Therefore, this topic is gaining substantial research attention, especially the analyses of bank risk-taking and bank capital regulations (Caprio & Levine, 2002; Pathan, 2009; Beltratti & Stulz, 2012; Gropp & Köhler, 2010; Berger & Bouwman, 2013).

Despite the existence of bank governance-related literature providing some insights, they are inconclusive, and the evidence that bank governance influences the level of bank capital is limited. For exception, some related studies, the study of Berger and Bouwman (2013) examines the functions of capital on survivorship with the controls for institutional block ownership, bank holding company (BHC) membership, and foreign ownership in bank survival and market share models. Their results show that capital increases the probability of surviving small banks in the event of a crisis and enhances the performance of medium and large banks during banking crises. However, the study needs to emphasize other variables related to board characteristics in their analysis, which is also one of this chapter's main topics of interest. Erken, Hung, and Matos (2012) show that financial firms

with a higher level of institutional ownership tend to take more risks by increasing the capital level before the banking crisis concerning the risk taken by banks. Consequently, it suffered massive losses over the crises of 2007-2008. Shehzad, Haan, and Scholtens (2010) report that concentrated ownership enhances the capital adequacy ratio conditional on shareholder protection rights.

Given the varying evidence and divergence of views in the literature, the issue of the effects of ownership structure and board characteristics on capital levels and the magnitude of these effects leads to an empirical question. Moreover, knowing how bank governance affects bank capital is crucial for regulators to consider banking regulations, specifically capital regulations. Hence, I aim to empirically analyze bank governance's effects on capital ratios in this chapter. The results serve as a base for the recent calls for change in bank governance to control risk. Besides, the results will provide some new dimensions to the existing literature on the effects of bank governance on capital levels.

The main results are as follows. First, the estimation results show that ownership structure and board characteristics significantly influence bank capital ratios. Specifically, ownership structures (institutional and foreign ownership) are positively associated with the level of capital ratios. Second, boards with high independence, specifically a higher ratio of outside and independent directors, are positively associated with the level of capital ratios. By contrast, there is a negative relationship between the ratio of executive directors and the level of capital ratios.

The remainder of the chapter is structured as follows. First, in section 4.2, I present the institutional background. Then, in section 4.3, I present literature reviews and hypotheses development. Next, data and methodology are in section 4.4, and empirical results are in section 4.5. Finally, section 4.6 concludes.

4.2 Institutional background

4.2.1 relationship between capital and risk

In theory, bank behaviors are based on high-risk-related costs and are predictable. Theory suggests that changes in bank risk and capital levels are positively associated. The assumed related costs are regulatory costs, unintended effects of minimum capital requirements, bankruptcy costs, and costs that relate to managerial risk aversion. Banks usually hold capital above the minimum requirement to

avoid any regulatory intervention, which is costly. Buser, Chen, and Kane (1981) suggest that regulations allow banks to pursue higher levels of risk by increasing their capital level. Consequently, changes in bank asset risk are positively related to bank capital. As regulations allow banks to pursue riskier investments by increasing the level of capital, a higher risk level effectively forces banks to increase the capital level.

Several studies (e.g., Koehn & Santomero, 1980; Kim & Santomero, 1988) focus on regulatory policy and suggest that regulations may have an opposite effect to that intended by regulators. The opposite effect is that regulations will cause bank capital and risk to become substitutes. That is, increase capital to fulfill higher risk-taking behavior. Thus, banks' reluctance to experience reductions in leverage because of the capital increase will achieve their desired level by increasing the asset risk. Similarly, aligned with regulators' incentives to reduce leverage, regulatory pressure allows a reduction in capital, and banks will reduce asset risk.

Moreover, in line with the bankruptcy costs view whereby bankruptcy costs increase as the probability of bankruptcy increases, banks will tend to increase capital when risk increases, and vice versa. Managers, who act as agents, face the undiversified human capital risk and tend to be more risk-averse relative to shareholders. Thus, managers whose banks are at high risk (with riskier asset portfolios) may compensate for the risk with a higher capital level, thereby leading to a positive relationship between the changes in risk and capital, as demonstrated in Berger and Bouwman (2013) and Thakor (2014).

As documented by Shrieves and Dahl (1992), if exploitation of the deposit insurance subsidy dominates bank behavior, the changes in capital and risk are negatively associated. However, if the abovementioned costs dominate and drive bank behavior, the relationship between capital changes and risks should be positive.

4.2.2 Cross-shareholdings

Cross-shareholdings refer to a situation where two companies own the shares of each other. Backed to earlier years in Japan, especially in the late 1950s to around the early 1960s, when Japan had undergone high economic growth, companies in Japan were heavily dependent on bank financing, which led to the formation called *keiretsu* (business affiliation). These banks supported the *keiretsu* with significant amounts of loans. For better monitoring of its borrowers, banks apply the means by owning the shares of their borrowers, and it also helps to strengthen the relationship with borrowers. Borrowers viewed cross-shareholding as one of the means of protection from unfriendly takeover.

Although cross-shareholding brought in some benefits for both parties, it still with some drawbacks. The biggest challenge is that cross-shareholding was considered the linkage between a bank's financial soundness and share market performance. In the upturns of the share market, banks can boost their profits through the increased share price of their portfolio. In contrast, during the downturn, banks may also suffer losses, which hurts the banks' profitability and capitalization in general. The financial results in March 2009 showed the worst net losses since 2003, whereby mega banks reported net losses of 1.17 trillion[34].

Moreover, the Bank of Japan (BOJ) acknowledged that most banks recorded declines in their Tier 1 capital due to the unrealized losses in securities of the financial year of March 2009. The linkage created by cross-shareholding activities harms the bank's capital adequacy via the net losses from securities. It is well-known that weak capital adequacy of banks can trigger instability in the financial system. The market value of a bank will affect its capital adequacy level. Therefore, banks can include the 45% of unrealized gains of equity securities in tier 2 capital calculations.

In contrast, banks require deducting any unrealized losses, including from cross-shareholdings from Tier 1 capital calculations. Significant amounts of unrealized losses, especially during the

[34] See bank financial statements.

downturn in the financial market, will hurt the banks' profitability and capital adequacy ratio. To relieve the impact of abnormal behavior in the capital markets, the Japanese Financial Services Agency (FSA) implemented a temporary program to temporarily exempt the deduction of unrealized losses from Tier 1 capital for domestic banks extended until March 2012[35]. The unrealized losses are exempt from Tier 1 capital calculation for internationally active banks. However, they may count 45% of the unrealized gain to their Tier II capital.

Banks can use the most direct means, which is by liquidating their shareholdings in firms via sale, but generally, banks are reluctant to take such means as this will ruin the long-term built relationship. Moreover, the sudden sale of significant bank-held shares could impede the share values and trigger adverse economic effects.

To alleviate the unfavorable impacts of the reduction of bank-held shareholdings in the financial market, BOJ implemented The Bank Shareholding Restriction Law (*Ginkoto no kabushikito no hoyuno seigento ni kansuru horitsu*) in November 2001. Based on this law, banks are required to reduce their shareholdings to 100% of their Tier 1 capital by 2004 (extended to 2006). In addition, this law also established the Banks' Shareholding Purchase Corporation (BSPC) in January 2002 to voluntarily purchase shares from banks. As a result, the establishment of BSPC reduced the bank-held shareholdings.

The reduction helps to alleviate the risk exposures of banks in the market. However, with the breakout of GFC, stock prices plummeted, so BOJ purchased approximately JPY30 billion, and BSPC purchased JPY137 billion in stocks from banks to reduce the banks' market risks in July 2009[36].

[35] Please refer (https://jp.reuters.com/article/idJPnTK019054720081107).
[36] See bank financial statement from Bank of Japan.

4.3 Literature review and hypothesis development

4.3.1 Ownership structure

The banking sector is well known for owner-manager conflicts (Fama & Jensen, 1983). The literature argues that shareholders tend to take more risks compared to managers, who are more risk-averse due to career concerns and the risk of unemployment, which is hard to be diversified. This risk-averse behavior of managers may lead them to choose safer investment projects or operate projects with more capital than that deemed optimal by shareholders.

However, as many authors agree, owner-manager agency conflicts may cancel out the increased risk-taking behavior arising from the moral hazard problem. Pathan (2009) provides empirical evidence that the United States BHC assume higher risks when they have more vigorous shareholder representation on the boards. Laeven and Levine (2009) illustrate through an international sample that banks with more diversified and externally controlled shareholder bases are less likely to be risk-taking overall. Further, after the recent financial crisis, significant attention has been placed on governance in banking, precisely the agency problem, which identifies the existence of the divergence in incentives between the owners and managers. In banking, Saunders, Strock, and Travlos (1990) highlighted that the manager, the agent of stockholders, may have different preferences for pursuing risk. Specifically, divergence in risk-pursuing incentives exists between managers and shareholders. The managers, who act as agents facing the undiversified human capital risk, tend to be more risk-averse than shareholders.

The risk-taking behavior between the block and dispersed shareholders shows that the block shareholders are more risk-averse relative to dispersed shareholders. Based on theory and literature, it is undeniable that ownership structure is one of the most influential factors in bank behavior. Large block shareholders are more capable and have a strong incentive to monitor the process and management than dispersed shareholders and, thus, are considered more influential by management.

In general, the free-riding problems can be a more severe problem of in high ratio of dispersed shareholders on board. In addition, large block shareholders are more likely to be well-informed, which helps them make more precise decisions or votes. However, some literature shows that a concentrated ownership structure does not matter in risk-taking behavior. For example, Grove et al. (2011) report a weak correlation between concentrated ownership and bank performance. In terms of effective monitoring, Aebi, Sabato, and Schmid (2012) find that a high ratio of institutional investors cannot provide effective monitoring for holding down the excessive risk-taking behavior of banks and enhancing the performance of banks. Erkens, Hung, and Matos (2012) report that banks took the excessive risk before the crisis and subsequently suffered considerable losses during the global financial crisis (2007-2008). Beltratti and Stulz (2012) find significant relationships between concentrated ownership and bank risk-taking during the U.S. subprime mortgage crisis. Mehran and Mollineaux (2012) argued that large equity owners might provoke the firm to higher risk-taking as the shareholders will benefit from the upside, whereas the debt holders need to bear the costs of failures. Hence, it must still determine whether large shareholders promote greater bank risk-taking.

Concerning banking regulations, the impact of concentrated ownership may vary depending on regulation and shareholder protection law[37].Leaven and Levine (2009) find that large shareholder banks promote high risk-taking. However, the effect can be mitigated through strong shareholder protection. By contrast, Shehzad, Haan, and Scholtens (2010) report that concentrated ownership reduces banks' non-performing loans and strengthens banks' capital ratio with strong shareholder protection.

[37] In Japan, shareholders' rights get protections under the Companies Act (Act No.86 pf 26th July 2005). The Company's Act was amended on 1st May 2015.

The ratio of ownership of shares in listed companies in Japan by foreign entities increased for three consecutive fiscal years until 2015 in response to the decline of stock market prices in Japan[38].In banking, foreign ownership in Japanese banks has also increased substantially[39].

Given the positive association between capital and risk and if shareholders are risk takers and shareholder activism is influencing enough to affect capital management, the higher risk level will effectively force shareholders to increase banks' capital level. Thus, I posit a positive relationship between capital ratio and ownership structure.

Hypothesis 1: The higher ratio of ownership structure (institutional[40] or foreign ownership) is positively associated with bank capital ratios.

4.3.2 Board characteristic

4.3.2a Board size

In theory, the larger the board, the more inefficient the governance due to time consumed in decision-making and free-rider issues among directors. Jensen (1993) argues that boards become less effective at monitoring management as their size increases because of the free-rider problem among directors and longer decision-making time. However, the other side of the theory suggests that banks can fully utilize the advice from the pool of expertise of a giant board, which is beneficial to banks.

As reported by several studies, Booth, Cornett, and Tehranian (2002) report that larger bank boards have a more significant proportion of outside directors by comparing the 100 largest banks to the 100 largest non-financial firms in 1999 in the United States. Adam and Mehran (2003) report that Bank

[38] Tokyo Stock Exchange Inc., et al., Result of Survey of Distribution Condition of shares in 2015, 20th June 2016. (https://www.jpx.co.jp/english/markets/statistics-equities/examination/01-archives-04.html).

[39] Please refer to Nikkei news dated August 29th, 2018, titled "*chi gin, fueru gaikokujin kabunushi,*" 「地銀、増える外国人株主」

[40] To improve the corporate governance of listed companies in Japan, the Tokyo Stock Exchange issued Japan's Corporate Governance Code (5 principles) on 1st June 2015. In addition, Japan's Stewardship Code (4 principles) was established on 26th February 2014 by Financial Services Agency (FSA) to assist institutional investors in fulfilling their stewardship responsibilities.

Holding Companies (BHC) have a giant board using the sample of 35 BHC in the United States in 1999, probably due to the high complexity organization structure. Using a sample covering the 1996–2007 period, Adams and Mehran (2012) found that bank boards are larger and more independent. By contrast, reducing board size has also been suggested in the literature. For example, Ferreira, Kirchmaier, and Metzger (2012) stated that the average US BHC board became smaller and more independent. Based on their study, over the 2000–2008 sample period, the average board size decreased from 15 to 11.6 members.

Note that banks have unique characteristics, for example, organizational complexity, risky business industry, the opacity of loans, and complicated financial statements. Therefore, banks with larger boards seem more rational as a giant board able to provide valuable advice to the manager to cope with a stiff competitive environment while also ensuring regulatory compliance. Some empirical studies encourage banks to have larger boards as banks operate in highly complex sectors and require more expertise for optimal decision-making. The advice from a vast pool of expertise on a board may outweigh the coordination and decision-making problems and associated costs. Aebi, Sabato, and Schmid (2012) employing the U.S. banks sample find that board size is positively correlated with bank performance indicators, for example, buy and hold returns and ROE using the sample period of July 2007-December 2008. Beltratti and Stulz (2012), employing an international sample, find that banks with smaller board sizes had lower buy and hold returns during the crisis using the sample period of July 2007 to December 2008. Adams and Mehran (2012) provide evidence that the bank board structure is relevant to bank performance. They find a positive relationship between board size and performance. Pathan (2009) finds that bank board size negatively relates to risk-taking. By employing several risk indicators, Minton, Taillard, and Williamson (2010) find a negative correlation between board size and risk-taking.

However, as theories suggest, too large a board might lead to problems of coordination and decision-making, thereby jeopardizing efficiency. Erkens, Hung, and Matos (2012) find no evidence that shows board size is related to bank performance during the crisis using an international sample. Berger et al. (2012) argue that U.S. banks' board sizes were not conducive to stability. Faleye and Krishnan (2010) find that banks with smaller boards provide lesser junk loans and are less likely to engage in speculative loans.

Meanwhile, for the bank manager, a smaller board might be easier to control and influence. By contrast, although larger boards suffer from the cost of coordination and inefficient decision-making processes, with more expertise and resources, they are expected to provide beneficial advice, which might be helpful in complex firms such as banks. In conclusion, the impact of board size and governance control mechanisms is not apparent, and it rises to alternative conjecture, leading to the proposal of the following hypothesis.

Hypothesis 2: A larger board size positively correlates with bank capital ratios.

4.3.2b Board composition

Referring to Fama and Jensen (1983), outside directors have a strong incentive to monitor the management diligently because of reputation protection. Jensen (1993) suggested that corporate office employees cannot effectively or neutrally monitor the firms because of their high compensation. Therefore, these officers should not serve on the board. Specifically, firms appointing more insiders decrease the level of board independence, which undermines the monitoring effect. Similarly, boards with more outsiders and a high level of independence may lead to more effective monitoring as independent boards are neutral. In addition, independent directors are considered more effective in prohibiting opportunistic behavior and reducing potential agency conflicts since they are in a better position to discipline the management. Pathan (2009) mentioned a competitive directorship market in the banking industry. Thus, independent directors are concerned about their reputation.

However, outsiders are being criticized over their effectiveness in the control function because they need more information or knowledge related to the banking and finance industry. Therefore, they may need to understand the complex nature of banking products, which may technically lead to ineffective monitoring, restrict economic flexibility, and cause conflict between the board and management. In addition, Adam (2012) finds that relatively independent boards receive money for bailouts. Thus, since independent directors may need more financial expertise and overlook the complexity of the bank, board independence may not be necessarily beneficial for banks, as the banking industry is highly complicated.

Beltratti and Stulz (2012), using the score of "good governance" (which includes board independence as one of the attributes in addition to the composition of the committee, size, and transparency), find that "good governance" (relating to higher board independence) performed worst during the crisis. Minton, Taillard, and Williamson (2010) used banks in the United States as a sample, covering the 2007–2008 period also found that board independence correlates with poor stock performance. Bank governance is different and widens the duties of the board. The principles aim to protect the interests of depositors, shareholders, and other stakeholders, including supervisors, governments, and bondholders. Appointing more competent directors emphasizing the risk management function can strengthen the bank board.

Some evidence shows that board independence is relatively correlated to risk-taking. For instance, Pathan (2009) board independence correlates negatively with most risk indicators used in the analyses. Faleye and Krishnan (2010) find that board independence reduces riskiness by using the borrower credit ratings and the inclusion of financial covenants as a measure. However, no relationship between banks that diversify their lending risk through syndication. Yeh, Chung, and Liu (2011) find that high independence in auditing and risk committees helps promote performance in a crisis. Committee

independence effectively monitors financial institutions that have more excessive risk-taking behavior and perform better.

Independent or outside directors are concerned about their reputation and directorship. Thus, I posit that outside directors will take a conservative approach to maintain higher capital levels or operate the banks with more capital.

Hypothesis 3: A higher independence level of the board positively correlates with bank capital ratios.

4.3.3 Amakudari

According to the National Public Service Law (*Kokka komuin ho*), government servants are not allowed to join private companies for two years after their retirement if they had a close connection with the company in the five years before their retirement. In addition, any government servant who wants to be employed by a related private company needs the approval of the National Personnel Authority (*Jinji in*) before the end of the two years post-retirement. The Japanese term *amakudari* means "descent from heaven," referring to retired government officials accepting new positions in private sectors. In banking or deposit-taking institutions, the *amakudari* refers explicitly to the case when high-ranked officials from the Ministry of Finance (MOF) and Bank of Japan (BOJ) take post-retirement positions in one of the banks.

There are several lines of argument regarding the placement of *amakudari* in banks. First, some studies suggest a productive function of *amakudari* in monitoring the banks. Second, *Amakudari* officials expect to have more precise knowledge as they may play the role of catalysts to smoothen the flow of information between the regulator and bank manager (Schaede, 1995). Finally, Van Rixtel and Hassink (2002) documented three significant roles that *amakudari* officials could play.

First, *the amakudari* practice is a mechanism that enables the government to implement effective policies and regulations. MOF *amakudari* officials are usually posted in troubled banks and, thus, assume the role of monitoring the banks. Second, this job posting can be considered a magnificent

job offer for *amakudari* officials, who can expect senior positions and higher salaries than their employment in ministries, even after retirement. All these incentives motivate *amakudari* officials to work harder. Third, "buying influence," meaning the *amakudari* officials from the MOF may potentially bend the rules by persuading MOF and letting banks increase risky and profitable lending. In the case of buying influence, *amakudari* officials are working on equalizing competitiveness. Van Rixtel and Hassink (2002) also suggest that banks seek *amakudari* officials when they are in trouble, hoping that *amakudari* officials will use their network with the MOF and help them bend the rules.

Nevertheless, Horiuchi and Shimizu (2001) suggest that the *amakudari* practice is a form of collusion between regulators and banks. Banks provide prestigious job offers to the regulatory authorities, specifically the *amakudari* officials from the MOF and BOJ after their retirement. In return, the *amakudari* officials enable banks to expand their business and increase their leverage.

Horiuchi and Shimizu (2001) demonstrated that the acceptance of *amakudari* officials in banks correlate negatively with the capital-to-asset ratio. The result suggests that managers may have different incentives for risk-taking than stockholders, as risk-taking behaviors may expose managers to career damage. Thus, this argument is relevant as bank managers may not collude with *amakudari* in high-risk behaviors because, with a fixed salary, they stand to gain little; yet, if they fail, they will lose their job and human capital investment.

By contrast, Konishi and Yasuda (2004) find no significant effect on the relationship between the acceptance of *amakudari* officials on boards and bank risk. Therefore, unlike Horiuchi and Shimizu (2001), I employ the BIS capital ratio instead of the capital-to-asset ratio.

Hypothesis 4: The higher acceptance ratio of *amakudari* officials is negatively associated with the bank capital ratio.

4.4 Data and methodology

4.4.1 Regression model

The following regression equation is to empirically test the main hypotheses provided in the literature review and hypotheses development in Section 2.

$$CAPITAL_{i,t} = \alpha + \beta_1 BANK\ GOVERNANCE_{i,t} + \beta_2 CONTROL_{i,t} + \rho_t + \mu_i + \varepsilon_{i,t}$$

Where the subscript *i* denotes an individual bank, *t* is the time, and $\beta_{1,}$ and β_2 are the parameters to be estimated. ρ_t represents year-fixed effects, μ_i denotes bank-fixed effects, and ε represents the idiosyncratic error terms. I included bank-fixed effects and year-fixed effects throughout the specifications.

To test the hypotheses, I construct an estimated model of the bank capital ratio. In this model, I test whether factors driven by bank governance affect banks' capital ratios after including control variables that affect bank capital ratios. As shown in the literature, banks stand by to adjust their capital as the adjustment cost is costly. Thus, the capital adjustment is in dynamic form.

However, I employ a static rather than a dynamic model for several reasons. First, governance variables have little or no variation over time; hence, dynamic estimations may not be efficient in estimating such a case.

Second, to apply an efficient system Generalized Method of Moments (GMM) analysis, "small T and large N" is recommended, which means a large sample and a shorter time frame[41]. I am uncertain about the effectiveness of the analysis result if I employ the dynamic estimation, where the Arellano–Bond autocorrelation test may be unreliable if the sample does not fulfill the “small T and large N” requirement. However, I applied a 2-step system GMM to serve as a robustness check.

[41]Please refer to (https://journals.sagepub.com/doi/pdf/10.1177/1536867X0900900106).

4.4.2 Sample

The sample comprises the listed commercial, regional, and second-regional banks in Japan over the 2006–2013 period. Financial data are sourced from Nikkei Financial Quest, while bank governance-related data are from Nikkei NEEDS–CGES and Toyo Keizai (*yakuinshikiho*). In addition, I collected data on gross domestic product growth from Japan's Department of National Accounts' annual estimation reports.

Accounting and financial data were collected from each bank's Nikkei NEEDS–Financial Quest database and were limited to unconsolidated annual data. I started the estimation period in 2006 as Japanese banks have undergone a relatively stable period after the massive mergers and acquisitions (M&A) that took place in 2002–2004. Furthermore, I limit the sample period to 2013 because of the introduction of "*Abenomics*," which consists of monetary easing, fiscal stimulus, and structural reforms. "*Abenomics*" was implemented in December 2012.

Therefore, I allow the dataset to cover the financial data as of March 2013, considering the data covered most of the information for 2012. For financial statements of March 2013, it covers the financial data information for 2012.04–2013.03. Furthermore, the bank governance statement of September 2013 covers the governance-related data information for 2012.08–2013.08. The financial dates for financial information and governance information are different. The period for governance information disclosures is in August / September, whereas for financial information, the disclosures are in March. To maximize the coverage for both sets of information, I paired the governance and financial information according to the yearly statement.

4.4.3 Explanatory variables

4.4.3a Control variables

The dependent variable is the capital ratio (CR). Japan has two standards of capital requirements for internationally active banks and domestic banks. Thus, I added a dummy that denotes internationally active banks (INTER) to control for the divergence effect of capital requirement.

I added a set of control variables employed by previous research in partial adjustment models for capital adjustment analysis (Estrella, 2004; Ayuso et al., 2004). Following the previous research (Ayuso et al., 2004; Bikker & Metzemakers, 2004; Stolz & Wedow, 2005; Jokipii & Milne, 2008), the ratio of after-tax earnings to book equity (ROE), as a proxy of opportunity cost in the analysis. Therefore, I expect a negative relationship between CR and ROE. According to Keeley (1990) and Estrella (2004), capital reduces the likelihood of bankruptcy and financial distress costs. Therefore, the ratio of total risk-weighted assets over total assets (RISK) is the proxy variable of bankruptcy costs in the analysis. If there is a positive relationship between RISK and CR, banks try to reduce the exposure of the cost of failures. In contrast, if there is a negative relationship between RISK and CR, it alerts the moral hazard problem.

Loan loss provision (LLP) is the proxy variable for banks' internal assessment of the losses embedded in their portfolio. A positive relationship between LLP and CR indicates that banks attempt to alleviate the expected costs of failures. In contrast, a negative relationship between LLP and CR reveals the moral hazard problem. Large banks usually maintain a relatively low capital ratio compared to small banks based on the too big to fail (TBTF) hypothesis. The hypothesis supports the notion that large banks are relatively easy to receive rescue measures from the government when they face difficulties compared to small banks.

Moreover, larger banks are engaging in more expansive investment areas, thus usually having better portfolio diversification. As such, they can also benefit from a lower capital financing cost. For

testing the TBTF hypothesis, a log of total assets (SIZE) was employed (Ayuso et al., 2004; Jokipii & Milne, 2008; Francis & Osborne, 2010). Therefore, I expect a negative relationship between CR and SIZE.

Capital quality affects the ability to absorb losses. Therefore, the ratio of tier 1 capital to total capital (TIER1) is the proxy variable for high-quality capital (Francis & Osborne, 2010). Banks backed by a higher ratio of high-quality capital can benefit by holding lower capital ratios and tend to maintain a lower level of capital. Therefore, I expect a negative relationship between TEIR 1 and the CR.

Since the information about bank capital levels is assessable in the market, other sources besides capital requirements may affect banks' capital adjustments. The other external pressures, for example, from market or rating agencies, may outweigh capital requirements in influencing bank capital adjustment. Following Nier and Baumann (2006) and Haq et al. (2014), the ratio of the negotiable certificate of deposits to total deposits (NCD) is the proxy of market discipline. The deposit insurance scheme does not cover the negotiable certificates of deposit. Thus, NCD is considered a good fit as the proxy of market discipline. If market discipline is an essential factor, then I can expect a positive relationship between CR and NCD.

Market concentration was considered one of the factors in banks' capital adjustment in the study of Valencia and Bolanos (2018). Higher market concentration prompts banks to hold a higher level of capital. Therefore, market concentration is one of the factors influencing banks' capital adjustment. The square of the ratio of each bank's total loans to all banks' total loans in a given year (CONC) is the proxy for market concentration. Thus, I expect a positive relationship between CR and CONC. Several studies (Ayuso et al., 2004; Cook & Tang, 2010; Valencia & Bolanos, 2018) show that the business cycle influences banks' capital adjustment. Therefore, following previous studies, gross

domestic product growth (GDP) as a proxy variable for a business cycle was employed in the analysis. Therefore, the relationship between CR and GDP can be either positive or negative.

4.4.3b Governance variables

For ownership structure, I employ institutional ownership (INST), defined as the ratio of the number of shares held by institutional investors of the bank to the bank's total number of outstanding shares. I also use foreign ownership (FRGN), defined as the ratio of the bank's shares held by foreign investors to the bank's total number of outstanding shares. Furthermore, considering Japan's background of cross-shareholding, I employ cross-shareholding (CROSS), defined as the ratio of bank shares involved in cross-shareholdings to the bank's total number of outstanding shares.

For board characteristics, I employ board size, the proportion of outside directors, independent directors, and executive directors on boards. Board size (BRD_SIZE) is the number of directors on the board adjusted by total assets. An outside director is an individual on the bank's board of directors who is not an employee or stakeholder. Outside directors (OUTSIDE) is the percentage of total directors who are outside directors to the total number of directors on the board. An independent director is an outside director who does not belong to any groups defined by the NEEDS–CGES. Independent directors (INDE) is the independent director's ratio to the board's total number of directors. Executive directors (EXE) is the percentage of executive directors to the total number of directors on the board. EXE serves as the insider proxy and implies lower board independence with a higher percentage of EXE. Acceptance of retired high-ranking officials from the MOF or BOJ on banks' boards of directors, namely the *amakudari* officials. I employ dummy variables for acceptance of *amakudari* officials (AMA), where the dummy variable denotes one if the *amakudari* officials are accepted by banks and zero otherwise.

4.5 Empirical results

4.5.1 Ownership structure

The main results are in Table 4.4. As evident from columns 1 and 2 of Table 4.4, institutional ownership (INST) and foreign ownership (FRGN) show positive and significant coefficients. I find a positive relationship between ownership structures (INST and FRGN) and CR, indicating that a higher percentage of institutional and foreign ownership leads to higher capital ratios. From a moral hazard perspective, shareholders in banks have the incentive to take risks. Given the agency problem between managers and shareholders, managers will avoid a high-risk investment to protect their employment; thus, we perceive managers are risk averse. By contrast, shareholders are more risk-taking and favor riskier but profitable investments.

Considering the theory and literature evidence, one possible explanation for the estimation results is that banks' shareholders tend to increase their risk appetite by increasing their capital ratio level. If shareholder activism dominates banks' capital management, shareholders might be influential enough to promote a high level of capital to align with their risk-taking incentives. Shareholders behave as risk-takers in expanding their assets and increasing banks' capital ratios while at the same time complying with capital requirements. Besides, public outcries and external pressures calling for more capital have strengthened after the recent financial crises. Therefore, if banks' shareholders wish to increase risk levels, under this external pressure, banks are forced to operate with a higher level of capital. Moreover, shareholders are concerned about banks' reputations; thus, maintaining higher capital ratios provides signaling effects to the market about the financial soundness of banks.

I find no significant relationships between cross-shareholdings (CROSS) and CR, indicating that cross-shareholdings are not the driving factor in capital management. One possible explanation for this insignificant result may be due to the relaxation of the temporary relief program by the Japanese

Financial Services Agency on the exclusion of net unrealized losses from Tier 1 capital calculations for domestic banks and also internationally active banks for risk-free bonds.

As a result, we cannot observe the full effect of unrealized losses on the capital ratio under this program. So, the relationship between the cross-shareholdings via the linkage of unrealized profit and gain and capital ratio still needs to be adequately estimated.

4.5.2 Board characteristic

Banks are involved in managing risk and perceive the risk management function at the bank's governance level. The financial crises indicated that the monitoring quality of bank governance needed to be improved in many cases. Banks in countries with stricter capital requirement regulations and also obliged to have more independent supervisors performed better (Beltratti & Stulz, 2009). Further, independent directors are considered more knowledgeable based on the extant literature. They have incentives to monitor the banks as independent directors are concerned with maintaining their reputation in their directorship (Jensen, 1993). Moreover, Hermalin and Weisbach (2003) argued that directors with no direct ties with management are more effective monitors of management because, theoretically, they are less obligated to management. From the perspective of agency problems, outside directors or independent directors face fewer conflicts when monitoring managers.

Columns 5 and 6 of Table 4.4 illustrate that the proportion of outside directors (OUTSIDE) and independent directors (INDE) correlate with the CR positively and significantly. This relationship indicates that an increase in the independence level of boards by having a more significant number of outside or independent directors promotes a higher level of capital to maintain bank soundness. The result may be due to outside directors or independent directors being less likely to engage in risk-taking and undertaking prudent approaches in capital management. Furthermore, with close regulator monitoring, outside directors or independent directors are more sensitive to regulatory compliance and take conservative approaches to avoid any breach of regulations. In addition, outside directors

and independent directors are considered more neutral and value their reputation and directorship, thus facilitating the monitoring function.

By contrast, the negative relationship between the proportion of executive directors (EXE) and the capital ratio is evident from column 7 in Table 4.4. Minton, Taillard, and Williamson (2010) mentioned that outside directors sometimes need more firm-specific information and more time to understand the firm's complexities causing ineffective monitoring. As against this, executive directors may bring significantly more valuable information to the board than outside directors and can facilitate the flow of information between the board and management (Adam & Ferreira, 2007; Coles, Daniel, and Naveen, 2008). One possible explanation for this negative association between EXE and CR is that human career risk is a primary concern for executive directors. In particular, the executive directors have real concerns over their unemployment risk, which is considered undiversified, thereby being reluctant to increase capital for higher risk-taking. Hence, with risk-averse behavior, executive directors tend to reduce capital for impending higher risk-taking behavior in banks. By contrast, I find no significant relationship between board size (BRD_SIZE) and CR.

The literature shows that banks accepting post-retired officials from the MOF reduce capital adequacy levels and increase non-performing loans (Horiuchi, 2001). In contrast to this evidence, estimations result presented in column 8 of Table 4.4 suggest the insignificant relationship between the acceptance of *amakudari* officials (AMA) on board and CR. The insignificant sign seems consistent with the analysis result of Konishi and Yasuda (2004), who find no significant effect on the relationship between the acceptance of *amakudari* officials on boards and bank risk.

4.5.3 Endogeneity and robustness check

One of the biggest challenges for governance studies is the endogeneity problem. The endogeneity concerns are due to reserve causality. For instance, foreign investors intend to invest in banks with higher capital ratios. Alternatively, specific bank board characteristics may be such that it makes

banks operate with higher capital ratios. Moreover, the board characteristics I investigate possibly correlate with other variables that I cannot account for, which also introduces endogeneity. A better-fit instrumental variable that is intrinsically related to the governance variable but uncorrelated to the error term is a vital topic for governance studies. Unfortunately, there are no valid instruments to account for potential endogeneity econometrically. Therefore, the analysis results in this chapter served as ancillary evidence to support the interpretations. Regarding the best fit instrumental variables for alleviating the endogeneity problem, I leave it to one of the significant concerns of future research topics.

Another potential source of endogeneity for employing the partial adjustment model may be the inclusion of the lagged dependent variable (Lagged capital ratio) as a control variable in the regression specification based on the partial adjustment model. Due to the autocorrelation in the dependent variable, the regressors may correlate with the error terms resulting in a biased coefficient. To solve this endogeneity, I applied a two-step system GMM that served as a robustness check. As a result, the results on ownership structure remained unchanged, but board characteristics show inconsistent estimation results.

For the robustness check, I squared the bank governance variables, considered the non-linear relationship that may exist, and verified the presence of any heterogeneous result. The estimation results are in Table 4.5.

Following the previous studies, I also employ a partial adjustment model (Ayuso et al., 2004; Estrella, 2004; Francis & Osborne,2010), which includes dynamic specification. Another potential source of endogeneity for employing the partial adjustment model may be the inclusion of the lagged dependent variable (Lagged capital ratio) as a control variable in the regression specification based on the partial adjustment model.

Due to the autocorrelation in the dependent variable, the regressors may correlate with the error terms resulting in a biased coefficient. To solve this endogeneity, I applied a two-step system GMM that served as a robustness check. As a result, the results on ownership structure remained robust in most specifications, but board characteristics show inconsistent estimation results. The estimation results are in Table 4.6. The result remained qualitatively unchanged for ownership structures (INST and FRGN).

4.6 Conclusion

As a follow-up to the existing body of literature, this chapter empirically addressed the impact of bank governance on capital ratios. I empirically examined Japanese commercial banks' governance, including ownership structure and board characteristics, over the 2006–2013 period. The findings illustrated that bank governance plays a pivotal role in deciding the level of bank capital.

The main results are as below. First, institutional and foreign ownership maintain positive and significant relationships with the bank capital ratio. As shareholder activism dominates the management in banks, capital increases because of pursuing a higher level of risk-taking. Second, executive directors have negative associations with the capital level. One potential explanation is that this was due to executive directors' concerns over risks to human capital, which induced them to be risk-averse and reluctant to increase banks' capital levels for higher risks.

Finally, I found that a higher board independence level, which means a higher proportion of outside and independent directors, maintains a significant and positive relationship with the bank capital ratio indicating effectiveness in monitoring functions by increasing the capital ratio for better regulatory compliance. This study shed light on the fact that bank governance actively engages in capital management, specifically the bank ownership structure and board characteristics.

These findings provide implications that can be useful for regulators, supervisors, managers, and other participants involved in maintaining bank soundness. It also offers some implications for

regulation. Knowing bank governance is vital for regulators to contemplate and construct more effective and comprehensive regulations.

TABLE 4.1: DEFINITION OF VARIABLES

Variables	Description	Source
Dependent variable		
CR(%)	Capital ratio	Nikkei Needs Financial Quest
Control Variables		
SIZE (%)	Natural logarithm of total assets	Nikkei Needs Financial Quest
LLP (%)	Ratio of loss provisions to total assets	Nikkei Needs Financial Quest
RISK (%)	Lagged ratio of risk-weighted assets to the sum of total assets	Nikkei Needs Financial Quest
TIER 1 (%)	Ratio of Tier1 capital to total capital	Nikkei Needs Financial Quest
CONC (%)	Square of the ratio of total loans of each bank to the total loans of al	Nikkei Needs Financial Quest
NCD (%)	Ratio of negotiable certificate of deposits to total deposits	Nikkei Needs Financial Quest
ROE (%)	Ratio of net income after tax/shareholders' equity (equity capital)	Nikkei Needs Financial Quest
GDP (%)	Growth rate in real Japanese gross domestic product (Annual)	The homepage of Cabinet Office of Japan
INTER	Dummy equal to one for internationally active bank	Nikkei Needs Financial Quest
Bank Governance Variables		
Ownership Structure		
Institutional Investors (INST) (%)	Ratio of a bank's shares held by institutional investors to the total number of outstanding shares.	CGES
Foreigner Investors (FRGN) (%)	Ratio of a bank's shares held by foreign investors to the total number of outstanding shares.	CGES
Cross-shareholdings (CROSS) (%)	Ratio of bank shares involved in cross-shareholdings to the total number of outstanding shares.	CGES
Board characteristics		
Board size (BRD_SIZE) (%)	Ratio of the number of members of the board of directors to the natural logarithm of total assets	CGES
Outside Directors (OUTSIDE) (%)	Ratio of the number of outside directors to the number of members of the board of directors.	CGES
Independent Directors (INDE) (%)	Ratio of the number of independent directors to the number of members of the board of directors.	CGES
Executive Directors (EXE) (%)	Ratio of the number of executive directors to the number of members of the board of directors.	CGES
Amakudari Officials (AMA) (%)	Dummy variable indicating whether the banks accept Amakudari Officials (from the Bank of Japan or the Ministry of Finance).	The homepage of the Bank of Japan

TABLE 4.2: SAMPLE DESCRIPTIVE STATISTICS

Variables	N	Mean	Std. Dev.	p25	p50	p75	Min	Max
Dependent variables	581	10.976	1.957	9.700	10.780	11.990	2.170	24.450
CR(%)								
Key Independent variables								
INST (%)	581	18.623	12.634	11.140	15.840	22.340	0.010	79.760
FRGN (%)	581	9.233	10.316	3.670	6.710	10.720	0.000	73.300
CROSS(%)	581	5.302	3.968	1.930	4.800	7.830	0.000	19.040
BRD_SIZE	581	0.700	0.194	0.562	0.686	0.819	0.272	1.314
OUTSIDE (%)	581	7.270	13.803	0.000	0.000	11.111	0.000	85.714
INDE (%)	581	6.570	12.320	0.000	0.000	10.000	0.000	80.000
EXE (%)	581	81.577	23.730	64.286	100.000	100.000	7.143	100.000
AMA (%)	581	0.227	0.419	0.000	0.000	0.000	0.000	1.000
Control variables								
SIZE	581	14.690	0.799	14.305	14.724	15.237	12.852	16.365
LLP (%)	581	0.955	0.578	0.603	0.839	1.149	0.175	6.037
RISK (%)	581	51.025	10.043	45.504	50.913	56.176	3.261	137.125
NCD (%)	581	2.352	3.527	0.000	1.435	3.387	0.000	39.642
TIER 1 (%)	581	90.098	12.633	83.450	89.915	96.647	49.877	189.541
ROE (%)	581	1.893	10.069	2.395	3.810	5.047	-118.990	16.862
CONC (%)	581	0.003	0.005	0.001	0.001	0.003	0.000	0.038
GDP (%)	8	0.491	2.131	-2.200	0.800	1.400	-3.400	3.300

TABLE 4.3: CORRELATION

	CR	INST	FRGN	CROSS	BRD_SIZE	OUTSIDE	INDE	EXE	AMA	SIZE	LLP	RISK	NCD	TIER 1	ROE	CONC	GDP
CR	1.000																
INST	0.374	1.000															
FRGN	0.518	0.859	1.000														
CROSS	-0.108	-0.187	-0.166	1.000													
BRD_SIZE	0.235	0.033	0.096	0.130	1.000												
OUTSIDE	0.330	0.561	0.652	-0.303	-0.168	1.000											
INDE	0.288	0.538	0.611	-0.295	-0.196	0.981	1.000										
EXE	-0.282	-0.366	-0.438	0.191	0.272	-0.603	-0.593	1.000									
AMA	-0.340	-0.104	-0.149	0.061	-0.063	-0.081	-0.076	0.149	1.000								
SIZE	0.573	0.536	0.575	0.005	0.345	0.149	0.123	-0.242	-0.309	1.000							
LLP	-0.263	-0.101	-0.059	0.014	-0.191	0.112	0.120	0.045	0.273	-0.335	1.000						
RISK	-0.206	0.172	0.203	0.036	-0.123	0.184	0.183	-0.103	0.120	-0.075	0.158	1.000					
NCD	0.350	0.211	0.362	-0.039	0.287	0.226	0.173	-0.173	-0.197	0.367	-0.159	-0.035	1.000				
TIER 1	-0.012	0.157	0.130	-0.306	-0.151	0.259	0.260	-0.093	-0.031	-0.110	0.046	0.077	-0.059	1.000			
ROE	0.307	0.111	0.084	-0.023	0.087	-0.016	-0.013	-0.037	-0.129	0.198	-0.339	-0.044	0.072	-0.200	1.000		
CONC	0.301	0.528	0.513	0.123	0.039	0.102	0.099	-0.196	-0.074	0.671	-0.191	0.060	0.126	-0.012	0.117	1.000	
GDP	0.100	-0.007	-0.016	-0.043	-0.022	0.031	0.029	-0.016	-0.004	0.014	-0.075	-0.170	0.009	-0.254	0.162	-0.018	1.000

TABLE 4.4: BANK CAPITAL RATIO AND BANK GOVERNANCE (2006-2013)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Ownership Structure											
INST	0.043 ***								0.043 ***		0.001
	(0.013)								(0.014)		(0.018)
FRGN		0.092 ***								0.085 ***	0.084 ***
		(0.018)								(0.018)	(0.024)
CROSS			0.036						0.059 *	0.045	0.045
			(0.036)						(0.036)	(0.034)	(0.035)
Board Characteristics											
BRD_SIZE				0.494					0.409	0.406	0.405
				(0.476)					(0.475)	(0.469)	(0.470)
OUTSIDE					0.043 ***				0.019	0.037	0.037
					(0.008)				(0.024)	(0.024)	(0.024)
INDE						0.046 ***			0.018	-0.001	-0.001
						(0.008)			(0.023)	(0.023)	(0.023)
EXE							-0.013 ***		-0.008 **	-0.007 *	-0.007 *
							(0.003)		(0.004)	(0.004)	(0.004)
AMA								-0.175	-0.152	-0.238	-0.238
								(0.202)	(0.190)	(0.189)	(0.189)
Bank Characteristics											
INTER	0.573 **	0.694 ***	0.602 **	0.596 **	0.453 *	0.446 *	0.547 **	0.577 **	0.418	0.540 **	0.539 **
	(0.262)	(0.258)	(0.264)	(0.265)	(0.260)	(0.258)	(0.262)	(0.266)	(0.257)	(0.254)	(0.256)
SIZE	-2.132 **	-2.995 ***	-2.408 ***	-2.121 **	-2.232 **	-2.191 **	-1.772 *	-2.026 **	-2.647 ***	-2.915 ***	-2.911 ***
	(0.987)	(0.989)	(0.816)	(1.003)	(0.972)	(0.966)	(0.985)	(0.997)	(0.821)	(0.809)	(0.815)
LLP	0.073	0.047	0.067	0.083	0.087	0.082	0.151	0.085	0.088	0.054	0.054
	(0.117)	(0.115)	(0.116)	(0.118)	(0.115)	(0.114)	(0.117)	(0.118)	(0.113)	(0.112)	(0.112)
RISK	-0.010 *	-0.009 *	-0.010 *	-0.011 **	-0.015 ***	-0.015 ***	-0.013 **	-0.011 *	-0.015 ***	-0.014 ***	-0.014 ***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
TIER 1	0.018 ***	0.017 ***	0.017 ***	0.016 ***	0.016 ***	0.017 ***	0.017 ***	0.017 ***	0.018 ***	0.017 ***	0.017 ***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
CONC	75.480	88.690	47.040	45.960	22.360	40.550	50.780	57.260	63.580	59.850	60.110
	(58.430)	(57.450)	(57.910)	(58.650)	(57.320)	(56.770)	(57.740)	(59.060)	(58.060)	(57.080)	(57.390)
NCD	0.028	0.041 *	0.030	0.024	0.020	0.017	0.017	0.023	0.025	0.031	0.031
	(0.021)	(0.021)	(0.020)	(0.022)	(0.021)	(0.021)	(0.021)	(0.022)	(0.019)	(0.019)	(0.019)
ROE	0.032 ***	0.032 ***	0.033 ***	0.033 ***	0.031 ***	0.030 ***	0.033 ***	0.034 ***	0.030 ***	0.030 ***	0.030 ***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GDP	-0.035	-0.028	-0.053 *	-0.053 *	-0.036	-0.034	-0.038	-0.049	-0.015	-0.007	-0.006
	(0.032)	(0.031)	(0.031)	(0.032)	(0.031)	(0.031)	(0.031)	(0.032)	(0.031)	(0.031)	(0.031)
Constant	39.380 ***	51.980 ***	44.100 ***	39.890 ***	41.930 ***	41.220 ***	36.210 **	38.800 ***	47.090 ***	51.140 ***	51.070 ***
	(14.390)	(14.390)	(11.880)	(14.600)	(14.180)	(14.100)	(14.350)	(14.540)	(11.920)	(11.720)	(11.840)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	581	581	581	581	581	581	581	581	581	581	581
Adjusted R-squared	0.349	0.370	0.335	0.336	0.368	0.375	0.353	0.336	0.394	0.409	0.409

Standard errors are in parentheses. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Bank FE denotes bank fixed effect. Year FE denotes year fixed effect. The Independent variable is the capital ratio. INST is the ratio of a bank's shares held by institutional investors to the total number of outstanding shares. FRGN is the ratio of a bank's shares held by foreign investors to the total number of outstanding shares. CROSS is the ratio of bank shares involved in cross-shareholdings to the total number of outstanding shares. BRD_SIZE is the ratio of the number of members of the board of directors to the natural logarithm of total assets. OUTSIDE is the ratio of the number of outside directors to the board of directors' members. INDE is the ratio of the number of independent directors to the number of members of the board of directors. EXE is the ratio of the number of executive directors to the number of members of the board of directors. AMA is the dummy variable indicating whether the banks accept *amakudari* officials (from the Bank of Japan or the Ministry of Finance). INTER is a dummy variable that takes 1 for an internationally active bank. SIZE is the natural logarithm of total assets. LLP is the ratio of loss provisions to total assets. RISK is the lagged ratio of risk-weighted assets to the sum of total assets. TIER1 is the ratio of Tier 1 capital to total capital. CONC is the square of the ratio of the total loans (each bank) to the total loans of all banks. NCD is the ratio of negotiable certificates of deposits to total deposits. ROE is the return on equity. GDP is the growth in gross domestic product.

TABLE 4.5: BANK CAPITAL RATIO AND BANK GOVERNANCE (SQUARED)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ownership Structure										
INST	-0.092 ***							-0.027		0.020
	(0.025)							(0.025)		(0.030)
INST_2	0.002 ***							0.001 **		-0.001
	(0.000)							(0.000)		(0.000)
FRGN		-0.109 ***							-0.056 *	-0.065 *
		(0.028)							(0.029)	(0.034)
FRGN_2		0.003 ***							0.002 ***	0.003 ***
		(0.000)							(0.000)	(0.001)
CROSS			0.013					0.055	0.052	0.052
			(0.082)					(0.072)	(0.071)	(0.071)
CROSS_2			0.002					0.000	0.000	0.000
			(0.005)					(0.004)	(0.004)	(0.004)
Board Characteristics										
BRD_SIZE				4.507 *				4.045 *	2.377	2.415
				(2.343)				(2.171)	(2.153)	(2.145)
BRD_SIZE_2				-2.832 *				-2.443	-1.424	-1.448
				(1.600)				(1.485)	(1.469)	(1.462)
OUTSIDE					-0.023 *			0.166 ***	0.191 ***	0.189 ***
					(0.013)			(0.037)	(0.037)	(0.037)
OUTSIDE_2					0.002 ***			-0.001 **	-0.001 **	-0.001 **
					(0.000)			(0.000)	(0.000)	(0.000)
INDE						-0.052 ***		-0.218 ***	-0.232 ***	-0.231 ***
						(0.013)		(0.038)	(0.037)	(0.037)
INDE_2						0.002 ***		0.003 ***	0.003 ***	0.003 ***
						(0.000)		(0.001)	(0.001)	(0.001)
EXE							0.001	-0.002	-0.001	0.003
							(0.003)	(0.003)	(0.003)	(0.015)
EXE_2							0.000 **	0.000	0.000	0.000
							(0.000)	(0.000)	(0.000)	(0.000)
AMA								-0.231	-0.249	-0.258
								(0.173)	(0.171)	(0.171)
Constant	42.960 ***	53.930 ***	44.180 ***	44.730 ***	50.060 ***	39.690 ***	41.760 ***	37.210 ***	45.680 ***	47.900 ***
	(11.370)	(10.930)	(11.890)	(12.070)	(11.150)	(10.670)	(11.790)	(10.940)	(10.810)	(10.990)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	581	581	581	581	581	581	581	581	581	581
Adjusted R-squared	0.398	0.446	0.335	0.339	0.418	0.471	0.348	0.512	0.531	0.532

Standard errors are in parentheses. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Bank FE denotes bank fixed effect. Year FE denotes year fixed effect. The Independent variable is the capital ratio. INST is the ratio of a bank's shares held by institutional investors to the total number of outstanding shares. FRGN is the ratio of a bank's shares held by foreign investors to the total number of outstanding shares. CROSS is the ratio of bank shares involved in cross-shareholdings to the total number of outstanding shares. BRD_SIZE is the ratio of the number of members of the board of directors to the natural logarithm of total assets. OUTSIDE is the ratio of the number of outside directors to the board of directors' members. INDE is the ratio of the number of independent directors to the number of members of the board of directors. EXE is the ratio of the number of executive directors to the number of members of the board of directors. AMA is the dummy variable indicating whether the banks accept *amakudari* officials (from the Bank of Japan or the Ministry of Finance). INST_2 is the square INST. FRGN_2 is the square of FRGN. CROSS_2 is the square of CROSS. BRD_SIZE_2 is the square of BRD_SIZE. OUTSIDE_2 is the square of OUTSIDE. INDE_2 is the square of INDE. EXE_2 is the square of EXE. Note that AMA_2, the square of the dummy variable indicating whether the banks accept *amakudari* officials (from the Bank of Japan or the Ministry of Finance) omitted due to collinearity and waives the display results of control variables for space considerations.

TABLE 4.6: ROBUSTNESS CHECK

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CR(-1)	0.708 ***	0.679 ***	0.659 ***	0.667 ***	0.687 ***	0.668 ***	0.681 ***	0.695 ***	0.704 ***	0.666 ***	0.679 ***	0.675 ***
	(0.078)	(0.084)	(0.077)	(0.085)	(0.070)	(0.095)	(0.098)	(0.071)	(0.087)	(0.102)	(0.086)	(0.086)
Ownership Structure												
INST		0.026 **								0.023		-0.041
		(0.012)								(0.027)		(0.041)
FRGN			0.041 ***								0.044	0.082 **
			(0.011)								(0.027)	(0.039)
CROSS				-0.030						-0.001	-0.014	-0.061
				(0.034)						(0.075)	(0.058)	(0.059)
Board Characteristics												
BRD_SIZE					-2.105					-0.876	-1.590	-2.261
					(1.376)					(2.387)	(1.823)	(2.813)
OUTSIDE						0.018				0.027	0.008	-0.015
						(0.012)				(0.054)	(0.045)	(0.050)
INDE							0.015			-0.030	-0.027	-0.016
							(0.012)			(0.040)	(0.032)	(0.036)
EXE								-0.004		0.012	0.013	0.003
								(0.011)		(0.012)	(0.011)	(0.013)
AMA									-0.059	0.236	0.378	0.323
									(0.334)	(0.432)	(0.479)	(0.375)
INTER	0.701 *	0.638	0.659	1.053 ***	0.760	0.723 *	0.737 *	0.600	0.672 **	1.124 *	1.051 *	1.151 **
	(0.420)	(0.494)	(0.454)	(0.337)	(0.461)	(0.426)	(0.413)	(0.457)	(0.277)	(0.622)	(0.579)	(0.526)
SIZE	0.350 **	0.233	0.181	0.313 *	0.591 ***	0.331 **	0.329 **	0.341 **	0.352 **	0.473	0.480	0.518
	(0.139)	(0.153)	(0.149)	(0.161)	(0.223)	(0.132)	(0.132)	(0.139)	(0.150)	(0.405)	(0.340)	(0.374)
LLP	0.241 **	0.192 *	0.173 *	0.169	0.177	0.156	0.177	0.238 **	0.253 **	0.153	0.122	0.176
	(0.115)	(0.102)	(0.095)	(0.112)	(0.138)	(0.094)	(0.110)	(0.103)	(0.118)	(0.128)	(0.139)	(0.166)
RISK	-0.026 ***	-0.046 ***	-0.054 ***	-0.025 **	-0.037 ***	-0.042 ***	-0.037 ***	-0.031 **	-0.027 ***	-0.042	-0.035	-0.036
	(0.009)	(0.012)	(0.012)	(0.010)	(0.013)	(0.015)	(0.013)	(0.013)	(0.009)	(0.034)	(0.026)	(0.023)
TIER 1	0.001	-0.002	-0.002	0.000	0.001	-0.001	-0.001	0.001	0.002	0.002	0.003	0.001
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)
CONC	-18.430	-32.110	-29.800	-22.690	-40.050	-15.550	-17.530	-17.470	-17.410	-57.280	-67.830 *	-58.320
	(16.400)	(23.320)	(18.660)	(17.640)	(26.700)	(15.160)	(14.420)	(17.200)	(15.350)	(42.610)	(37.280)	(38.410)
NCD	0.004	0.008	-0.007	0.009	0.023	0.003	0.004	0.004	0.003	0.009	0.009	0.004
	(0.012)	(0.016)	(0.016)	(0.014)	(0.021)	(0.015)	(0.014)	(0.013)	(0.013)	(0.030)	(0.024)	(0.027)
ROE	0.025 *	0.024 *	0.027 *	0.026 **	0.025 **	0.024 *	0.024 *	0.024 *	0.025 *	0.025 *	0.028 **	0.030 **
	(0.013)	(0.014)	(0.014)	(0.012)	(0.012)	(0.013)	(0.013)	(0.012)	(0.014)	(0.013)	(0.014)	(0.013)
GDP	0.336	-0.573	-0.989	-0.027	0.669	-0.196	-0.060	0.060	0.322	0.691	0.725	0.251
	(0.471)	(0.610)	(0.659)	(0.603)	(0.569)	(0.547)	(0.522)	(0.714)	(0.594)	(1.525)	(1.412)	(1.237)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	504	504	504	504	504	504	504	504	504	504	504	504
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.382	0.496	0.476	0.396	0.307	0.383	0.405	0.330	0.535	0.642	0.778	0.579
Hansen Test	0.094	0.074	0.071	0.097	0.166	0.099	0.089	0.085	0.049	0.116	0.068	0.157
SOA	29.20%	32.10%	34.10%	33.30%	31.30%	33.20%	31.90%	30.50%	29.60%	33.40%	32.10%	32.50%

***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Figures in parentheses are robust heteroskedasticity standard errors. The Hansen is a test of the over-identifying restrictions for the GMM estimator. AR (1) and AR (2) indicate first and second-stage autocorrelations. Bank FE denotes bank fixed effect. Year FE denotes year fixed effect. SOA is the speed of adjustment of the capital ratio toward its target capital ratio. The independent variable is the capital ratio, CR. The explanatory variables are as follows: - INST is the ratio of a bank's shares held by institutional investors to the total number of outstanding shares. FRGN is the ratio of a bank's shares held by foreign investors to the total number of outstanding shares. CROSS is the ratio of bank shares involved in cross-shareholdings to the total number of outstanding shares. BRD_SIZE is the ratio of the number of members of the board of directors to the natural logarithm of total assets. OUTSIDE is the ratio of the number of outside directors to the board of directors' members. INDE is the ratio of the number of independent directors to the number of members of the board of directors. EXE is the ratio of the number of executive directors to the number of members of the board of directors. AMA is the dummy variable indicating whether the banks accept *amakudari* officials (from the Bank of Japan or the Ministry of Finance). INTER is a dummy variable that takes 1 for an internationally active bank. SIZE is the natural logarithm of total assets. LLP is the ratio of loss provisions to total assets. RISK is the lagged ratio of risk-weighted assets to the sum of total assets. TIER1 is the ratio of Tier 1 capital to total capital. CONC is the square of the ratio of the total loans (each bank) to the total loans of all banks. NCD is the ratio of negotiable certificates of deposits to total deposits. ROE is the return on equity. GDP is the growth in gross domestic product.

CHAPTER 5

BUSINESS IMPROVEMENT ORDER AND BANK GOVERNANCE

In this chapter, I focus on the business improvement order issued against banks around 2004-2013 to demonstrate whether bank governance, specifically ownership structure and board characteristics, effectively prevents the commission of non-compliance. The estimation results illustrate that larger board size, a higher percentage of outside directors with bank working experience, and a higher percentage of executive directors effectively prevent regulation breaches and reduce non-compliance.

5.1 Introduction

Japan needs more independence in its governance system. With frequent personnel rotations and blurred distinctions between the execution and monitoring functions of the boards, Japan's governance system received criticism for lagging behind international standards[42]. The Tokyo Stock Exchange has urged Japanese companies to align their practices with global norms. The discussions on the existing bank governance system typically focus on whether it can provide effective monitoring to dissuade non-compliance with laws, especially concerning excessive risk-taking behavior issues.

Moreover, a dramatic increase in fraud cases in Japan has further raised concern about the board's effectiveness in monitoring. There have been changes in the board and ownership structure over the past decade. These changes have cast doubt on whether these changes (in the board and ownership structure) are related to non-compliance with laws and prompting excessive risk-taking behavior. For example, *Higashi-Nippon* Bank, under the Concordia Financial Group, was found to be engaging in improper lending activities by charging inappropriate commitment fees[43].Around 1,000 cases were detected, with the total amount of inappropriate charges approximating 400 million yen. Different from *Higashi-Nippon* Bank, under a mega financial group, other regional banks, such as *Michinoku* Bank in *Aomori* prefecture, were also detected in document falsification despite being experienced receiving the business improvement order before. In addition, regulators detected *Suruga* Bank in *Shizouka* prefecture for fraudulence in mortgage loans[44]. The sudden increase in fraud cases in regional banks also made the public skeptical about the effectiveness of bank governance in regional

[42] Please refer to Nikkei Asian Review dated June 2nd,2018, "Japan's revised governance code takes on cross-shareholdings."(https://asia.nikkei.com/Business/Markets/Equities/Japan-s-revised-governance-code-takes-on-cross-shareholdings).

[43] Please refer to Nikkei news dated July 19th, 2018, titled "*Higashi nippon gin mo ...fusyouji aitsugu chigin ni tsuukyou suru kukyou,*"「東日本銀も…不祥事相次ぐ地銀に共通する苦境」(https://newswitch.jp/p/13744).

[44] Please refer to Nikkei news dated July 24th, 2018, titled "*chigin no gabanansu ha daijyoubu ka,*"「地銀のガバナンスは大丈夫か」(https://www.nikkei.com/article/DGXKZO33367490U8A720C1EA1000/).

areas. Despite these experiences, empirical evidence of bank governance on the relationship between non-compliance with laws still needs to be discovered in the academic literature. The continuous decline in regional banks' profits has provided some indications of the vast pressures of meeting the sales target or recovering from losses for banks has provoked the tendency to violate laws[45].

The low evaluation of the governance system and the recent surge in non-compliance with laws or fraud cases in Japan has created doubt on whether bank boards can monitor the management team to avoid or mitigate any non-compliance with laws in the future. A bank's board director should be capable of monitoring and advising the board and play a vital role in the implementation and oversight of controls to mitigate the risk of wrongdoing (Fama & Jensen, 1983; Adam & Ferreira, 2007). Moreover, regulators increasingly view boards as key to shaping a bank's risk culture to mitigate any wrongdoing. "Heightened expectations" of the role of bank boards in ensuring that banks operate safely and soundly need to be established (Office of the Comptroller of the Currency, 2014[46]; Financial Stability Board, 2014[47]). Besides, with increasing levels of independence, one would expect bank boards to be more effective in mitigating non-compliance. However, non-compliance with laws increases under a higher level of an independent board, consistent with the view that true independence is hard to achieve (Coles, Daniels, and Naveen, 2014). These conflicting contentions provoke a continuing debate on the efficiency and effectiveness of bank governance in promoting compliance with laws. The critical question is whether board characteristics matter for banks' compliance with laws and, if they do, which board functions matter.

In terms of board structure, in leading countries of the west, such as the United States, bank boards usually have a significant number of outside directors. However, including outside directors on the

[45] Based on the financial statement of regional banks dated March,2018.
[46] See (https://home.treasury.gov/system/files/266/21.-OCC-CJ-Final-ok-FY2014.pdf).
[47] See (https://www.fsb.org/wp-content/uploads/r_140407.pdf).

board in Japan is comparatively rare. Under the revised corporate governance codes and the amended Companies Act in 2015, advise companies to aggressively invite outside directors, going beyond the recommended two and appointing "a sufficient number" of independent directors if necessary. Further, these revisions encourage companies to consider "gender and international experience." The introduction of outside directors is considered a major recent initiative to restructure board compositions in Japan. Specifically, after the global financial crisis in 2008, regulators have been urging banks to impose a certain minimum number of outside directors. However, whether outside directors' imposition will effectively monitor the management team to reduce regulatory non-compliance with laws remains an open question. Another critical research question is whether a more effective board with more outside directors will increase the likelihood of detecting non-compliance.

Over the past decade, foreign shareholding in banks in Japan has been increasing at a relatively fast pace[48]. Foreign shareholding appears to pressurize higher dividend payout despite banks making a loss or having almost no room to increase profit. Of late, foreign investors have emerged as the largest investor group. Some regional banks' ownership structure shows that some have one-third of foreign shareholdings. Theoretically, foreign institutional investors can be effective monitors; however, whether the current Japanese environment and governance culture allow foreign investors to be effective monitors is a moot point. If foreign investors can enhance bank governance, it will help attract inward investments and boost the Japanese economy. Besides, the newly revised governance code requires companies in Japan to reduce cross-shareholdings and exhorts companies to submit plans in more detail to explain the appropriateness of each cross-shareholding based on benefits and risks[49]. From an institutional investor's perspective, excessive cross-shareholding against

[48] Please refer Nikkei news dated August 29th, 2018, titled "*chi gin, fueru gaikokujin kabunushi,*" 「地銀、増える外国人株主」(https://www.nikkei.com/article/DGKKZO34696030Y8A820C1EE9000/).

[49] The governance codes here refer to Japan's Corporate Governance Code issued by Tokyo Stock Exchange on 1st June 2015, revised in the year 2018 and subsequent revision in the year 2021, and Japan's Stewardship Code established by Financial Services Agency on 26th February 2014.

the principle of effective monitoring[50]. With the revised corporate governance code and the reduction in cross-shareholding, foreign shareholders are expected to influence corporate governance strongly.

Regarding the regulatory enforcement environment, Japan and the United States are under different enforcement procedures. In the latter, the bank regulator has an intimidating array of mechanisms, and enforcement actions are divided into two categories, namely, informal and formal, based on the severity level of cases[51]. The informal actions usually apply to less severe in-scope cases, which regulators do not make public. In contrast, in more severe cases, formal actions are applied in all but a few rare instances, and the cases are disclosed or made public. By contrast, Japan has a more straightforward enforcement procedure in Japan, wherein various orders are issued depending on the scope of severity and type of non-compliance[52]. The enforcement procedure in Japan is the business improvement orders, orders of suspension, orders to remove a bank's management, and revocation of a bank's banking business license. Under such a divergence of regulatory enforcement environment, the question of whether the conclusions made regarding the effectiveness of bank governance in mitigating bank non-compliance are valid in Japan's context still needs to be answered.

In response to the ongoing debate on the effectiveness of bank governance in preventing non-compliance, I empirically explore the relationship between bank governance and regulatory compliance using the sample data of Japanese banks. To explain the factors or extent to which bank governance—particularly ownership structure and board characteristics—can reduce regulatory non-compliance of banks, I study business improvement orders issued against banks to capture banks' regulatory non-compliance. Furthermore, to delve further, I divide the types of non-compliance in the

[50] In November 2015, three megabanks in Japan announced their plans to reduce cross-shareholdings substantially. See (https://asia.nikkei.com/Business/Finance/Only-some-regional-banks-to-cut-cross-shareholdings) and (https://asia.nikkei.com/Business/Companies/Megabanks-slow-to-unwind-stock-ties-to-top-Japanese-clients).
[51] See (https://www.wlrk.com/webdocs/wlrknew/AttorneyPubs/WLRK.21807.12.pdf).
[52] See (https://www.nishimura.com/sites/default/files/tractate_pdf/en/201005_tezuka.pdf).

analysis. Although the existing body of research offers deep insights and evidence on the relationship between corporate governance and bank risk-taking behavior, to knowledge, analyzing what bank governance matters in preventing bank non-compliance is considered new to the literature. Thus, I am taking this initiative to study the business improvement order issued against banks to demonstrate whether and what governance variables matters in alleviating banks' non-compliance by employing the issued business improvement orders against banks to analyze the Japanese banking data from 2004-2013. However, empirically analyzing non-compliance is not easy. Generally, we can only observe non-compliance once it is detected. There is a case whereby banks may still commit non-compliance without business improvement orders issued against banks due to detection imperfections. Following the past literature. I deal with this partial observability of non-compliance by employing a bivariate probit model (Nguyen, Hagendroff, & Eshraghi, 2016; Wang, 2013). The proposed bivariate probit model models the detected non-compliance as the compound outcome of the incentive of commission to non-compliance and cost of detection. The model allows us to observe the two latent probabilities of interest. As to knowledge, the empirical studies employing this model are still niche and limited.

The main results are as follows. First, larger board size tends to associate with fewer cases of issued business improvement orders against banks. The result implies that a giant board has a lower likelihood of non-compliance detection and plays a vital role in preventing non-compliance. Second, regarding board independence, a higher percentage of outside directors with bank working experience tends to associate with fewer cases of issued business improvement orders against banks, lower likelihood to non-compliance detection, and preventing non-compliance.

Third, a higher percentage of executive directors on the board tends to associate with fewer cases of issued business improvement orders against banks, lower likelihood to non-compliance detection,

and preventing non-compliance. Last, by contrast, no significant relations were found between ownership structure and the cases of non-compliance.

The remainder of this chapter is as follows. First, section 5.2 presents the institutional background of enforcement actions and ownership restrictions. Next, section 5.3 presents a literature review and hypothesis development. Then, following the data and methodology in section 5.4, empirical results are in section 5.5. Finally, the conclusion is in section 5.6.

5.2 Institutional background

5.2.1 Enforcement Actions

In Japan, the primary statutes and regulations that govern the banking industry are The Bank Law of Japan (Law no. 59 of 1981), The Deposit Insurance Law of Japan (Law No. 34 of 1971), and The Law Concerning Concurrent Business Trust Business by Financial institutions of Japan (Law no. 43 of 1943). The Financial Services Agency (FSA) of Japan, under the Bank Law, is primarily responsible for overseeing banks. In addition, the FSA publishes its supervisory policies and related examination manuals for major and regional banks to ensure fairness and transparency in supervision.

The FSA supervises banks through off-site and on-site monitoring and examination, following the banking laws, supervisory policies, and examination manuals. A bank must submit annual and semi-annual reports to the FSA that describe the bank's business and property status and periodically report extensive data to the FSA. As part of its off-site monitoring, the FSA regularly holds various hearings with banks on the operation, risk management, internal audit, and other affairs of banks. Enforcement actions use to restore safety and soundness by altering bank practices. The FSA's enforcement procedures include issuing business improvement orders (*gyomu kaizen meirei*), orders of suspensions of operations, orders to remove a bank’s management, and revocation of a bank's banking business license. Depending on the level of safety and soundness of banks, the FSA may issue a

business improvement order and instruct a bank to submit a business improvement order, and if necessary, may also order the suspension of that bank's operations for a specified period. Other orders, such as the deposit of bank property, removal of its management, and revocation of the banking license of banks, are contingent on the applicable orders to be issued. Moreover, a bank that breaches the enforcement procedures of the FSA may be subject to criminal sanctions.

The issuance of enforcement actions due to several reasons, for example, underestimating the expected profit, poor internal control in risk and asset management, system failure, colossal divergence in the revenue goal and actual performance, customers' information disclosure, and inability to implement their management rehabilitation plans as scheduled.

In response to the crisis in 2008, considering the turmoil in financial and capital markets triggered by the subprime mortgage problem, the FSA amended the Supervisory Policies in August 2008 to emphasize risk management more. According to the amended version, new checkpoints for risk management, such as securitization products risk management, management of counterparty risk, and information disclosure, must be established.

There are two main groups of non-compliance. The first relates to breaching the Financial Function Early Strengthening Law provisions, while the second pertains to the command issued to strengthen the internal control system. The Financial Function Early Strengthening Law was passed in 1998 to resolve the non-performing loans problem and rebuild the financial industry's function to support the economic entities. This law authorized public funds to recapitalize financial institutions for writing off non-performing loans. In addition, the law instructs the Financial Reconstruction Commission (FRC) to use public funds to purchase preferred shares/subordinated debt from the financial institutions for which the law was applicable, according to their capital adequacy levels. Financial institutions for which this law was applicable needed to submit a plan to the FRC to restore financial soundness. The majority of the issuance of business improvement orders by the FSA under the

Financial Function Early Strengthening Law is due to the deviation from the goal set in the plan during submission. The FSA can also penalize misconduct and non-compliance and issue commands to strengthen banks' internal control systems.

5.2.2 Ownership restriction

Under the Bank Law, banks in Japan have no restriction on foreign ownership, and any individual or entity, foreign or domestic, can acquire a controlling interest in a bank.

5.2.2a Major shareholders

Although the banking law strictly prohibits banks in Japan from entering the general business, it has no explicit regulations on shareholders of banks and, thus, has no specific regulations on general business corporations owning banks. In 2000, the FSA published guidelines entitled "Measures for Licensing for and Supervision of New Types of Banks" concerning the parts that existing laws and ordinances can cover. The amendment defines "major shareholders" as shareholders that hold 20% or more of a bank's shareholders voting rights and stipulates that those intending to become significant shareholders must obtain a permit from the Commissioner of the FSA. When granting permission, the criteria for judging eligibility are the financial soundness, objective for holding the shares, and social credibility of those applying to be significant shareholders. When a particular need for securing the soundness of a bank is needed, the FSA is allowed to request major shareholders holding 50% or more of voting rights to submit an improvement plan, if needed, for securing the soundness of the bank's subsidiary.

5.2.2b Cross-shareholdings

When companies hold shares of other listed companies as cross-shareholdings, they need to disclose their cross-shareholdings policy, including their policies for the reduction in such

shareholdings[53]. Besides, the board should annually assess whether to hold each cross-shareholding, explicitly examining whether the purpose is appropriate and whether the benefits and risks from each holding cover the company's cost of capital. The board must disclose the assessment report.

When cross-shareholders (i.e., shareholders who hold a company's shares for cross-shareholding) indicate their intention to sell their shares, companies should not hinder the sale of the cross-held shares by, for instance, implying a possible reduction in business transactions. In addition, companies should not engage in transactions with cross-shareholders that may harm the interests of the companies or the common interests of their shareholders by, for instance, continuing the transactions without carefully examining the underlying economic rationale.

Among financial institutions in the banking and insurance industries, many companies have put forward a fundamental policy of reducing cross-shareholdings. The cross-shareholdings reductions policies are underpinned by factors such as long-standing needs to reduce cross-shareholdings that are risk assets in response to capital adequacy regulations.

5.3 Literature review and hypothesis development

Non-compliance with regulations and laws can lead banks to severe problems in operations and hurt reputations. The ownership structure and board structure may play an essential role in mitigating and reducing the probability of bank non-compliance.

5.3.1 Ownership structure and bank non-compliance

One of the mechanisms to control the management is through the ownership structure. Aebi, Sabato, and Schmid (2012) contended that large shareholders, such as institutional investors, cannot provide effective monitoring to control the excessive risk-taking behaviors by the bank to improve bank

[53] See (https://www.jpx.co.jp/english/news/1020/b5b4pj000000jvxr-att/20180602_en.pdf).

performance. Cheng, Hong, and Scheinkman (2014) find a positive association between institutional ownership and risk-taking before 2008. Erkens, Hung, and Matos (2012) argue that financial firms with greater institutional ownership took a more significant risk during the period before the crisis. Therefore, these banks suffered considerable losses during the crisis of 2007–2008. Barry, Lepetit, and Tarazi (2011) report that sizeable institutional ownership is associated with increased risk-taking strategy at privately held banks. However, no similar effects for publicly traded banks.

By contrast, using a sample of 74 large bank holding companies, Ellul and Yerramilli (2013) demonstrate that banks with higher institutional ownership take a lesser risk. However, in the presence of deposit insurance, a positive association between risk and institutional ownership is documented. Laeven and Levine (2009) find that stricter regulation can decrease bank risk if the bank is widely held but increases bank risk if the bank has large controlling shareholders.

In Japan, stable shareholders have substantially substituted by foreign shareholdings with foreign ownership in some regional banks reaching approximately one-third over the past decade. Despite the challenging environment in increasing the business's profitability, regional banks with a higher percentage of foreign shareholdings are under pressure. As a result, they tend to increase dividend payouts and redemptions to shareholders. Employing listed banks as a sample for the 2010–2016 period, a study by the Bank of Japan found that the higher percentage of foreign shareholdings raises the tendency to increase dividend payouts[54]. The pressure on listed banks to increase dividend payouts might be one of the possible explanations.

These studies illustrate the relationship between bank risk-taking behaviors and ownership structures, which relates to non-compliance, although the findings are still inconclusive. I, therefore, construct the following hypothesis:

[54] Please refer (https://www.boj.or.jp/research/wps_rev/wps_2018/data/wp18j07.pdf) for the study titled "*kabunushi kousei no henka ga chiikiginnkou no keiei ni ataeru eikyou,*"「株主構成の変化が地域銀行の経営に与える影響」.

Hypothesis 1: Ownership structure (Institutional and foreign shareholdings) impacts a bank's propensity to non-compliances.

5.3.2 Board characteristics and bank non-compliance

Outside board directors also serve a vital monitoring function (Jensen, 1993; Zajac & Westphal, 1996). Following Fama and Jensen (1983), independent directors have incentives to scrutinize because they want to protect their reputation, acting as effective monitors of managerial discretion. Pathan (2009) mentioned that a competitive directorship market in the banking industry causes independent directors to be concerned about their reputation.

Adams and Ferreira (2007) explained that higher independence levels in boards reduce the board's information production, hurt its advisory role, and may reduce its monitoring function theoretically. For example, if independent directors have stricter monitoring incentives than non-independent directors, the chief executive officer (CEO) responds to increase board independence by providing less information. Harris and Raviv (2008) offer a similar view that shareholders prefer a board that insiders control unless the agency costs are high. Finally, Adams (2012) contended that banks receiving bailout money have relatively more independent boards and concluded that board independence might not necessarily benefit banks as independent board members may need more expertise to oversee the banks.

The competency of independent board members is one factor influencing the monitoring effectiveness. Although outside directors may be more effective in monitoring the management, they may need more in-depth knowledge of the internal workings of banks on whose boards they sit. In addition, as banking is a complex industry in terms of products and activities, independent board members may need more financial expertise to understand its operations.

Some evidence shows that board independence negatively correlates with bank risk-taking. Pathan (2009) reports that board independence, as measured by the percentage of the total number of independent directors, is negative and significantly correlated with most of the bank risk measures employed in the study. Faleye and Krishnan (2010) argued that board independence reduces banks' riskiness by including financial covenants in loan contracts rather than the bank's decision to diversify its lending risk. Chief Executive Officer (CEO) duality means a situation in which the CEO or executive directors also hold the position of chairperson on the board. In past research, CEO duality and its influence on board decisions broadly. For example, Hardwick, Adams, and Zou (2011) reported that CEO duality could reduce the dissemination of information on boards.

Regarding the issue of the impact of CEO duality and risk-taking, Faleye and Krishnan (2010) contended that CEO duality increases the tendency of high-risk lending. Grove et al. (2011) demonstrated that CEO duality negatively correlates with bank performance and quality. However, Pathan (2009) argued that CEO duality might reduce bank risk. Anderson and Anthony (1986) contended that CEO duality provides a single focal point for company leadership, projecting a clear sense of direction. Moreover, CEO duality provides stability and improves performance by reducing the likelihood of conflict between management and the board of directors. Executive directors of banks who concurrently sit on boards are also considered influential in management. Nguyen, Hagendroff, and Eshraghi (2016) showed that board monitoring and advising prevent bank misconduct and increase the likelihood of detecting misconduct.

Regarding *amakudari*, they referred to the acceptance of retired government officials, usually from the Ministry of Finance (MOF) or Bank of Japan (BOJ), to hold positions in the private sector. Van Rixtel and Hassink (2002) documented three significant roles that *amakudari* officials could play. First, the *amakudari* practice is a mechanism that enables the government to implement effective policies and regulations. Specifically, *amakudari* officials are from MOF or BOJ, usually posted in

troubled banks. Thus, assuming the role of monitoring the banks and considering amakudari is ex-post monitoring. Second, this job posting can be considered a magnificent job offer for *amakudari* officials, who can expect senior positions and higher salaries than their employment in ministries, even after retirement. All these incentives are to motivate *amakudari* officials to work harder. The third role is the "buying influence," meaning the *amakudari* officials from the MOF or BOJ may potentially bend the rules by persuading MOF and letting banks increase risky and profitable lending. In the case of buying influence, *amakudari* officials are working on equalizing competitiveness. Van Rixtel and Hassink (2002) also suggest that banks seek *amakudari* officials when they are in trouble, hoping that *amakudari* officials will use their network with the MOF and help them bend the rules.

These studies provide insights into board composition's influential roles or impact on bank behavior, specifically excessive risk-taking behavior, which is considered a further link to non-compliance. However, a more definitive conclusion is no doubt needed to deter potential non-compliance. Furthermore, we need to analyze the board's characteristics and, if so, what governance variables relate to preventing non-compliance with regulations needs. I, therefore, construct the following hypothesis:

Hypothesis 2: Board Characteristics (Board size, composition, and *Amakudari*) impact the bank's propensity to non-compliances.

5.4 Data and methodology

5.4.1 Bivariate probit model

The empirical research on non-compliance is challenging. One of the biggest challenges is that we can only observe non-compliance when detected. The whole process from the detected results that we observe has undergone two processes; the first is the commission of non-compliance, and the second is the detection of non-compliance. As the detection is imperfect, we cannot observe every

instance of non-compliance committed. I employ the bivariate probit model to deal with this partial observability problem (Nguyen, Hagendroff, & Eshraghi, 2016; Wang, 2013). In theory, it implies that an individual's probability of committing fraud increases with the expected payoffs and decreases with the expected cost of getting caught and penalized. Following this, two sets of variables determine the probability of committing a breach of rules and regulations. In other words, the first set is the expected benefit from non-compliance. The second set of variables is related to the expected costs of committing a breach of rules and regulations, which essentially depends on the probability of detection.

Moreover, factors such as bank size are related to both the probability of non-compliance and detection. Following previous research, the equations of committing non-compliance are as follows:

$$NC_{it}^{*} = X_{NC,it}\beta_{NC} + \mu_{it} \quad (1)$$

$$D_{it}^{*} = X_{D,it}\beta_{D} + \gamma_{it} \quad (2)$$

Where $X_{NC,it}$ is a vector of variables that explain the bank i's incentives to commit a breach of rules and regulations in year t, $X_{D,it}$ is a vector of variables that explain the firm i's likelihood of being detected, and μ_{it} and γ_{it} are zero-mean disturbances with a bivariate normal distribution.

We assume NC_{it}=1 if $NC_{it}^{*} > 0$ and $NC_{it} = 0$ otherwise and $D_{it} = 1$ if $D_{it}^{*} > 0$, and $D_{it} = 0$ otherwise. Therefore, we do not directly observe the realizations of NC_{it} and D_{it}. However, we can observe the following: $Z_{it} = NC_{it}$ x D_{it} where $Z_{it} = 1$ if bank i is involved in non-compliance and is detected, and Z_{it}=0 if bank i does not commit a regulation breach or non-compliance but is not detected.

Let Φ denote the bivariate standard normal cumulative distribution function. ρ is the correlation between μ_{it} and γ_{it} . Then derived the following equations: -

$$P(Z_{it} = 1) = P(NC_{it}D_{it} = 1) = P(NC_{it} = 1, D_{it} = 1) = \Phi(X_{NC.it}\beta_{NC}, X_{D.it}\beta_{D}, \rho) \quad (3)$$

$$P(Z_{it} = 0) = P(NC_{it}D_{it} = 0) = P(NC_{it} = 0, D_{it} = 0) + P(NC_{it} = 1, D_{it} = 0) = 1 - \Phi(X_{NC.it}\beta_{NC}, X_{D.it}\beta_D, \rho) \quad (4)$$

Thus, the log-likelihood for the model is:

$$L(\beta_{NC}, \beta_D, \rho) = \sum \log\left(P(Z_{it} = 1)\right) + \sum \log\big(P(Z_{it} = 0)\big) \quad (5)$$

5.4.2 Sample

The sample in this paper consists of the listed commercial, regional, and second-regional banks in Japan over the 2004–2013 period. Financial data are sourced from Nikkei Financial Quest, while bank governance-related data from NEEDS–CGES and Toyo Keizai (*yakuinshikiho*). The Nikkei Financial Quest provided information for the years 2004 to 2013. Accounting and financial data were collected from each bank's Nikkei NEEDS–Financial Quest database and were limited to unconsolidated annual data. I limit the sample period to 2013 for several reasons. First, because of the introduction of "Abenomics," which consists of monetary easing, fiscal stimulus, and structural reforms, which took place in 2012/12. However, I expanded the financial year of 2013, considering most of the information covered in 2012, before the "Abenomics." For example, the bank governance statement of September 2013 covers the governance-related data information for 2012.08–2013.08. Therefore, I obtained detailed information on the governance of banks from 2004 to 2013 from Nikkei NEEDS–CGES and Toyo Keizai (*yakuinnshikiho*). Second, the substantial decline in the number of issuances of business improvement orders since 2011 restricts from proceeding further. Finally, it noted that the definition of independent directors was redefined by Nikkei NEEDS–CGES, leaving a gap in the percentage of independent directors in 2005. To overcome this, I pair the number of independent directors from the data for 2005 to derive the percentage of independent directors for 2005.

Japan has experienced difficult long-term economic conditions, including the "lost decade," and its effects have lingered into the 21st century. Besides, during the long period of economic stagnation,

Japan witnessed several mergers and acquisitions (M&A) and absorption in banking industries from 2001 to 2002. Therefore, I track every single M&A and re-code them in the sample. Banks with a substantial increase (more than 20%) in their asset growth in the following fiscal year due to any M&A activity or absorption were also re-coded

The estimation model based solely on the issuance of business improvement orders may suffer from an endogeneity problem. Hence, following Nguyen, Hagendroff, and Eshraghi (2016), and Wang (2013), I employ the conditions probability estimation, which should serve as a more accurate estimation. However, I also recognize that the estimations may suffer from potential endogeneity problems, precisely the selection bias problem on ownership structure. However, I leave this concern as one of the future research questions.

5.4.3 Explanatory variables

5.4.3a Control variables

In terms of practical design, I employ the bivariate probit model—it requires two sets of control variables, one to explain the expected benefit from non-compliance and the other to clarify the detection of non-compliance. Following Nguyen, Hagendroff, and Eshraghi (2016) and Wang (2013), I choose the variables based on the current theoretical and empirical work in corporate fraud and bank misconduct literature.

The equation for banks committing non-compliance is as follows: -

$$NC_{it}^{*} = X_{NC,it}\beta_{NC} + X_{NCD,it}\gamma_{NC} + \mu_{it} \quad (6)$$

where $X_{NC,it}$ contains a set of variables that, as proven by past studies, influences only the bank's incentive in committing non-compliance and not the likelihood of detection. $X_{NC,it}$includes the bank probability and investor belief about industry prospects. Wang, Winton, and Yu (2010) argue that misconduct is related to investors' belief and prospects of banks and show significant results in

nonlinear relation. Nguyen, Hagendroff, and Eshraghi (2016), who conducted the study on bank misconduct, included industry charter value (ICV) and squared of industry charter value (ICV2) as the factors. Industry charter value is measured as the median charter value each year.

Thus, following the previous literature, I control bank profitability using the ratio of earnings before interest and tax divided by total assets (ROA), industry charter value (ICV), and squared industry charter value (ICV2) for $X_{NC,it}$ in equation (6).

$X_{NCD,it}$, contains a set of factors that affect both banks' incentives to commit non-compliance and the likelihood of detection. In addition, $X_{NCD,it}$ contains other bank characteristic variables such as bank size, growth prospects, the board size, and financial expertise. For example, I control for the bank's charter value using the ratio of the market value of equity divided by the book value of equity (CV) and the natural logarithm of total assets (SIZE) as bank size. In addition, I control various board monitoring proxies. For example, for board size, I use the number of directors on the board (BRD_NUM). For the proxy of financial expertise, I use the fraction of outside directors with prior experience working in banks to the total number of directors on the board (OUTSIDE_BANK). Thus, I include CV, SIZE, BRD_NUM, and OUTSIDE_BANK for $X_{NCD,it}$in the estimation of equations (6) and (7).

The equation for the detection of non-compliance is as follows:

$$D_{it}^{*} = X_{D,it}\beta_D + X_{NCD,it}\delta_{NC} + \upsilon_{it} \quad (7)$$

Certain factors only trigger the detection of non-compliance but are not related to the causes of banks committing non-compliance. For example, one must consider some factors when committing non-compliance. For example, the bank's stock volatility and turnover could trigger regulators' attention for further inspection. However, poor performance may prompt the regulator's scrutinization and contribute to non-compliance detection. So, I identify a vector $X_{D,}$ which includes variables that affect detection but are exogenous to banks' ex-ante incentives to commit non-compliance.

Following Nguyen, Hagendroff, and Eshraghi (2016) and Wang (2013), I include abnormal ROA, adverse stock return, abnormal return volatility, and abnormal stock turnover in this vector. For abnormal ROA, I compute the residuals (ε_{it}) from the model for each bank in equation (8).

$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 ROA_{it-2} + \varepsilon_{it} \quad (8)$$

Adverse stock return is a dummy variable that equals one if the bank's stock return is in the bottom 10% of all the bank-year return observations. Finally, I measure abnormal return volatility as the demeaned standard deviation of daily stock returns each year and abnormal stock turnover as the demeaned daily stock turnover each year. Thus, for $X_{ND,it}$, I include abnormal ROA, adverse stock return, abnormal return volatility, and abnormal stock turnover in the equation for the prediction of D_{it}^{*} in equation (7).

5.4.3b Governance variables and bank characteristic variables

For testing which bank governance characteristics are related to the issuance of business improvement orders, I employ ownership structure and board compositions as the proxies for bank governance. I employ the institutional ownership ratio (INST) and foreign ownership ratio (FRGN) for ownership structure. For board characteristics related variables, I employ board size (BRD_SIZE), the ratio of outside directors (OUTSIDE), the ratio of outside directors with bank working experience (OUTSIDE_BANK), the ratio of independent directors (INDE), ratio of executive directors (EXE), and a dummy variable representing 1 for *amakudari* (AMA). In addition, I include a set of control variables. For instance, bank size (SIZE), loan growth (LOAN_G), charter value (CV), leverage (LEVERAGE), tier 1 ratio (TIER 1), the ratio of risk-weighted assets (RWA), ratio of loan loss provisions (LLP), and return on asset (ROA)to proxy bank characteristics variables. Finally, I include year dummies in all estimations to control for the general economic environment. Please refer to Table 5.1 provides definitions of variables in detail, and Table 5.2 presents summary statistics.

5.5 Empirical results

5.5.1 Prediction results of non-compliance (standard probit model)

Table 5.4 reports the probit estimation results of banks committing non-compliances. The independent variable is the probability of the commission of non-compliance (dummy variables denoted 1 when a bank received the business improvement orders or 0 otherwise). In column 2 of Table 5.4, a higher percentage of foreign ownership (FRGN) associates with more cases of committed non-compliance, indicating that a higher percentage of foreign ownership tends to trigger regulators' issuance of business improvement orders. This result also implies a higher likelihood of committing non-compliance. One possible explanation is that shareholders are concerned about profit-oriented investments, leading to their risk-taking behavior favoring riskier but profitable investments. Further, they may overlook their excessive risk-taking behavior, potentially increasing the probability of a non-compliance or regulation breach.

Notably, a higher percentage of outside directors (OUTSIDE) in column 5, which represents higher board independence, does not show significance. This result implies that the current board independence level fails to prevent a bank's regulations breach. By contrast, a higher percentage of the executive directors (EXE) ratio in column 8 shows a negative and significant coefficient. This result indicates that a higher percentage of executive directors effectively reduced a bank's non-compliance and implies a lower likelihood of committing non-compliance. This result could be because executive directors who work in the bank while also sitting on its board can effectively analyze the bank's situations with valuable information flow from both management and board, thereby effectively reducing the trigger of non-compliance. Another possible explanation may be that the executive directors have real concerns over their unemployment risk, which is considered undiversified, thus making them reluctant toward excessive risk-taking behavior and more cautious in preventing a breach of regulations.

However, in column 12 of Table 5.4, when I compile all governance variables in the estimation, the coefficient sign of foreign ownership was insignificant, suggesting the interdependence of different dimensions of governance variables. The impact of foreign ownership with a higher likelihood of non-compliance is being netted off.

5.5.2 Prediction results of non-compliance (Bivariate probit model)

Table 5.5 presents the prediction results for banks detected committing non-compliance and conditional upon committed non-compliance. Odd-numbered columns report prediction results for banks committing non-compliance, P(NC=1); even-numbered column shows the prediction results for banks detected to have committed non-compliance, P(D=1|NC=1).

Board size (BRD_NUM) shows a negative and significant coefficient, implying that a larger number of board members is associated with fewer cases of non-compliance commission. The results suggest a low probability of committing to non-compliance and are less likely to be detected, a lower likelihood of non-compliance detection. The results confirm bank boards' essential roles in alleviating non-compliance.

As Dalton et al. (1999) suggested, large boards may be beneficial because they increase the expertise and resources available to the organization. Banks with larger boards seem more rational as the board is to provide expert advice to ensure regulatory compliance. Past literature suggests that smaller boards would result in a closer alignment of shareholder interests than larger boards, thereby increasing risk-taking behavior (Pathan, 2009). In other words, larger boards can alleviate excessive risk-taking behavior and have professional knowledge in preventing the commission of non-compliance.

Due to the business nature of banks in a highly complex sector, having a giant board is beneficial as banks can fully utilize the advice from a giant board's pool of expertise in deterring non-compliance.

Surprisingly, a higher percentage of outside directors (OUTSIDE), representing the higher level of the board's independence, is not statistically significant. This result implies that the board may need to increase the current level of outside directors to prevent the commission of non-compliance. The result indicates that the current standard or level of board independence (a higher percentage of outside or independent directors) cannot prevent non-compliance. This result may be because the introduction of outside directors is new to Japan's governance system, and the impact of board independence in alleviating non-compliance is yet to be observed.

It is interesting to mention that although the number of outside directors does not show any significant coefficient, a higher percentage of outside directors with working experience in banks (OUTSIDE_BANK) is associated with fewer cases of non-compliance commission. The result suggests a lower probability of committing to non-compliance and less likely to be detected, implying a significant role in reducing non-compliance. This result supports the notion that banks belong to a high-complexity sector and only expertise can alleviate breaches of regulations. For example, having board directors equipped with specialized knowledge in this particular industry, only the directors with related professional experience effectively prevent the commission of non-compliance.

A higher percentage of executive directors (EXE) in column 8 shows a negative and significant coefficient. This estimation result is consistent with Table 5.4, implying that banks with a higher percentage of executive directors have a lower probability of committing non-compliance and also a lower likelihood of non-compliance detection, playing an essential role in preventing non-compliance. Executive directors who work in the bank while sitting on the board can alleviate the non-compliance problems. The executive directors are better informed, have the know-how, and can timely deal with potential non-compliance. In contrast, ownership structure shows no significant relationships[55].

[55] Results are available upon request.

5.5.3 Types of non-compliance

Some board characteristics reduce the commission of non-compliance; however, it is still uncertain whether this reduction holds for different types of non-compliance. Thus, for verification, I divided the sample into subsamples based on the types of non-compliance involved. For grouping, suppose the issuance of a business improvement order is under the Financial Function Early Strengthening Law in the commission of non-compliance are grouped under the category of non-compliance type 1, P(TYPE=1). In contrast, suppose the issuance of a business improvement order is due to the order for improving the internal control system. Then, in that case, they are grouped under non-compliance type 2, P(TYPE=2).

Tables 5.6a and 5.6b report the subsample estimations under different types of commissions. Both types of commissions show similar estimations results. Board size (BRD_NUM) shows a negative and significant coefficient, implying that a larger number of board members is associated with fewer cases of committed non-compliance, regardless type of commission. For banks with a higher percentage of outside directors with working experience in banks (OUTSIDE_BANK) and executive directors (EXE), both are relatively effective in preventing commission non-compliance regardless of the type of commissions and associated with fewer cases of commission of non-compliance.

5.5.4 Endogeneity

Following Nguyen, Hagendroff, & Eshraghi, 2016; Wang, 2013, I employ the bivariate probit model. Empirical analysis of misconduct or non-compliance is challenging as the commission can only observe the commission of non-compliance once detected. This model assists us in observing the two latent probabilities of non-compliance, the probability of non-compliance commission and the probability of detected non-compliance, from the observed non-compliance. It helps us in gaining a precise understanding of the non-compliance process.

However, endogeneity is still a significant concern. Identifying the reverse causality problem between governance, for example, board measures and bank non-compliance, is challenging. In particular, banks with specific board characteristics are more likely to engage in non-compliance. Alternatively, a bank's culture may likely prompt banks to commit non-compliance. There are unobservable bank characteristics or board characteristics that may affect the occurrence of non-compliance. A variable that is intrinsically related to the governance variable but uncorrelated to the error term is needed to serve as an efficient instrument variable. Unfortunately, there are no valid instruments to account for potential endogeneity econometrically. I have no choice but to leave it as one of the future research topics.

5.6 Conclusion

This chapter leads to some policy implications and contributions. First, this chapter empirically analyzes whether bank governance effectively prevents non-compliance by employing the business improvement orders issued against banks. However, observing non-compliance is challenging as the detection is imperfect. I encounter the partial observability problem. Therefore, I use the bivariate probit model to address the partial observability problem.

This model offered a precise understanding of the process of non-compliance to deter non-compliance better, followed by the past literature (Nguyen, Hagendroff, & Eshraghi, 2016; Wang, 2013). Furthermore, the model allows us to see the detected non-compliance as the compound outcome of the commission incentive to non-compliance and cost of detection, that is, the compound outcome of two latent processes, and provides new insights into detection.

Second, the estimation results help us gain a more precise understanding of non-compliance for designing more effective rules and policies to deter non-compliance. The estimation also empirically justified the board characteristics that effectively prevent non-compliance in response to the regulators stressing the significant roles of a bank board in deterring non-compliance (Office of the

Comptroller of the Currency, 2014; Financial Stability Board, 2014; Companies Act, 2015). For instance, the evidence highlights some board measures or characteristics, such as board size and financial expertise directors are essential in alleviating the probability of non-compliance commission. Thus, regulators and investors should allocate more financial expertise to provide monitoring resources to banks to decrease the probability of non-compliance.

TABLE 5.1: DEFINITION OF VARIABLES

Variables	Description	Source
Bank Characteristics		
SIZE	The natural logarithm of total assets	Nikkei Financial-Quest
LOAN_G (%)	The percentage of change in total loans relative to the prior year	Nikkei Financial-Quest
CV (%)	Market value ratio by the book value of equity	Nikkei Financial-Quest
LEVERAGE (%)	Book value of liabilities divided by book value of total assets	Nikkei Financial-Quest
TIER 1 (%)	Ratio of Tier 1 capital divided by total assets	Nikkei Financial-Quest
RWA (%)	Ratio of risk-weighted assets divided by total assets	Nikkei Financial-Quest
LLP (%)	Ratio of loan loss provisions to total assets	Nikkei Financial-Quest
ROA (%)	Ratio of Earnings before interest and taxes (EBIT) divided by the book value of total assets	Nikkei Financial-Quest
Bank Governance Variables		
Ownership Structure		
Institutional Investors (INST) (%)	Ratio of a bank's shares held by institutional investors to the total number of outstanding shares.	CGES
Foreign Investors (FRGN) (%)	Ratio of a bank's shares held by foreign investors to the total number of outstanding shares.	CGES
Cross-shareholdings (CROSS) (%)	Ratio of bank shares involved in cross-shareholdings to the total number of outstanding shares.	CGES
Board characteristics		
Board size (BRD_SIZE) (%)	Ratio of the number of members of the board of directors to the natural logarithm of total assets	CGES
Outside Directors (OUTSIDE) (%)	Ratio of the number of outside directors to the number of members of the board of directors.	CGES
Outside Directors (OUTSIDE_BANK) (%)	Ratio of the number of outside directors with bank working experience to the number of members of the board of directors.	CGES
Independent Directors (INDE) (%)	Ratio of the number of independent directors to the number of members of the board of directors.	CGES
Executive Directors (EXE) (%)	Ratio of the number of executive directors to the number of members of the board of directors.	CGES
Amakudari Officials (AMA)	Dummy variable indicating whether the banks accept Amakudari Officials (from the Bank of Japan or the Ministry of Finance)	The homepage of Bank of Japan
Detection of misconduct		
RESIDUALS	Residuals from the regression $ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 ROA_{it-2} + \varepsilon_{it}$	Nikkei Financial-Quest
D_STOCKTURNOVER	The demeaned standard deviation of daily stock volatility in a year	Nikkei Financial-Quest
D_STOCKRETURN	The demeaned standard deviation daily stock return in a year	Nikkei Financial-Quest
ADVERSE	Dummy equals one if stock is in the bottom 10% of all stocks in the bank sample	Nikkei Financial-Quest

TABLE 5.1a: TIME DISTRIBUTION OF BANKS RECEIVE BUSINESS IMPROVEMENT ORDERS (BIO)

Year	Number of issuance of BIO	Number of issuance of BIO in the sample	Orders for compliances under Financial Function Early Strengthening Law (Type 1)	Order to strengthen the internal control system (Type 2)
2004	17	10	8	2
2005	17	10	9	1
2006	15	11	10	1
2007	6	9	8	1
2008	3	2	0	2
2009	7	6	4	2
2010	4	2	1	1
2011	2	1	0	1
2012	1	0	0	0
2013	2	1	0	1

Source: www.fsa.go.jp

TABLE 5.2: DESCRIPTIVE STATISTICS

	N	Mean	Std.Dev	P25	P50	P75	Min	Max
Bank Characteristics								
SIZE	717	14.674	0.793	14.282	14.717	15.222	12.804	16.365
LOAN_G	717	1.684	4.276	0.000	1.361	3.137	-18.662	56.067
CV	717	0.912	1.989	0.490	0.680	0.913	0.000	38.697
LEVERAGE	717	94.908	1.527	94.069	94.931	95.785	87.666	106.127
TIER 1	717	88.860	12.179	82.067	88.563	95.403	49.877	189.541
RWA	717	51.432	9.415	46.165	51.343	56.565	3.261	137.125
LLP	717	1.036	0.623	0.660	0.894	1.241	0.175	6.037
ROA	717	0.288	0.420	0.216	0.337	0.486	-3.873	1.113
ICV	717	0.694	0.200	0.503	0.648	0.849	0.487	1.137
ICV2	717	0.519	0.316	0.253	0.420	0.721	0.238	1.293
Ownership Structure								
INST	717	16.930	12.428	9.050	14.090	21.030	0.010	79.760
FRGN	717	8.127	9.866	2.550	5.860	9.750	0.000	73.300
CROSS	717	5.525	4.018	2.220	5.080	7.940	0.000	23.180
Board Characteristics								
BRD_NUM	717	0.699	0.197	0.556	0.683	0.827	0.257	1.314
OUTSIDE	717	6.334	12.958	0.000	0.000	9.091	0.000	86.667
OUTSIDE_BANK	717	0.293	2.041	0.000	0.000	0.000	0.000	37.500
INDE	717	5.890	11.860	0.000	0.000	9.091	0.000	80.000
EXE	717	60.753	43.556	0.000	83.333	100.000	0.000	100.000
AMA	717	0.241	0.428	0.000	0.000	0.000	0.000	1.000
Detection of non-compliance								
RESIDUALS	717	0.624	0.017	0.623	0.624	0.625	0.385	0.928
D_STOCKTURNOVER	717	-0.098	0.172	-0.182	-0.141	-0.072	-0.235	1.582
D_STOCKRETURN	717	-0.003	0.001	-0.003	-0.003	-0.002	-0.006	0.004
ADVERSE	717	0.066	0.248	0.000	0.000	0.000	0.000	1.000

TABLE 5.3: CORRELATION MATRIX

	INST	FRGN	CROSS	BRD_NUM	OUTSIDE	OUTSIDE BANK	INDE	EXE	AMA	SIZE	LOAN_G	CV	LEVERAGE	TIER 1	RWA	LLP	ROA	RESIDUALS	D_STOCK TURNOVER	D_STOCK RETURN	ADVERSE
INST	1																				
FRGN	0.8254	1																			
CROSS	-0.1668	-0.1593	1																		
BRD_NUM	0.0375	0.1077	0.1317	1																	
OUTSIDE	0.5139	0.6401	-0.2986	-0.1357	1																
OUTSIDE_BANK	0.2891	0.4018	-0.1219	0.0306	0.4438	1															
INDE	0.4952	0.6066	-0.2916	-0.1555	0.9829	0.3049	1														
EXE	-0.1856	-0.2203	0.1133	0.3329	-0.2684	-0.0686	-0.2687	1													
AMA	-0.1291	-0.1539	0.0582	-0.0481	-0.0578	-0.081	-0.0533	0.0237	1												
SIZE	0.5326	0.5531	0.033	0.3322	0.1281	0.1326	0.1073	-0.0471	-0.3074	1											
LOAN_G	0.0152	-0.0178	-0.0448	0.1128	-0.0755	-0.0454	-0.0694	-0.0201	-0.0957	0.0622	1										
CV	-0.0422	-0.0081	-0.1104	-0.0088	-0.0417	-0.0201	-0.0399	0.0332	-0.0284	0.061	0.1603	1									
LEVERAGE	-0.2579	-0.4495	-0.1012	-0.1863	-0.202	-0.3002	-0.163	0.0332	0.2362	-0.3579	0.0841	0.1484	1								
TIER 1	0.1955	0.1651	-0.3196	-0.147	0.2722	0.1175	0.2716	-0.0601	-0.0267	-0.1133	0.0474	0.0584	0.2455	1							
RWA	0.1169	0.1711	0.0874	-0.1149	0.1469	0.0507	0.1506	-0.0826	0.1003	-0.0764	0.0618	0.1091	-0.071	0.0505	1						
LLP	0.1698	0.0875	-0.0462	0.1403	-0.0902	-0.0397	-0.0978	-0.0224	-0.2594	0.2955	0.2079	-0.0127	-0.1087	0.02	-0.1668	1					
ROA	0.1177	0.1139	0.0445	0.096	-0.0541	-0.0053	-0.0501	-0.0107	-.155	0.2764	0.1083	0.0211	-0.2285	-0.324	-0.012	0.2171	1				
RESIDUALS	0.0069	0.0169	0.0255	0.0167	0.0024	-0.0298	0.01	0.0033	0.0601	0.0135	0.0059	0.0476	-0.0288	-0.0118	0.0177	-0.0192	0.0503	1			
D_STOCKTURNOVER	0.4468	0.5096	-0.1051	-0.0785	0.2864	0.1903	0.2681	-0.3152	-0.0131	0.2618	0.0546	0.0205	-0.0997	0.0475	0.1098	-0.0105	0.1138	-0.0143	1		
D_STOCKRETURN	0.0081	-0.0106	0.0166	-0.017	0.0435	0.0294	0.0408	-0.0153	0.0384	0.055	-0.0483	0.1407	-0.0491	-0.0928	-0.0482	-0.0433	0.0905	0.0324	0.0844	1	
ADVERSE	0.0049	0.0146	0.0107	-0.1334	0.0115	0.0014	0.0123	-0.1075	0.035	-0.1745	0.0148	-0.0182	0.0942	0.0785	0.0961	-0.044	-0.1161	-0.121	0.0947	-0.4933	1

TABLE 5.4: STANDARD PROBIT MODEL ESTIMATION

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)	P(NC=1)
Ownership Structure												
INST	0.018									0.014		-0.003
	(0.012)									(0.013)		(0.017)
FRGN		0.036 **									0.040 *	0.043
		(0.017)									(0.022)	(0.027)
CROSS			0.006							0.020	0.023	0.023
			(0.029)							(0.030)	(0.031)	(0.031)
Board Characteristics												
BRD_NUM				-0.659						-0.588	-0.591	-0.605
				(0.549)						(0.604)	(0.605)	(0.609)
OUTSIDE					0.002					0.056	0.034	0.033
					(0.010)					(0.064)	(0.069)	(0.070)
OUTSIDE_BANK						0.114				0.161	0.099	0.096
						(0.109)				(0.153)	(0.168)	(0.170)
INDE							0.000			-0.078	-0.059	-0.058
							(0.011)			(0.071)	(0.074)	(0.074)
EXE								-0.005 **		-0.005 *	-0.004 *	-0.004 *
								(0.003)		(0.003)	(0.003)	(0.003)
AMA									0.158	0.107	0.069	0.070
									(0.255)	(0.252)	(0.257)	(0.257)
Bank Characteristics												
SIZE	-0.029	-0.099	0.130	0.180	0.121	0.094	0.131	0.106	0.141	0.014	-0.077	-0.065
	(0.188)	(0.184)	(0.151)	(0.155)	(0.157)	(0.154)	(0.155)	(0.145)	(0.152)	(0.192)	(0.192)	(0.201)
LOAN_G	-0.022	-0.024	-0.020	-0.019	-0.020	-0.023	-0.020	-0.019	-0.020	-0.018	-0.020	-0.020
	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)	(0.019)
CV	0.011	0.011	0.004	0.003	0.004	0.006	0.003	0.007	0.005	0.016	0.016	0.015
	(0.034)	(0.034)	(0.034)	(0.033)	(0.034)	(0.034)	(0.034)	(0.033)	(0.034)	(0.034)	(0.034)	(0.034)
LEVERAGE	0.140 *	0.197 **	0.124	0.119	0.128	0.141 *	0.124	0.119	0.114	0.125	0.165 *	0.168 *
	(0.080)	(0.087)	(0.077)	(0.077)	(0.078)	(0.079)	(0.079)	(0.075)	(0.078)	(0.085)	(0.090)	(0.091)
TIER 1	-0.006	-0.012	0.000	-0.002	-0.002	-0.003	-0.001	-0.002	0.000	-0.001	-0.004	-0.004
	(0.012)	(0.013)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.011)	(0.013)	(0.013)	(0.013)
RWA	0.051 ***	0.044 **	0.057 ***	0.056 ***	0.057 ***	0.051 ***	0.058 ***	0.050 ***	0.058 ***	0.034 *	0.031	0.031
	(0.018)	(0.019)	(0.018)	(0.017)	(0.018)	(0.018)	(0.018)	(0.017)	(0.017)	(0.020)	(0.020)	(0.020)
LLP	-0.410 *	-0.479 **	0.380 *	-0.378 *	-0.386 *	-0.400 *	-0.379 *	-0.393 *	-0.394 *	0.390 *	0.435 **	0.438 **
	(0.209)	(0.217)	(0.202)	(0.201)	(0.205)	(0.205)	(0.205)	(0.203)	(0.204)	(0.210)	(0.217)	(0.217)
ROA	-0.938 ***	-0.913 ***	-0.936 ***	-0.935 ***	-0.929 ***	-0.901 ***	-0.936 ***	-0.932 ***	-0.925 ***	-0.888 ***	-0.900 ***	-0.899 ***
	(0.256)	(0.263)	(0.245)	(0.243)	(0.249)	(0.255)	(0.247)	(0.239)	(0.245)	(0.255)	(0.258)	(0.258)
Constant	-15.680 *	-19.080 **	-17.290 **	-16.760 **	-17.290 **	-17.670 **	-17.240 **	-15.490 **	-16.520 **	-13.710	-15.810 *	-16.230 *
	(8.224)	(8.313)	(8.009)	(7.991)	(8.000)	(8.053)	(7.999)	(7.856)	(8.062)	(8.494)	(8.435)	(8.723)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	727	727	727	727	727	727	727	727	727	727	727	727

Standard errors are in parentheses. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Year FE denotes year fixed effect. The independent variable is the probability of the commission of non-compliance (dummy variables denoted 1 when a bank received the business improvement orders or 0 otherwise). INST is the ratio of a bank's shares held by institutional investors to the total number of outstanding shares. FRGN is the ratio of a bank's shares held by foreign investors to the total number of outstanding shares. CROSS is the ratio of bank shares involved in cross-shareholdings to the total number of outstanding shares. BRD_NUM is the ratio of the number of members of the board of directors to the natural logarithm of total assets. OUTSIDE is the ratio of the number of outside directors to the board of directors members. OUTSIDE_BANK is the ratio of the number of outside directors to the number of members of the board of directors. INDE is the ratio of the number of independent directors to the number of members of the board of directors. EXE is the ratio of the number of executive directors to the number of members of the board of directors.AMA is the dummy variable indicating whether the banks accept *Amakudari* Officials (from the Bank of Japan or the Ministry of Finance). SIZE is the natural logarithm of total assets. LOAN_G is the percentage of change in total loans relative to the prior year. CV is the market value ratio divided by the book value of equity. LEVERAGE is the ratio of the book value of liabilities divided by the book value of total assets. TIER1 is the ratio of Tier 1 capital to total capital. RWA is the ratio of risk-weighted assets to the sum of total assets. LLP is the ratio of loss provisions to total assets. ROA is the ratio of earnings before interest and taxes (EBIT) divided by the book value of total assets.

TABLE 5.5: BIVARIATE PROBIT MODEL ESTIMATION

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)
Board Characteristics												
BRD_NUM	-6.617 ***	-6.926 ***										
	(0.740)	(0.836)										
OUTSIDE			0.000	-0.004								
			(0.006)	(0.005)								
OUTSIDE_BANK					-0.308 ***	-0.197 ***						
					(0.119)	(0.070)						
INDE							0.004	-0.001				
							(0.007)	(0.006)				
EXE									-0.008 ***	-0.009 ***		
									(0.002)	(0.002)		
AMA											0.336	0.137
											(0.211)	(0.179)
ROA	-6.910 ***		-5.383 ***		-5.887 ***		-5.482 ***		-5.649 ***		-5.681 ***	
	(0.982)		(0.721)		(0.919)		(0.787)		(0.590)		(0.844)	
ICV	-78.250 ***		10.410		7.704		6.962		5.329		7.038	
	(21.170)		(22.600)		(27.270)		(22.830)		(24.010)		(24.340)	
ICV2	74.810 ***		0.486		4.988		3.121		5.989		3.876	
	(17.830)		(17.790)		(21.710)		(17.820)		(18.970)		(19.190)	
SIZE	1.140 ***	0.728 ***	0.536 ***	0.140	0.614 ***	0.170	0.531 ***	0.128	0.566 ***	0.141	0.586 ***	0.136
	(0.185)	(0.141)	(0.140)	(0.102)	(0.152)	(0.110)	(0.143)	(0.102)	(0.127)	(0.102)	(0.151)	(0.110)
LOAN_G	-0.032 *	0.017	-0.036	-0.018	-0.035	-0.020	-0.032	-0.017	-0.029	-0.013	-0.028	-0.016
	(0.018)	(0.017)	(0.023)	(0.016)	(0.025)	(0.016)	(0.021)	(0.016)	(0.029)	(0.017)	(0.022)	(0.016)
CV	0.203	0.157 **	0.473	0.104	0.368	0.095	0.485	0.107	0.252	0.101	0.474	0.108
	(0.252)	(0.070)	(0.529)	(0.099)	(0.537)	(0.096)	(0.326)	(0.097)	(0.350)	(0.093)	(0.489)	(0.098)
LEVERAGE	0.205 **	0.216 ***	0.154 **	0.207 ***	0.055	0.160 ***	0.156 *	0.209 ***	0.175 **	0.218 ***	0.124	0.205 ***
	(0.091)	(0.073)	(0.073)	(0.053)	(0.089)	(0.060)	(0.081)	(0.054)	(0.071)	(0.054)	(0.082)	(0.055)
TIER 1	-0.0292** **	-0.018 **	-0.010	-0.007	-0.004	-0.003	-0.011	-0.008	-0.011	-0.007	-0.009	-0.007
	(0.013)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.006)	(0.007)	(0.007)	(0.008)	(0.007)
RWA	0.007	-0.019 ***	0.016 **	-0.002	0.015	0.001	0.015 **	-0.002	0.017	-0.005	0.016	-0.004
	(0.008)	(0.007)	(0.008)	(0.006)	(0.013)	(0.007)	(0.007)	(0.006)	(0.011)	(0.007)	(0.012)	(0.007)
LLP	0.068	0.106	-0.161	-0.028	-0.261	-0.055	-0.136	-0.014	-0.143	-0.018	-0.123	0.000
	(0.174)	(0.155)	(0.181)	(0.138)	(0.213)	(0.143)	(0.216)	(0.144)	(0.190)	(0.139)	(0.173)	(0.140)
RESIDUALS		-44.890		-21.340		-33.790		-21.690		-17.860		-15.800
		(33.670)		(33.920)		(34.180)		(32.810)		(32.530)		(31.520)
D_STOCKTURNOVER		0.336		0.939 *		1.050 **		0.921 **		0.388		0.941 **
		(0.282)		(0.489)		(0.493)		(0.442)		(0.467)		(0.471)
D_STOCKRETURN		63.300		101.800		81.370		92.170		75.650		82.250
		(131.000)		(90.480)		(81.290)		(89.880)		(74.660)		(81.510)
ADVERSE		1.361 **		1.129 ***		1.171 ***		1.098 ***		1.143 ***		1.095 ***
		(0.541)		(0.298)		(0.377)		(0.377)		(0.370)		(0.379)
Constant	-6.094	9.374	-25.91***	-5.039	-17.690	6.296	-24.760 **	-4.739	-26.510 ***	-7.560	-22.970 *	-8.162
	(11.750)	(22.370)	(9.961)	(21.630)	(12.500)	(22.360)	(10.700)	(20.970)	(9.698)	(20.820)	(11.930)	(20.670)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	717	717	717	717	717	717	717	717	717	717	717	717

Standard errors are in parentheses. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Year FE denotes year fixed effect. Odd-numbered columns report prediction results for banks committing non-compliance, P(NC=1); even-numbered column shows the prediction results for banks detected to have committed non-compliance, P(D=1|NC=1).

TABLE 5.6a: SUBSAMPLE ESTIMATIONS BASED ON TYPES OF NON-COMPLIANCE (TYPE 1) AND BANK GOVERNANCE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)
Board Characteristics												
BRD_NUM	-6.549 ***	-6.922 ***										
	(0.738)	(0.832)										
OUTSIDE			0.000	-0.003								
			(0.008)	(0.006)								
OUTSIDE_BANK					-0.314 ***	-0.194 ***						
					(0.120)	(0.069)						
INDE							0.005	0.000				
							(0.007)	(0.006)				
EXE									-0.008 ***	-0.009 ***		
									(0.002)	(0.002)		
AMA											0.360 *	0.149
											(0.202)	(0.179)
ROA	-6.929 ***		-5.462 ***		-6.040 ***		-5.548 ***		-5.707 ***		-5.816 ***	
	(0.890)		(0.878)		(0.963)		(0.809)		(0.639)		(0.815)	
ICV	-77.910 ***		10.800		8.725		7.726		5.814		7.895	
	(20.910)		(24.160)		(27.340)		(22.950)		(25.470)		(24.270)	
ICV2	74.570 ***		0.116		4.008		2.595		5.519		3.125	
	(17.540)		(18.950)		(21.760)		(17.770)		(20.110)		(19.240)	
SIZE	1.145 ***	0.743 ***	0.559 ***	0.149	0.630 ***	0.187 *	0.557 ***	0.136	0.577 ***	0.153	0.611 ***	0.154
	(0.184)	(0.134)	(0.142)	(0.105)	(0.153)	(0.111)	(0.146)	(0.102)	(0.131)	(0.105)	(0.171)	(0.112)
LOAN_G	-0.0330*	0.016	-0.035	-0.018	-0.037	-0.021	-0.031	-0.017	-0.030	-0.013	-0.030	-0.016
	(0.018)	(0.017)	(0.022)	(0.016)	(0.026)	(0.016)	(0.021)	(0.016)	(0.029)	(0.017)	(0.026)	(0.016)
CV	0.204	0.160 **	0.498	0.108	0.444	0.095	0.485	0.111	0.268	0.103	0.469	0.111
	(0.250)	(0.071)	(0.470)	(0.099)	(0.538)	(0.097)	(0.297)	(0.098)	(0.391)	(0.094)	(0.349)	(0.098)
LEVERAGE	0.210 **	0.219 ***	0.157 *	0.209 ***	0.048	0.164 ***	0.160 **	0.210 ***	0.174 **	0.219 ***	0.118	0.208 ***
	(0.091)	(0.073)	(0.083)	(0.055)	(0.090)	(0.060)	(0.070)	(0.052)	(0.075)	(0.054)	(0.079)	(0.054)
TIER 1	-0.030 **	-0.018 **	-0.011	-0.007	-0.004	-0.003	-0.012	-0.008	-0.011	-0.008	-0.009	-0.007
	(0.013)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.006)
RWA	0.006	-0.020 ***	0.016 **	-0.003	0.015	0.000	0.014 *	-0.003	0.017 **	-0.006	0.015 *	-0.005
	(0.008)	(0.007)	(0.008)	(0.006)	(0.013)	(0.007)	(0.008)	(0.006)	(0.008)	(0.007)	(0.008)	(0.006)
LLP	0.044	0.097	-0.189	-0.038	-0.293	-0.070	-0.163	-0.025	-0.163	-0.029	-0.159	-0.011
	(0.177)	(0.155)	(0.238)	(0.146)	(0.214)	(0.144)	(0.219)	(0.143)	(0.223)	(0.145)	(0.214)	(0.144)
RESIDUALS		-47.040		-26.720		-37.590		-27.460		-21.200		-17.820
		(33.660)		(32.770)		(34.830)		(33.290)		(33.060)		(31.600)
D_STOCKTURNOVER		0.286		0.870 *		0.953 *		0.855 *		0.338		0.861 *
		(0.284)		(0.448)		(0.498)		(0.451)		(0.467)		(0.485)
D_STOCKRETURN		84.270		109.900		84.930		100.200		76.290		88.870
		(130.500)		(78.090)		(80.460)		(88.180)		(78.800)		(95.410)
ADVERSE		1.427 **		1.133 ***		1.174 ***		1.102 ***		1.126 ***		1.106 ***
		(0.556)		(0.379)		(0.252)		(0.381)		(0.380)		(0.398)
Constant	-6.732	10.380	-26.620 **	-1.897	-17.500	8.143	-25.710 **	-1.325	-26.710 **	-5.671	-22.880 *	-7.422
	(11.480)	(22.320)	(11.010)	(20.960)	(12.530)	(22.670)	(10.450)	(21.050)	(10.500)	(21.100)	(11.960)	(21.060)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	711	711	711	711	711	711	711	711	711	711	711	711

Standard errors are in parentheses. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Odd-numbered columns report prediction results for banks committing non-compliance, P(NC=1); even-numbered column shows the prediction results for banks detected to have committed non-compliance, P(D=1|NC=1).

TABLE 5.6b SUBSAMPLE ESTIMATIONS BASED ON TYPES OF NON-COMPLIANCE (TYPE 2) AND BANK GOVERNANCE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)	P(NC=1)	P(D=1|NC=1)
Board Characteristics												
BRD_NUM	-6.549 ***	-6.922 ***										
	(0.738)	(0.832)										
OUTSIDE			0.000	-0.003								
			(0.008)	(0.006)								
OUTSIDE_BANK					-0.314 ***	-0.194 ***						
					(0.120)	(0.069)						
INDE							0.005	0.000				
							(0.007)	(0.006)				
EXE									-0.008 ***	-0.009 ***		
									(0.002)	(0.002)		
AMA											0.360 *	0.149
											(0.202)	(0.179)
ROA	-6.929 ***		-5.462 ***		-6.040 ***		-5.548 ***		-5.707 ***		-5.816 ***	
	(0.890)		(0.878)		(0.963)		(0.809)		(0.639)		(0.815)	
ICV	-77.910 ***		10.800		8.725		7.726		5.814		7.895	
	(20.910)		(24.160)		(27.340)		(22.950)		(25.470)		(24.270)	
ICV2	74.570 ***		0.116		4.008		2.595		5.519		3.125	
	(17.540)		(18.950)		(21.760)		(17.770)		(20.110)		(19.240)	
SIZE	1.145 ***	0.743 ***	0.559 ***	0.149	0.630 ***	0.187 *	0.557 ***	0.136	0.577 ***	0.153	0.611 ***	0.154
	(0.184)	(0.134)	(0.142)	(0.105)	(0.153)	(0.111)	(0.146)	(0.102)	(0.131)	(0.105)	(0.171)	(0.112)
LOAN_G	-0.033 *	0.016	-0.035	-0.018	-0.037	-0.021	-0.031	-0.017	-0.030	-0.013	-0.030	-0.016
	(0.018)	(0.017)	(0.022)	(0.016)	(0.026)	(0.016)	(0.021)	(0.016)	(0.029)	(0.017)	(0.026)	(0.016)
CV	0.204	0.160 **	0.498	0.108	0.444	0.095	0.485	0.111	0.268	0.103	0.469	0.111
	(0.250)	(0.071)	(0.470)	(0.099)	(0.538)	(0.097)	(0.297)	(0.098)	(0.391)	(0.094)	(0.349)	(0.098)
LEVERAGE	0.210 **	0.219 ***	0.157 *	0.209 ***	0.048	0.164 ***	0.160 **	0.210 ***	0.174 **	0.219 ***	0.118	0.208 ***
	(0.091)	(0.073)	(0.083)	(0.055)	(0.090)	(0.060)	(0.070)	(0.052)	(0.075)	(0.054)	(0.079)	(0.054)
TIER 1	-0.030 **	-0.0177**	-0.011	-0.007	-0.004	-0.003	-0.012	-0.008	-0.011	-0.008	-0.009	-0.007
	(0.013)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.006)
RWA	0.006	-0.020 ***	0.016 **	-0.003	0.015	0.000	0.014 *	-0.003	0.017 **	-0.006	0.015 *	-0.005
	(0.008)	(0.007)	(0.008)	(0.006)	(0.013)	(0.007)	(0.008)	(0.006)	(0.008)	(0.007)	(0.008)	(0.006)
LLP	0.044	0.097	-0.189	-0.038	-0.293	-0.070	-0.163	-0.025	-0.163	-0.029	-0.159	-0.011
	(0.177)	(0.155)	(0.238)	(0.146)	(0.214)	(0.144)	(0.219)	(0.143)	(0.223)	(0.145)	(0.214)	(0.144)
RESIDUALS		-47.040		-26.720		-37.590		-27.460		-21.200		-17.820
		(33.660)		(32.770)		(34.830)		(33.290)		(33.060)		(31.600)
D_STOCKTURNOVER		0.286		0.870 *		0.953 *		0.855 *		0.338		0.861 *
		(0.284)		(0.448)		(0.498)		(0.451)		(0.467)		(0.485)
D_STOCKRETURN		84.270		109.900		84.930		100.200		76.290		88.870
		(130.500)		(78.090)		(80.460)		(88.180)		(78.800)		(95.410)
ADVERSE		1.427 **		1.133 ***		1.174 ***		1.102 ***		1.126 ***		1.106 ***
		(0.556)		(0.379)		(0.252)		(0.381)		(0.380)		(0.398)
Constant	-6.732	10.380	-26.62** **	-1.897	-17.500	8.143	-25.710 **	-1.325	-26.710 **	-5.671	-22.880 *	-7.422
	(11.480)	(22.320)	(11.010)	(20.960)	(12.530)	(22.670)	(10.450)	(21.050)	(10.500)	(21.100)	(11.960)	(21.060)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	711	711	711	711	711	711	711	711	711	711	711	711

Standard errors are in parentheses. ***, **, and * indicate significance level at 1%, 5%, and 10%, respectively. Odd-numbered columns report prediction results for banks committing non-compliance, P(NC=1); even-numbered column shows the prediction results for banks detected to have committed non-compliance, P(D=1|NC=1).

CHAPTER 6

Conclusions, policy implications, and limitations

The global financial crisis (2008-2009) has highlighted several main issues or problems. For instance, 1.) the procyclicality problem, 2.) the pro-cyclical nature of Basel II capital requirement 3.) the effectiveness of bank governance in monitoring. On top of that, concerning the current issues, recent literature shows that economic policy uncertainty causes unfavorable effects on the real economy. This result has created doubt regarding whether economic policy uncertainty may trigger a procyclicality problem. Furthermore, the public accuses the failure of bank governance in monitoring as the cause of the global financial crisis. These noises lead to the skepticism that failure of effective monitoring by bank governance may also be far-reaching to a more severe level, like non-compliance or rules and regulations breaching. Therefore, any abovementioned issues are considered serious and need urgent attention before it becomes another financial crisis.

There are some advantages or uniqueness of employing Japanese banks as a sample for the analyses. For example, a.) the divergence standard in capital adequacy requirement, b.) long stagnations of the economy, c.) experiencing two different crises, namely the non-performing loans and global financial crisis, d.) low independence in bank boards, cross-shareholdings, and *amakudari* culture. Taking advantage of these natural settings provides some worthful insights that only can benefit from this uniqueness.

This dissertation aims to cover the issues mentioned above extensively and aims to draw some challenging implications and contributions to the existing literature and related parties. For example, the implications regarding the capital adequacy requirements backed by supportive empirical evidence serve as valuable insights. They can benefit regulators and policymakers in designing more comprehensive regulations or requirements. Besides, the evidence provides some applicative implications for the bank board in reexamining its board structure. These results will guide the bank

in engaging in a bank board with board characteristics that empirically tested effective monitoring. From a broader perspective, this dissertation aims to provide valuable insights backed by supportive empirical evidence for a reassessment of the appropriateness of the divergence standard of capital adequacy requirement in Japan's banking system and to reevaluate the need for the revision of the governance system in Japan. This dissertation ambitiously delves into the latest research topics by exploring the related new external factors, such as economic policy uncertainty, which is considered related to the issue of financial stability. It provides conducive empirical evidence, targeting to draw fruitful conclusions in response to the abovementioned issues for promoting financial stability in the financial system.

In response to the issue of 1.) the procyclicality problem and 2.) the pro-cyclical nature of Basel II capital requirement, chapter 2 in this dissertation, entitled "The Cyclical Patterns of Capital Buffers: Evidence from Japanese Banks," focuses on analyzing the cyclical patterns of capital buffer under the prevailing macroeconomic conditions. The evidence suggests that in the overall sample period (2002-2012), Japanese commercial banks maintain a sufficient level of capital buffers far from the capital adequacy requirements. However, negative relationships between capital buffers and the phases of the business cycle can be found with the inclusion of internationally active bank dummies, indicating that the capital buffer of domestic banks is behaving pro-cyclical relative to internationally active banks. On the other hand, internationally active banks have positive relationships between capital buffers and the phrases of the business cycle in the overall sample periods. The results suggest that the capital buffer of internationally active banks behaves counter-cyclically (positive correlation) and built-up capital buffers during favorable economic conditions.

Even though the capital buffer of internationally active banks behaves in a counter-cyclical manner (positive correlation), during crises, the capital buffer patterns of internationally active banks became pro-cyclical, suggesting that the counter-cyclical seems weak in response to the crisis. The negative

pro-cyclical behavior of capital buffers rebounded when responding to crises. The result implies that the counter-cyclical behavior is offset by the effects of crises regardless of the type. It also indicates that the counter-cyclical behavior did not continue once banks achieved a certain capital buffer level.

Surprisingly, compared to the non-performing loan crisis period, in which the Japanese banking sector's financial soundness underwent severe damage due to high levels of non-performing loans, the magnitude of the cross-term global financial crisis was larger. Despite the relatively small effects of the global financial crisis on Japan's economy compared to other countries, it still prompted a negative pro-cyclical pattern in capital adjustment. The results are consistent with some of the previous literature suggesting that the persistent counter-cyclical manner in capital management practice in Japanese banking is hard to achieve and potentially provokes a procyclicality problem. Of note is that the effect for domestic banks shows no significant positive sign, regardless of the crisis period or the overall period. This result indicates that the weaker counter-cyclical behavior of capital buffers is more of a generalized problem in domestic banks.

The results have contributed relevant implications on the banking regulations, specifically capital adequacy requirement. The evidence suggests that regulators must continue to promote and strengthen the counter-cyclical capital adjustments with regulatory measures. The new Basel III capital requirement that promotes financial soundness and stability with high-quality capital, namely the counter-cyclical buffer requirement, should continuously be taking place. The evidence also brought another concern: the appropriateness of maintaining dual standards in capital adequacy requirements. Specifically, shall the dual standard capital requirement system be revised to set optimum capital requirements conducive to promoting counter-cyclical capital for the future resiliency of the financial system?

The chapter offers valuable insights and relevant implications. There are some limitations. First, the sample period covered only some of the economic cycle due to the introduction of Basel III, which

is currently taking step-wise implementation. Including different regimes may lead to confusion in the interpretation of the results. Thus, it is difficult to conclude whether and how banks behave during more prolonged economic downturns as the sample covered a relatively favorable economic period. Second, the exclusion of the Basel III regime implementation. Covering the Basel III period contemplates bringing more decisive implications regarding the effectiveness of the revised capital adequacy requirement of promoting a counter-cyclical buffer in future research. Third, chapter 2 should have covered the analysis adjustment on the denominator. This adjustment of the risk-weighted asset side expects to help in tackling the procyclicality problem.

Moreover, if the research includes numerator and denominator analyses, we can foresee thorough implications regarding the capital adequacy requirement. However, I leave the abovementioned limitations as future research questions or topics. Taking the abovementioned limitations, for example, the Basel III regime, the adjustment of capital and risk-weighted asset as considerations in future research shall lead to more comprehensive research and provide decisive implications that better fit the latest capital adequacy requirement.

Recent literature empirically shows that economic policy uncertainty causes some unfavorable effects on the real economy, for example, postponement of investment by firms and reduction of bank lending when economic policy uncertainty elevates. Therefore, linking the unfavorable consequences brought by economic policy uncertainty, it is reasonable to justify it as a new external factor that may influence bank behavior and bank capital buffer and subsequently link to the issue of the procyclicality problem. However, despite the limited numbers of literature providing helpful evidence, the effect of economic policy uncertainty on bank behavior, especially the effect on the capital buffer, has received little attention and needs to be sufficiently tested. Thus, chapter 3 of this dissertation, entitled "Economic policy uncertainty and banks' target capital buffers," fills the gap by empirically analyzing the impact of economic policy uncertainties on Japanese banks' target capital. The evidence

shows that bank capital buffers increase, and the speed at which banks adjust their capital buffers toward their target increases when economic policy uncertainty increases.

Moreover, the evidence shows that fiscal, trade, and currency exchange policy uncertainties are the driving forces to prompt the increment of the target capital buffer. The extension of analyses in chapter 3 focused on adjusting other items in the capital ratio when economic policy uncertainty elevates. The evidence shows that banks hold more government bonds but fewer stock holdings when economic policy uncertainty increases. In response to economic policy uncertainty, the evidence shows that banks extend more loans to large companies but reduce loans to small and medium enterprises when economic policy uncertainty elevates. The evidence shows the heterogeneous effects of economic policy uncertainty on rebalancing under the dual standards of Japanese capital adequacy ratios.

In the aftermath of the 2008 global financial crisis, relations between business cycle indicators and capital management practices have been widely empirically tested, but not on the topic of economic policy uncertainty. As mentioned before, to keep up with the latest financial stability-related issue, this dissertation has empirically explored the studies on economic policy uncertainties that are considered new to the research field to bring in some challenging implications. The evidence brought in new insights and led to decisive conclusions. For example, the evidence shows that economic policy uncertainty, reflecting the future outlook, serves as a guideline for banks, prompts the increment of banks' target capital buffers, and increases the speed of adjustment toward the target capital buffer. The results have contributed relevant implications on bank behaviors and how banks respond to the high level of economic policy uncertainty. The effect of bank behaviors will subsequently pass on to the real economy and be perceived to influence the financial system's stability. Thus, the evidence brought a conducive conclusion on how banks respond to economic policy uncertainty, given a precautionary perspective. The evidence implied that economic policy

uncertainty, which serves as a future outlook, prompted banks to increase their capital buffer and adjustment speed rather than the concurrent business fluctuation. The evidence supports the notion that other factors, such as general macroeconomic uncertainty, may influence the adjustment of the capital buffer that must be considered. The evidence contributed pragmatic implications for regulators and policymakers to consider a broader range of factors that potentially affect the adjustment of capital buffers in dealing with the procyclicality problem and designing regulations and policies.

The extension analyses also brought evidence of the adjustment on the assets side of the capital ratio. The results show that banks reduce their credit risk amid high economic policy uncertainty by adjusting the content of assets rather than the size of assets, shifting to risk-free assets from stock to government bonds. The results also show that banks extend more loans to large companies but reduce loans to small and medium enterprises when economic policy uncertainty elevates. Also, the evidence shows the heterogeneous effects of economic policy uncertainty on rebalancing under the dual standards of Japanese capital adequacy ratios. This evidence delivered some crucial implications for policy maker in identifying the direct means that banks use in portfolio rebalancing for a better understanding of bank behaviors amid high economic policy uncertainty. These results assist them in alleviating the damaging effects on the real economy by revising banking regulations and policy-making.

However, there are some limitations. First, despite this dissertation attempting to trace indirect possible channels or mechanisms, other possible channels or mechanisms may need to be covered. Second, some of the economic policy uncertainties may be advantageous to banks, while some are disadvantageous to the standing of banks. However, the advantages and disadvantages cannot be disentangled or identified. Third, there is still room to explore better instrumental variables to improve the estimation method. For future research topics, there are a few suggestions. First, other uncertainties, such as the macroeconomic uncertainty of Rossi and Sekhposyan (2015), may have

more impact on bank capital than policy uncertainty. Second, chapter 3 scrutinized the speed of adjustment by exploring the economic policy uncertainty varied adjustment speed instead of just counting on constant adjustment speed. The prior studies on varied adjustment speeds are limited to the research of De Young et al. (2018) and Öztekin and Flannery (2012). Thus, it is justifiable to design future research exploring economic policy uncertainty varied adjustment speed on other items in capital adequacy ratios, specifically the denominator, referring to the assets side.

Poor banks' governance cannot provide adequate monitoring is one of the leading causes of the global financial crisis. Banks are in the business of risk-taking and are heavily regulated. Given their influential financial intermediation roles in the market, if bank governance fails to provide adequate monitoring, it may negatively affect the real economy more than firms. Thus, bank governance and its effectiveness in monitoring are crucial, considering the enormous social costs coming from monitoring failures of bank governance. Thus, chapter 4 of this dissertation, entitled "Bank capital ratio and governance: evidence from Japanese banks." emphasizes empirically analyzing the relationship between banks' capital ratio and governance, explicitly focusing on ownership structure and board characteristics and continuously delving further into the causes of the mentioned problems, such as effective monitoring by bank governance, for better dealing with the bank behavior problem of excessive risk-taking. The main results are as below. First, the evidence shows that ownership structure maintains a significant and positive relationship with capital ratio throughout all specifications, implying that ownership structure, referring to concentrated ownerships, is significant in influencing banks' capital management. The estimation results imply that institutional and foreign ownership induces maintaining a higher level of capital ratios. Second, banks with a higher ratio of outside and independent directors, which implies a high level of board independence, tend to increase and maintain higher capital ratios. Last, banks with higher executive ratios, which indicates a lower level of board independence, tend to maintain lower capital ratios.

This evidence delivered necessary implications. First, the evidence brought in the implication regarding the development of shareholder activism in Japan. After the global financial crisis of 2008, shareholder activism worldwide decreased significantly. However, Japan again became involved in the development of shareholder activism after the global financial crisis by establishing corporate governance policy codes. For instance, Japan established the Corporate Governance Code on 1st June 2015 and the Stewardship Code on 26th February 2014. Despite the sample period covered in chapter 4 being before the establishment of the governance code and stewardship code, the evidence supports the notion that shareholder activism in Japan was influential and prompted to increase in bank capital adequacy and efficiency during that period. This result implies that shareholder activism influences a bank's direction and management. Moreover, predictably, shareholder activism will be further enhanced in the future with equipped and improved codes.

Second, the evidence brought in the implication regarding the regulatory development in Japan. The Companies Act 2005 was amended in 2015, aiming to prompt companies to have outside directors be engaged on the board. The amended Companies Act 2015 allows the company to adopt an audit and supervisory committee, and the majority must be outside directors. The evidence shows that board independence, referring to the higher ratio of outside and independent directors, will prompt higher capital ratio maintenance. Therefore, it is reasonable to justify that the effect of board independence on capital management will be sustainable with the amended Companies Act 2015, which aligns intending to urge listed banks to have more outside directors or independent directors to get engaged.

However, there are some limitations in chapter 4. First, the sample period did not cover after establishing the governance code in 2015, the stewardship of Companies Act 2014, and the amended Companies Act 2015, where all these codes and acts aim to enhance governance and better protection for shareholders' rights. Covering the sample period after establishing those codes and amended acts

are contemplated bringing more decisive implications regarding the effectiveness of the codes and acts.

Second, the chapter should have covered the expertise of outside or independent directors. The main argument for the engagement of outside or independent directors is their competency in performing the job effectively. Lacking banking knowledge and related experience, supervisory board members cannot effectively monitor the executive. Moreover, information asymmetries are a more severe issue in the banking industry than in non-financial firms. Thus, financial expertise directors on boards are vital in the banking industry. Despite the evidence showing a positive and significant relationship between board independence (proxies by outside and independent directors' ratio) and capital ratio, it still needs to be determined whether the evidence is limited to particular circumstances. In response to the mixed findings in the extant works of literature, one of the potential explanations is because of using different proxies for financial expertise. For example, Minton, Taillard, and Williamson (2010) and Fernandes and Fich (2009) use different proxies for financial expertise. Outside and independent directors' expertise relates to their competency in monitoring effectively. Therefore, a more uniform definition of financial expertise shall bring a decisive conclusion in future research. The definition of proxy variables of financial expertise that fit in the banking industry's bank governance shall be explored in future research topics.

Third, the chapter should have covered the period of essential implementation of capital requirements, referring to Basel III. The relationship between stricter capital requirements and effective bank governance remained unanswered. The cover of the Basel III period considered can enhance the findings. I leave the abovementioned limitations as future research questions or topics. Taking the abovementioned limitations as considerations in designing new research shall lead to more comprehensive research and enhance findings for a better discussion of the effectiveness of bank governance in monitoring.

Because the impact of the global financial crisis is far-reaching, regulators and policymakers are urging steps to revise the regulations. Particularly the capital adequacy requirement, namely Basel III aiming to promote high-quality capital with stricter capital definition to enhance banks' soundness. However, concurrently the fraud cases, for instance, improper lending, document falsification, and inappropriate charges, still show up in Japanese banks. Thus, it raised the question of whether the non-compliances of banks are due to the failure of effective monitoring by bank governance. Chapter 5, entitled "Business improvement order and bank governance," focuses on the business improvement order issued against banks to present whether bank governance mechanisms, specifically ownership structure and board characteristics, prevent the commission of non-compliance. The evidence shows that board characteristics significantly influence the commission of non-compliance compared to ownership structure which did not show robust significant correlations. This result implies that board characteristics are the driving forces influencing the commission of non-compliance.

The evidence shows that a giant bank board, a higher percentage of outside directors with the bank's working experiences, and a higher percentage of executive directors are associated with fewer cases of non-compliance detection. The evidence indicates these board characteristics effectively prevent the commissions of non-compliance, first due to the business nature of banks, which is considered a highly complex sector. Banks can fully utilize the advice from a giant board's pool of expertise, which benefits banks. Banks with larger boards seem more rational as the board is to provide expert advice to ensure regulatory compliance. Second, the evidence shows that the higher percentage of outside directors with banking working experience is associated with fewer cases of non-compliance detection. The evidence implies that banks belong to a highly complex sector, and the breach of regulations can only be easily alleviated if having board directors equipped with specialized knowledge in this particular industry and related professional experience can reduce the probability of non-compliance. Third, the evidence shows that a higher percentage of executive directors is also

associated with fewer cases of non-compliance detection. This result implies that executive directors who lead the bank, manage the bank daily, know the bank's operation site very well while sitting on board to oversight the board, and have valuable information, can effectively monitor the banks and ensure regulatory compliance. Last, the evidence shows that a higher percentage of institutional ownership has a lower likelihood of non-compliance detection, and foreign ownership has a higher likelihood of non-compliance detection when I compiled all the governance variables in the estimation. This result suggests the interdependence of the different dimensions of governance variables. The evidence brought in some practical implications. First, chapter 5 addresses the partial observability of non-compliance by modeling the detected non-compliance as the compound outcome of the incentive of commission and cost of detection following the limited past literature (Nguyen, Hagendroff, & Eshraghi, 2016; Wang, 2013). Thus, the model reveals the two latent probabilities of interest rather than general models that focus only on one side of latent probabilities. This help in future research to have a precise understanding of the process of non-compliance and deter the non-compliance behavior. Second, in response to the regulators, where the establishment is to emphasize the "heightened expectations" of the roles of bank boards, shaping the board culture and increasing board independence in alleviating the non-compliance (Office of the Comptroller of the Currency, 2014; Financial Stability Board, 2014; Companies Act, 2015). The estimation results empirically justified that the board plays a vital role in preventing non-compliance. The evidence highlights some board measures or characteristics, such as board size and financial expertise directors are essential in alleviating the probability of non-compliance commission. The results illustrate bank board matters in banks' management and direction.

However, there are some limitations in chapter 5—first, the period covered. Chapter 5 should have taken into consideration the period covered. For instance, the inclusion of crisis and non-crisis periods, the period of different Basel implementations, the period of establishing governance codes, and the

amendment of laws shall also be considered. Since banks are highly regulated, considerations on the period of crises, necessary regulations implementation, and revision of governances are essential for analyzing the non-compliance and bank risk-taking related research. Second is the dramatic reduction in regulators' issuance of business improvement orders. I am still determining what factors drive regulators' dramatic reduction in business improvement orders. There is a need to scrutiny this issue further. Other than issuing business improvement orders by regulators, alternative regulator non-compliance indicators shall be employed to explore the potential commitment of non-compliance better. Third, bank governance definition. Notably, banks are different from non-financial firms. Since the failure of a bank related to substantial social costs. They are heavily regulated, thus creating a difference from non-financial firms in several aspects—for instance, the regulation, the capital structure, complexity of their business structure. Thus, the ordinary consideration of corporate governance is insufficient. There is a need to define more "bank features" of bank governance for better fitting.

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