



Main bank relationship and accounting conservatism: evidence from Japan

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Received: 20 July 2018 / Revised: 29 April 2019 / Accepted: 17 May 2019 / Published online: 27 May 2019
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Abstract

In a market-oriented economy like the USA, the process of monitoring through lending mitigates lenders' demand for accounting conservatism. Japanese corporate governance is characterized as a bank-dominated or relationship-oriented system. Under bank-dominated systems, main banks are expected to be effective monitors. In our model, main banks play the role of reducing the lenders' demand for accounting conservatism by reducing information asymmetry. We find that main banks can reduce the demand for accounting conservatism. Our findings help understand accounting conservatism vis-à-vis agency problems. We provide empirical evidence to contribute to literature on banking, specifically to fields such as relationship banking.

Keywords Accounting conservatism · Agency problem · Corporate governance · Main bank

Introduction

Conservatism accounting presents an asymmetric timeline of earnings from a higher degree of verification to recognize good news as accounting gain than bad news as loss (Basu 1997). From the perspective of the agency theory, shareholders have an incentive to appropriate wealth from debt holders (Jensen and Meckling 1976). There are two key drivers of accounting conservatism: agency costs and information asymmetry (Basu 1997; Watts 2003a). A major source of demand for accounting conservatism arises from debt contracts (Watts 2003a). However, accounting conservatism cannot fully solve the agency problems related to debt contracts (Erkens

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et al. 2014). Asymmetric information matters in the occurrence of severe agency problems. Previous literature on corporate governance conceptualizes that monitoring roles of corporate governance systems are differently characterized under different institutional settings (Aguilera et al. 2015). Thus, corporate governance systems in large US firms are not necessarily effective in different corporate governance settings as bank-dominated corporate governance endeavors in Japan are. In this paper, we analyze whether main banks, an intense form of relationship banking, can moderate accounting conservatism.

There remains a research question of whether features of corporate governance or financial systems affect accounting conservatism stemming from agency conflicts, or asymmetric information under bank center economy, even if their effective monitoring can mitigate agency problems. We hypothesize that the Japanese main bank systems can moderate the demand for accounting conservatism. As Aoki et al. (1994) and Shleifer and Vishny (1997) mentioned, market-oriented economies like the USA and the U.K. are different from bank-oriented economies like Japan. In a market-oriented economy, corporate governance systems essentially have strong legal protection for minority shareholders and monitoring roles of institutional investors. Accounting conservatism is especially necessary in firms with higher degrees of information asymmetry for their institutional investors (LaFond and Roychowdhury 2008; Ramalingegowda and Yu 2012). In a bank-oriented economy, main banks are expected to be effective monitors (Aoki 1990; Sheard 1994). They are not only the largest lenders, but also have large shareholdings to maintain long-term relationships with their client firms (Aoki et al. 1994). These positions of main banks might enable them to monitor other stakeholders.

Lenders favor accounting conservatism because they enjoy its benefits in keeping with the positive accounting theory (Watts and Zimmerman 1986). In the context of debt contracts, lenders are more interested in assuring the minimum amounts of net assets in borrowing firms to avoid problems pertaining to limited liability. Accordingly, they demand conservative accounting. This is because lenders cannot receive any additional wealth when a borrowing firm's net assets are above the face value of the debt (Watts 2003a). The benefits of accounting conservatism to lenders have been summarized in several studies (Ahmed et al. 2002; Zhang 2008). Firstly, conservatism improves the borrowers' debt ratings, and firms under severe debtholder–shareholder conflict tend to adopt more conservative accounting (Ahmed et al. 2002). Second, conservative financial reports are likely to trigger debt covenant violations. These accelerated covenant violations on the part of borrowers provide a chance for lenders to mitigate their downside risk in advance. Thus, conservatism of borrowers plays a role in signaling for lenders (Zhang 2008).

However, no previous study has examined the relationship between the main bank and conservative accounting. We speculate that main banks do play a substitute role of signaling for other lenders instead of conservatism accounting of borrowers. Even in the USA, lenders have to play an effective monitoring role in mitigating information asymmetry by using conservative accounting (Erkens et al. 2014). On the other hand, Japanese main banks have positions as both lenders and shareholders. Therefore, main banks are less likely to face an asymmetric downside risk, when compared to commercial banks in the USA. In addition, main banks can gather private information



on borrowers using the relationship banking technique (Aoki et al. 1994). Main bank systems are regarded as “a particular intense and close form of relationship banking” (Patrick 1994). As a result, firms with main bank relationships might not face severe agency problems.

There is an additional empirical question on the difference in delegated monitors between main banks and other banks having lending relationships with their client firms. This study focuses on the potential differences between main banks and other banks with lending ties alone. Japanese banks can gather private information on client firms through the lending relationship using “relational debt” (David et al. 2008; O’Brien et al. 2014). By using techniques of relationship lending, banks can gather detailed information on their client firms (Boot 2000). As for relationships between lenders and borrowers, effective monitoring, such as relationship banking, can help mitigate the risk of lenders who may face their borrowers’ limited liability problems.

In this paper, we examine conservative accounting models similar to those of Erkens et al. (2014) to answer the empirical question of whether main banks play the role of reducing the lenders’ demand for accounting conservatism. The results of our paper are summarized as follows. First, we find that firms with main bank relationships have lower asymmetric timelines than firms without main bank relationships. Our finding implies that main banks would not demand accounting conservatism from the perspective of both lenders and effective shareholders. We can interpret that main banks can substitute the role of conservative accounting because they take on the role of delegated monitors. Second, we also investigate whether commercial banks, which only hold the position of lenders, demand accounting conservatism or not. We check the robustness to examine the analysis of restricted sample firms which have lending relationships. This suggests that commercial banks do not depend on private information through relational debt contracts.

This paper contributes to the literature on conservatism accounting and banking. First, this study analyzes the relationship between accounting conservatism and the main bank, to reveal who demands earlier recognition of loss value. Our findings show that the main bank systems can significantly moderate accounting conservatism. Second, we also provide empirical evidence to contribute to banking literature, particularly to fields such as relationship banking. Our study is the first to discuss the role of main banks in relation to accounting conservatism. Our findings also reveal that only lending by banks does not affect management decisions of accounting conservatism.

The rest of this paper is organized as follows. The next section reviews the literature and develops our hypotheses. We then introduce our sample and discuss our estimation method. We then present our empirical results and additional analysis in the section that follows. Finally, we discuss and conclude the paper.

Hypothesis development

Accounting conservatism, information asymmetry, and agency problem

Accounting conservatism, in principle, functions to mitigate information asymmetry between insiders and outsiders. From the perspective of the agency theory, there



are conflicts between shareholders and managers under separation of ownership and management in publicly listed companies. To mitigate potential conflicts among shareholders and managers, corporate governance is an important system that affects managerial decision making (Jensen and Meckling 1976). Agency costs from information asymmetry are incurred by both shareholders and lenders of a firm.

There are two types of financial systems, namely the Anglo-American model and the bank-based model (Aoki et al. 1994). The former is based on transaction finance, in that the security market plays an important role in financing. Thus, it is regarded as market-based finance, or capital market finance. The latter model depends on relationship finance that is constructed by repeated lending and close relationships between banks and clients. Previous studies on bank lending focus on the different roles of “relational debt” (also called “private loan”) and “transaction debt” (also called “market securities”; Boot 2000; David et al. 2008; O’Brien et al. 2014). In financial systems, excluding the USA, commercial banks play an important role as sources of finance for not only small and medium enterprises, but also for large listed firms (Patrick 1994).

As for the relationship between the agency problem and accounting conservatism, institutional shareholders demand conservatism in dispersed ownership countries¹ (Ramalingegowda and Yu 2012). In the USA, institutional investors demand accounting conservatism in firms with higher degrees of information asymmetry. Accounting conservatism is highly investigated in firms where the separation of ownership and management is more pronounced (LaFond and Roychowdhury 2008). In addition, conservative reporting occurs in firms with a higher degree of information asymmetry (Lafond and Watts 2008). Greater institutional shareholdings are positively associated with conservative reporting in firms with higher information asymmetry (Ramalingegowda and Yu 2012).

As lenders have incentives for minimizing agency cost by the late loss recognition of borrowing firms, they demand accounting conservatism. Debt contracts would also mitigate agency problems arising from debt relationships by transferring control rights from borrowers to lenders during bad conditions, through covenant violations (Black and Cox 1976; Jensen and Meckling 1976). As a result, accounting conservatism has been adopted to facilitate debt contracts by triggering covenant violations through the recognition of accelerated loss (Watts 2003a; Ball et al. 2008).

While debt contracting would be a driver of accounting conservatism, debt contracts cannot fully solve agency problems. Effective monitoring by lenders can moderate and solve agency problems between lenders and borrowers. Banks can gather detailed information on client firms by adopting relationship lending (Boot 2000). In

¹ In family firms, Chen et al. (2014) show that conservative accounting is pronounced by the founding CEO ownership because they have the incentive to reduce risk of potential litigation and agency costs consistent with Watts (2003a, b). On the other hand, the presence of foreign institutional shareholders would be enhanced in East Asian Countries (Chung et al. 2019). These studies imply that the one who demands conservatism might depend on the difference in the corporate ownership structure.



the USA, relationship lending would help mitigate information asymmetry and substitute for the role of conservatism accounting (Erkens et al. 2014).

Japanese corporate governance and main bank system

Corporate governance in Japan is a bank-centered system, which is different from the market-oriented system in the USA. One of the features of bank-centered systems is that banks play the role of main capital suppliers for firms (Biddle and Hilary 2006). The other feature is a close relationship between bank and client firms through lending relationships (Aoki 1990; Hoshi and Kashyap 2001). Japanese main banks are defined as banks that lend the largest share of loans to client firms, and this is based on long-term relationships between the banks and the firms (Aoki et al. 1994). We introduce literature on Japanese corporate finance and several functions of the close relationship between them.

Main banks play an important role in monitoring their client firms and helping reduce principal-agency problems (Aoki 1990).² As Aoki et al. (1994) and Weinstein and Yafeh (1998) noted, main banks are regarded as “delegated monitors” which is theoretically advocated by Diamond (1984). Bank lending or “relational debt” has a strong influence on management decisions such as R&D investment (David et al. 2008). The turnover of top executives in a firm with bank relationships tends to be prompted, and this is regarded as a disciplinary mechanism for executives (Kang and Shivdasani 1995). As for executive compensation, executive incentive tends to be provided for firms with higher bank ownership (Sakawa et al. 2012). Thus, there might be a possibility that their information gathered through the monitoring activity is not necessarily restricted by financial reporting, but is also affected by the need to construct effective incentive compensation structures for their client firms.

Main banks do not bear the impact of severe conflicts that take place between shareholders and lenders. Debt holders have an asymmetric payoff related to net assets. This asymmetric payoff is problematic when borrowers face distress. Main banks are not only the largest lenders for client firms, but are also lenders for the large equity owners of the firms (Morck et al. 2000; Sakawa et al. 2014). Main banks may have the chance of acquiring additional payments, such as dividends, when projects of borrowing firms produce higher earnings. Therefore, main banks do not have incentive to transform wealth from lenders to shareholders because they are major shareholders of client firms (Prowse 1990).

Main banks do not face severe problems as a result of information asymmetry between themselves and their client firms. At first, the equity ownership of main banks is regarded as a device of the banks’ commitment to their clients, to maintain

² On the advices of an anonymous reviewer’s comment, we discuss about the effectiveness of main bank monitoring in 2000s. Arikawa and Miyajima (2015) themselves pointed out that main bank relationships have been maintained post bubble-bursting. In addition, they pointed out that main bank relationships have been helpful in restructuring borrowing firms suffering from financial distress. Furthermore, empirical papers showed that main bank lending relationships have performed to mitigate information asymmetry (Sakawa et al. 2014) and decrease the degree of underpricing of IPO firms (Sakawa and Watanabel 2019). Thus, we conclude that the main bank relationships have still been functioned in 2000s.



their long-term relationships (Aoki et al. 1994). In Japan, firms which have relationship with a bank do not face severe liquidity problems when the firms make decisions on their investment (Hoshi et al. 1990, 1991). Even in the USA, small firms with close ties to banks are able to access capital (Petersen and Rajan 1994). Therefore, these long-term relationships are regarded as an important function of reducing asymmetric information problems between the main banks and their clients (Weinstein and Yafeh 1998).

Second, the main bank can gather detailed private information not only through lending activities but also through settlements accounting of their clients. Main banks have an information advantage vis-à-vis their client firms over other lending banks. Firms need to manage cash flow transactions, such as their checks and promissory bills (or *Yakusoku Tegata* in Japanese). Japanese firms tend to depend on receipts and payments in the settlements accounting of main banks for their cash flow (Aoki et al. 1994). Therefore, main banks can hold a financial position with respect to their client firms to check their cash flow.

Close relationships between main banks and their client firms are incentives for main banks to maintain their relationships. Sheard (1994) summarizes the various business benefits of main banks, such as corporate bank deposit, bond issues, co-underwriter, and foreign exchange transactions. In addition, main banks address large shares of foreign exchange business of clients' firms because clients maintain settlement accounts with main banks (Aoki et al. 1994).

On the other hand, main banks bear special obligation and responsibility when their client firms face financial distress (Sheard 1994). Therefore, close relationships between banks and clients discourage banks from pursuing risky attitudes (Weinstein and Yafeh 1998). To maintain close relationships among banks and their clients, main banks extend the debt contracts of client firms to multiple beneficial business relationships. In this case, client firms are willing to submit their information to main banks, which is regarded as voluntary disclosure. If the firms give the main banks information related to their potential troubles, the main bank cannot abandon their duties and responsibilities (Aoki et al. 1994). Main banks play an important role of managing the financial position of client firms.³

Main bank system and accounting conservatism

This paper analyzes the relationship between accounting conservatism and main banks in Japan. There are two main views of the relationship between main banks and accounting conservatism. One view is that main banks, being the largest lenders, tend to be more risk averse than other equity owners, because they need to maintain close ties with their client firms (Weinstein and Yafeh 1998). In principle, lenders are interested in protecting their debt by adopting conservatism accounting (Watts

³ The roles of main banks differ based on financial conditions. Sheard (1994) summarizes their roles in the phase of financial distress of their client firms and shows the main banks' involvement in restructuring listed firms.



2003a). Thus, these close relationships between the banks and the firms would urge them to demand accounting conservatism.

The other view is that the main bank can moderate accounting conservatism, which is based on two paths. First, the Japanese main bank systems can moderate principal-agent problems and the conflicts between lenders and shareholders. In addition, conflicts stemming from the asymmetric payoff are relatively small for main banks because the banks have a significant share of their own clients. Second, the central source of these agency problems is information asymmetry among lenders and borrowers. In fact, Erkens et al. (2014) point out that “Borrower-lender information asymmetry is central to the agency problem of debt and, therefore, any monitoring mechanism that is effective in reducing this information asymmetry could potentially ameliorate the agency problem.”. Main bank systems moderate agency problems arising from asymmetric information between creditors and firms (Hoshi et al. 1990). Banks gather enough private information on the client firms by using the lending relationship or “relational debt” (David et al. 2008; O’Brien et al. 2014). The main bank is well informed about the client firms because of their duty and responsibility to be well informed. Thus, according to this view, main banks do not demand accounting conservatism.

To clarify the two possibilities, we consider the potential difference between main banks and commercial banks when it comes to their demand for conservative accounting. The former view suggests that the risk averse attitude of banks would promote the demand for conservative accounting. However, main banks would have several mechanisms to mitigate agency problems arising from debt contracts, which is different from the case of commercial banks. First, as Prowse (1990) mentioned, main banks are large equity holders and do not have concerns about asymmetric downside risk as lenders. Second, the main banks carefully monitor the client firms through their lending activities and by observing accounting settlements for both, their own interest and the other lenders’ interests, as in the above-mentioned second point of view. In other words, monitoring mechanisms of main banks reduce duplication of monitoring costs (Aoki et al. 1994). Considering these two points, we speculate that main banks may play substitute roles of accounting conservatism. Therefore, we construct the following hypothesis related to accounting conservatism.

Hypothesis 1 Firms that have relationships with main banks adopt less conservative accounting than firms that do not have relationships with main banks.

Data and estimation measure

Sample selection and variables

We select data from non-financial firms listed in the Japanese stock exchange from 2007 to 2014 to analyze the relationship between non-financial listed firms and main



banks.⁴ We drop all financial firms because we are interested in the relationships between main banks and client firms. The financial accounting data and corporate governance data, including those on main banks, are collected from the Astra Manager database, such as financial data and corporate governance data. To remove outliers, we drop the top or bottom 1% of market value deflated earnings. Our selected sample consists of 25,505 firm-year observations.

We adopt a dummy variable (Main Bank Dummy or MBD) to analyze whether the main bank affects accounting conservatism or not. MBD equals 1 if the proportion of the largest lenders' shareholdings is positive and 0 otherwise. In addition, there might be a possibility that commercial banks that do not have stakes of client firms can take on a role to effectively monitor their client firms. Following a long-term relationship between main banks and client firms, banks without stakes in their client firms may not demand accounting conservatism.

Empirical model

We define accounting conservatism as the asymmetric loss recognition coefficient model through Eq. (1), following Basu (1997).⁵

$$\text{Earnings}_{i,t} = \alpha_0 + \beta_1 \text{DR}_{i,t} + \beta_2 \text{Ret}_{i,t} + \beta_3 \text{Ret}_{i,t} * \text{DR}_{i,t} + \delta \text{Industry FE}_i + \varepsilon_{i,t}, \quad (1)$$

where: $\text{Earnings}_{i,t}$ = Net income of firm i in fiscal year t divided by the beginning of the fiscal year market value of equity, $\text{Ret}_{i,t}$ = Stock returns of firm i in fiscal year t over the fiscal year, $\text{DR}_{i,t}$ = An indicator variable that takes the value of 1 if Ret is negative and 0 otherwise; we define three variables, namely *Earnings*, *Ret*, and *DR*, following Shuto and Takada (2010). In Eq. (1), β_2 captures and measures the timeliness of earnings with respect to good news and β_3 captures accounting conservatism in terms of the asymmetric timeliness of earnings.

To analyze our empirical hypothesis, we expand the Basu (1997)'s model to incorporate the effect of both main bank relationships and bank lending. We estimate Eq. (2) as follows:

⁴ Our sample period starts in 2007 when the banks in Japan faced a recovery period after the corruption of non-performing loan problems (Hoshi and Kashyap 2006). Especially, main mega banks' M&A have ended during the year 2006 (Sakawa and Watanabel 2018a). In 2015, the corporate governance code was introduced and main bank stakes would have been weakened. Therefore, we set the ending period in 2014.

⁵ Following the studies of Erkens et al. (2014) in the U.S., and Shuto and Takada (2010) in Japan, we used Basu (1997)'s conditional conservatism model in this paper. Accounting conservatism is defined as an asymmetric verification standard for recording good news as gains, rather than for recording bad news as losses. The above definition implies conditional conservatism as measured by the asymmetric timeliness of earnings and it is not consistent with the definition of unconditional conservatism (Shuto and Takada, 2010). Furthermore, Roychowdhury and Watts (2007) stated the validity of Basu (1997)'s model. Thus, we use Basu (1997)'s specification of the measure of asymmetric timeliness of earnings to examine the association between main bank relationships and accounting conservatism.



$$\begin{aligned}
\text{Earnings}_{i,t} = & \alpha_0 + \beta_1 \text{DR}_{i,t} + \beta_2 \text{Bank Relation}_{i,t-1} + \beta_3 \text{DR}_{i,t} * \text{Bank Relation}_{i,t-1} \\
& + \beta_4 \text{Ret}_{i,t} + \beta_5 \text{Ret}_{i,t} * \text{DR}_{i,t} + \beta_6 \text{Ret}_{i,t} * \text{Bank Relation}_{i,t-1} \\
& + \beta_7 \text{Ret}_{i,t} * \text{DR}_{i,t} * \text{Bank Relation}_{i,t-1} + \delta \text{Industry FE}_i + \theta \text{Year}_t + \varepsilon_{i,t},
\end{aligned} \tag{2}$$

where $\text{Bank Relation}_{i,t-1} = \text{Main Bank Dummy (MBD}_{i,t-1})$; $\text{Bank Lending}_{i,t-1}$; $\text{MBD}_{i,t-1}$ = An indicator variable is equal to 1 if the proportion of main bank shareholdings of firm j at the end of year $t-1$ are positive, otherwise it is 0; $\text{Bank Lending}_{i,t-1}$ = The sum of all bank loans divided by the market value of firm j at the end of year $t-1$; Industry FE_{it} = Industry fixed effects; Year_t = Year effects.

The other variables are defined in the same way as in Eq. (1). If the coefficient β_7 is negative, firms with main bank relations (*MBD*) or *Bank Lending* have lower asymmetric loss recognition than firms without them. Our estimations adopt cluster standard errors at the firm level to control for residual dependence.

Next, we implement several control variables related to accounting conservatism. These variables are Market to Book ratio (*MTB*), financial leverage (*Leverage*), firm size (*MV*), and the percentage of CEO ownership (*CEO Ownership*). Market to Book ratio (*MTB*) is adopted to control for the effects of the future asymmetric timelines of equity value (Roychowdhury and Watts 2007). Financial leverage (*Leverage*) is controlled for the demand of accounting conservatism by debt holders. In addition, firm size (*MV*) is also controlled because it is negatively correlated with asymmetric timeliness of earnings (LaFond and Watts 2008). Finally, CEO ownership is controlled to capture agency problems between shareholders and managers (LaFond and Roychowdhury 2008). Our model adds several control variables into the Basu (1997)'s model as follows.

$$\begin{aligned}
\text{Earnings}_{i,t} = & \alpha_0 + \beta_1 \text{DR}_{i,t} + \beta_2 \text{Bank Relation}_{i,t-1} + \beta_3 \text{DR}_{i,t} * \text{Bank Relation}_{i,t-1} \\
& + \beta_4 \text{Ret}_{i,t} + \beta_5 \text{Ret}_{i,t} * \text{DR}_{i,t} + \beta_6 \text{Ret}_{i,t} * \text{Bank Relation}_{i,t-1} \\
& + \beta_7 \text{Ret}_{i,t} * \text{DR}_{i,t} * \text{Bank Relation}_{i,t-1} \\
& + \beta_1 \Sigma \text{Control}_{i,t-1} + \beta_1 \Sigma \text{DR}_{i,t} * \text{Control}_{i,t-1} \\
& + \beta_1 \Sigma \text{Ret}_{i,t} * \text{Control}_{i,t-1} + \beta_1 \Sigma \text{Ret}_{i,t} * \text{DR}_{i,t} * \text{Control}_{i,t-1} \\
& + \delta \text{Industry FE}_i + \theta \text{Year}_t + \varepsilon_{i,t},
\end{aligned} \tag{3}$$

Control variables; $\text{MTB}_{j,t-1}$ = market to Book ratio of firm j at the end of year $t-1$; $\text{Leverage}_{j,t-1}$ = financial leverage of firm j at the end of year $t-1$; $\text{MV}_{j,t-1}$ = market value of equity of firm j at the end of year $t-1$; $\text{CEO Ownership}_{j,t-1}$ = the percentage of CEO ownership of firm j at the end of year $t-1$.

Results

Descriptive statistics

Our descriptive statistics and correlation matrix, and the sample are reported in Tables 1 and 2. In Table 1, the average of earnings is 0.033, which is smaller than



Table 1 Descriptive statistics

Variable	Mean	SD	Q1	Median	Q3
Earnings	0.033	0.140	0.016	0.052	0.092
DR	0.525	0.499	0.000	1.000	1.000
Ret	-0.020	0.173	-0.102	-0.008	0.069
MBD	0.353	0.478	0.000	0.000	1.000
MBS	1.105	1.719	0.000	0.000	2.140
Bank Lending	0.560	1.093	0.000	0.160	0.674
Non-MB Lending	0.369	0.740	0.000	0.087	0.434
MTB	1.526	7.406	0.603	0.919	1.505
Leverage	49.842	20.835	33.580	50.600	66.080
MV	103,393	507,426	3867	10,959	40,295
CEO Ownership	7.050	12.219	0.072	0.768	8.869

$N=25,055$. Descriptive statistics are based on the data from non-financial firms listed at the Japanese stock exchange from 2007 to 2014. See “[Appendix](#)” for variable definitions

the average earnings of US firms as reported by Erkens et al. (2014). The mean of stock returns (RET) is -0.020 , which suggests that Japanese firms suffered from the global financial crisis. The mean of DR (negative return dummy) also occupies more than 0.5 which shows the same tendency as seen in previous studies such as Shuto and Takada (2010). We find 8849 firm-year observations (about 35.3%) which have relationships with main banks. It appears that these relationships are still maintained for more than 1/3 of the total number of Japanese listed firms.

As for Pearson’s correlation matrix in Table 2, we can find that earnings are positively correlated with RET and negatively with DR. This implies that reported earnings include a part of information that is consistent with previous studies such as Basu (1997) and LaFond and Roychowdhury (2008). In addition, bank lending is positively correlated with MBD. This implies that there are conflicts among banks as lenders and shareholders.

We compare the differences between sample firms with and without MBD. Table 3 reports the results of the mean difference t test. In Table 3, we find that firms with MBD have significantly higher earnings, which is a higher indicator of negative stock returns (DR). In addition, we also find higher bank lending ratio and higher leverage. These means that firms with MBD tend to rely on debt financing more than firms without MBD. We also find that Market to Book ratio (MTB) and firm size with MBD are significantly lower, implying that firms with lower growth opportunities and smaller sizes tend to be monitored by main banks. Finally, CEO ownership is significantly lower for firms with MBD. This means that the main bank would be helpful to reduce agency conflicts between shareholders and managers.



Table 2 Correlation coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Earnings										
2. DR	-0.259*									
3. Ret	0.334*	-0.704*								
4. MBD	0.027*	0.020*	0.001							
5. MBS	0.023*	0.017*	0.002	0.871*						
6. Bank lending	-0.059*	-0.063*	0.077*	0.247*	0.222*					
7. Non-MB lending	-0.047*	-0.060*	0.071*	0.220*	0.187*	0.940*				
8. MTB	-0.017*	0.044*	-0.071*	-0.030*	-0.034*	-0.022*	-0.020*			
9. Leverage	-0.009	0.035*	-0.032*	0.280*	0.237*	0.495*	0.493*	0.060*		
10. MV	0.017*	0.006	-0.010	-0.077*	-0.076*	-0.069*	-0.060*	0.013*	0.020*	
11. CEO ownership	-0.007	0.018*	-0.038*	-0.113*	-0.137*	0.026*	0.014*	0.035*	-0.050*	-0.091*

N = 25,055. See "Appendix" for variable definitions

*Indicate significance at the 5% level



Table 3 Mean difference between MBD and non-MBD

Variable	MBD (mean)		Difference
	No	Yes	
Earnings	0.030	0.038	-0.008***
DR	0.517	0.538	-0.021**
Ret	-0.021	-0.020	0.000
MBS	0.000	3.130	-3.130***
Bank lending	0.361	0.925	-0.564***
MTB	1.691	1.223	0.467***
Leverage	45.533	57.734	-12.201***
MV	132,074	50,865	81,209***
CEO ownership	8.070	5.181	2.889***
Observations	16,206	8849	

$N=25,055$. See “Appendix” for variable definitions

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

Regression results

Using whole samples of our analysis, we first test whether MBD firms adopt less conservative accounting than non-MBD firms. First, we insert Bank Lending into the estimation models to adopt all samples. Furthermore, we focus on firms with bank lending relationships to check the robustness of our results. Our estimated models adopt cluster standard errors at the firm level to control for residual dependence. To remove outliers, we drop the top 1% of the absolute standardized residuals.

In Table 4, we aim to reveal whether the degree of accounting conservatism is differently observed between MBD and non-MBD firms. Estimated data is based on all firms in Models (1)–(6) and firms with bank lending relationships in Models (7)–(8). In Table 4, we find that the coefficient (β_5) is significantly positive and accounting conservatism is observed for all estimated models. As for the role of main banks, we find that the coefficient of MBD (β_7) is significantly negative in Models (3)–(8). This implies that firms with MBD use less accounting conservatism than firms without, which is consistent with Hypothesis 1.

Next, we check whether bank lending relationships are negative to accounting conservatism using the alternative models in Table 5. Estimated data is based on all firms in Models (1)–(4) and firms with bank lending relationships in Models (5)–(6). Using Table 5, we also find that the coefficient (β_5) is significantly positive, implying accounting conservatism for not only all firms, but also firms with bank lending relationships. Table 4 shows that the coefficient of bank lending relationship (β_7) is not significant. Therefore, we can conclude that main banks, as both lenders and shareholders, matter for decreasing accounting conservatism.



Table 4 Accounting conservatism and main bank relationship

	All data							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DR	β_1	-0.010 (0.03)	-0.015* (0.99)	-0.013*** (-4.30)	-0.009 (-1.44)	-0.020*** (-6.83)	-0.015* (-2.38)	0.005 (0.46)
MBD	β_2		0.006+ (1.69)	0.006+ (1.56)	0.005 (1.34)	0.005 (1.30)	0.008+ (1.78)	0.007 (1.54)
MBD	β_3		-0.007 (-1.44)	-0.009+ (-1.70)	-0.007 (-1.37)	-0.008 (-1.59)	-0.011+ (-1.86)	-0.011+ (-1.79)
*DR	β_4	0.001 (0.03)	0.036 (0.99)	0.112*** (6.89)	-0.006 (-0.18)	0.137*** (8.27)	0.125* (2.00)	0.123* (1.98)
Return	β_5	0.231*** (4.67)	0.234*** (4.67)	0.206*** (8.95)	0.247*** (5.04)	0.204*** (8.69)	0.250*** (5.01)	0.198* (2.50)
MBD	β_6		0.090** (2.70)	0.054 (1.53)	0.112*** (3.38)	0.070* (1.99)	0.044 (1.15)	0.038 (1.00)
Return	β_7		-0.109 (-2.48)	-0.132** (-2.79)	-0.128** (-2.94)	-0.139** (-2.99)	-0.117* (-2.32)	-0.106* (-2.09)
MBD	*DR*return	No	Yes	No	No	Yes	Yes	Yes
Year	Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	No
Control	Control	Yes	Yes	No	Yes	No	Yes	Yes
N	Adjusted R ²	25,055 0.13	25,055 0.155	25,055 0.122	25,055 0.132	25,055 0.146	25,055 0.157	16,410 0.167
F		93.41***	85.51***	149.1***	83.1***	119.8***	77.8***	57.3***

This table presents the results of a regression model that examines the relationship between a main bank and accounting conservatism using the Basu (1997)'s model. Estimated data is based on all firms in Models (1)–(6) and firms with bank lending relationships in Models (7)–(8). We cluster standard errors at the firm level. *T*-values are presented in parentheses. To control for an unobserved effect, we adopted industry fixed effect including year dummies in our estimation following Erkens et al. (2014). The results of control variables, industry dummies, and year dummies are not reported. See "Appendix" for variable definitions

***, **, *, †Indicate significance at the 0.1, 1, 5, and 10% levels

Table 5 Accounting conservatism and bank lending

		All data				Banks with only lending-ties	
		(1)	(2)	(3)	(4)	(5)	(6)
DR	β_1	-0.023*** (-3.51)	-0.024*** (-3.61)	-0.028*** (-4.22)	-0.028*** (-4.33)	-0.021* (-1.97)	-0.020+ (-1.82)
Bank lending	β_2	-0.006+ (-1.91)	-0.006* (-2.05)	-0.004 (-1.19)	-0.004 (-1.33)	-0.005 (-1.29)	-0.004 (-1.10)
Bank lending	β_3	-0.020*** (-3.73)	-0.020*** (-3.80)	-0.019*** (-3.55)	-0.019*** (-3.62)	-0.020*** (-3.43)	-0.020*** (-3.33)
*DR							
Return	β_4	-0.007 (-0.18)	-0.007 (-0.17)	0.028 (0.73)	0.027 (0.71)	0.113+ (1.80)	0.114+ (1.82)
DR*return	β_5	0.259*** (4.88)	0.251*** (4.68)	0.257*** (4.78)	0.251*** (4.63)	0.201* (2.36)	0.218** (2.58)
Bank lending	β_6	-0.009 (-0.51)	-0.012 (-0.67)	-0.008 (-0.49)	-0.011 (-0.63)	-0.016 (-0.88)	-0.013 (-0.68)
*Return							
Bank lending	β_7	0.044 (1.04)	0.051 (1.17)	0.045 (1.07)	0.051 (1.20)	0.062 (1.30)	0.054 (1.17)
*DR*return							
Year		No	No	Yes	Yes	Yes	Yes
Industry FE		Yes	Yes	Yes	Yes	Yes	Yes
Control		No	Yes	No	Yes	Yes	No
<i>N</i>		25,055	25,055	25,055	25,055	16,410	16,410
Adjusted <i>R</i> ²		0.146	0.15	0.167	0.17	0.186	0.183
<i>F</i>		112.7***	84.96***	100.4***	80.05***	59.91***	74.95***

This table presents the results of a regression model that examines the relationship between a main bank and accounting conservatism using the Basu (1997)'s model. Estimated data is based on all firms in Models (1)–(4) and firms with bank lending relationships in Models (5)–(6). We cluster the standard errors at the firm levels. *T*-values are presented in parentheses. See “Appendix” for variable definitions. To control for an unobserved effect, we adopted industry fixed effect including year dummies in our estimation following Erkens et al. (2014). The results of control variables, industry dummies, and year dummies are not reported

***, **, *, +Indicate significance at the 0.1, 1, 5, and 10% levels

Additional estimations

The results above focus on the lending relationship of main banks. Main banks have monitoring roles for two types of client firms: those connected by lending and others connected by shareholdings (Aoki et al. 1994). Following previous studies (Morck et al. 2000; Sakawa and Watanabel 2018b, c), we additionally analyze the effect of the amounts of main bank shareholdings (MBS) on borrowing firms' accounting conservatism. In this sense, MBD would be a discrete version of MBS. In addition, MBS would decrease due to their M&A activities after the 2000s (Hoshi and Kashyap 2010). It is possible that the decrease in MBS could change the activity of main banks and weaken monitoring activity, which



Table 6 Accounting conservatism and main bank shareholdings

		MBS			
		(1)	(2)	(3)	(4)
DR	β_1	-0.014*** (-4.85)	-0.009 (-1.41)	-0.021*** (-7.49)	-0.015* (-2.36)
MBS	β_2	0.001 (1.28)	0.001 (1.27)	0.001 (1.09)	0.001 (1.20)
MBS	β_3	-0.001 (-0.91)	-0.002 (-1.37)	-0.001 (-0.84)	-0.002 (-1.29)
*DR					
Return	β_4	0.117*** (7.36)	-0.003 (-0.09)	0.144*** (8.89)	0.031 (0.84)
DR*return	β_5	0.197*** (8.82)	0.242*** (4.90)	0.192*** (8.42)	0.244*** (4.86)
MBS	β_6	0.025* (2.42)	0.014 (1.29)	0.029** (2.88)	0.016 (1.52)
*Return					
MBS	β_7	-0.026* (-1.97)	-0.032* (-2.23)	-0.029* (-2.18)	-0.031* (-2.19)
*DR*return					
Year	No	No	Yes	Yes	
Industry FE	Yes	Yes	Yes	Yes	
Control	No	Yes	No	Yes	
<i>N</i>		25,055	25,055	25,055	25,055
Adjusted R^2		0.121	0.131	0.146	0.156
<i>F</i>		148.7***	82.5***	119.3***	77.3***

This table presents the results of a regression model that examines the relationship between a main bank and accounting conservatism using the Basu (1997)'s model. Estimated data is based on all samples. We cluster standard errors at the firm level. *T*-values are presented in parentheses. "Appendix" for variable definitions. To control for an unobserved effect, we adopted industry fixed effect including year dummies in our estimation following Erkens et al. (2014). The results of control variables, industry dummies, and year dummies are not reported. See "Appendix" for variable definitions

***, **, *, +Indicate significance at the 0.1, 1, 5, and 10% levels

would lower borrowers' accounting conservatism. To investigate this alternative rationale, we adopted MBS as an alternative measure of MBD and re-estimated Eq. (2) using models (1)–(4). The results also show a significantly positive coefficient (β_5), implying the existence of accounting conservatism for all firms. The coefficient (β_7) is also significant and negative in all models, which is consistent with Hypothesis 1. We can confirm that firms with MBS also have less accounting conservatism, which is the same as in the MBD results in Table 6. In other words, we can gain consistent results for Hypothesis 1 using the alternative measure of MBS as a proxy for main banks.



Table 7 Additional regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DR	β_1	-0.007** (-2.61)	-0.023*** (-3.53)	-0.015*** (-5.05)	-0.028*** (-4.22)	-0.008* (-2.41)	-0.023*** (-3.45)	-0.015*** (-4.62)
MBD	β_2				0.008* (2.15)	0.007 (1.74)	0.006 (1.61)	0.005 (1.41)
MBD	β_3				0.001 (0.14)	-0.005 (-0.93)	0.001 (0.19)	-0.004 (-0.83)
*DR	β_4	0.127*** (8.22)	-0.008 (-0.22)	0.153*** (9.66)	0.027 (0.70)	0.110*** (6.46)	-0.020 (-0.54)	0.133*** (7.64)
Return	β_5	0.171*** (6.94)	0.246*** (4.59)	0.165*** (6.66)	0.247*** (4.55)	0.193*** (7.41)	0.266*** (4.98)	0.266*** (4.92)
DR*return	β_6					0.096** (3.01)	0.072* (2.10)	0.113*** (3.55)
MBD	β_7					-0.122** (-2.73)	-0.145** (-3.11)	-0.135** (-3.07)
*Return	β_8	-0.002 (-0.75)	-0.006 (-1.54)	0.000 (-0.11)	-0.003 (-0.74)	-0.004 (-1.30)	-0.007 (-1.72)	-0.002 (-0.59)
MBD	β_9	-0.024*** (-3.66)	-0.029*** (-3.80)	-0.023*** (-3.49)	-0.027*** (-3.55)	-0.024*** (-3.52)	-0.029*** (-3.73)	-0.023*** (-3.36)
*DR*return	β_{10}	0.008 (0.40)	-0.023 (-0.94)	0.014 (0.66)	-0.019 (-0.80)	0.001 (0.04)	-0.027 (-1.13)	0.004 (0.21)
Non-MB lending	β_{11}	0.057 (1.03)	0.055 (0.92)	0.050 (0.93)	0.055 (0.93)	0.065 (1.15)	0.060 (0.99)	0.060 (1.02)
*DR*return	Year	No	No	Yes	Yes	No	No	Yes
Industry FE	Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control	Control	No	Yes	No	Yes	No	Yes	Yes



Table 7 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>N</i>	25,055	25,055	25,055	25,055	25,055	25,055	25,055	25,055
Adjusted <i>R</i> ²	0.135	0.144	0.157	0.166	0.138	0.147	0.159	0.168
<i>F</i>	158.3	84.2	125.3***	79.1***	128.0	76.7	108.4***	73.2***

This table presents the results of a regression model that examines the relationship between a main bank and accounting conservatism using the Basu (1997)'s model. Estimated data is based on all samples. We cluster standard errors at the firm level. *T*-values are presented in parentheses. "Appendix" for variable definitions. To control for an unobserved effect, we adopted industry fixed effect including year dummies in our estimation following Erkens et al. (2014). The results of control variables, industry dummies, and year dummies are not reported

***, **, * Indicate significance at the 0.1, 1, 5, and 10% levels

We also adopt an alternative measure of bank lending relationships, namely total bank lending minus main bank lending.⁶ In Table 7, the coefficient (β_5) is positive and significant. The coefficient (β_{11}) is not significant, which implies that bank lending does not affect accounting conservatism. In addition, the coefficient (β_7) is also significantly negative in all models. Therefore, we confirm that the bank lending relationship does not substitute for the role of main banks, which decreases accounting conservatism.

Robustness of results

In this paper, we further use propensity score matching (PSM) methods to control for confounding factors on the dependent variables. Specifically, for each of the firm years, we estimate the conditional probability of having MBD relationships using a logistic regression model, where MBD is the dependent variable and the following control variables are the independent variables. We use market to book ratio (*MTB*) as a proxy for the understatement of net assets. We include financial leverage (*Leverage*) to control for demand for conservatism as debt holders. Firm size is controlled by the logarithm of total assets (*ln(Assets)*). We use stock return volatility (*Volatility*) to control for firm risk. In addition, we use the square term of stock return volatility (*Volatility*²) to control the possibility that firm risk with MBD would be marginally higher. We measure the amount of free cash flow (*Free Cash*) as cash flow from operating activities and investing activities divided by total assets. Bank lending (*Bank Lending*) is the sum of all bank loans divided by the market value of the firm (O'Brien et al. 2014).

Subsequently, we match each firm with MBD to firms without MBD, or non-MBD firms, that have the closest probability of having MBD using a one-to-one matching method. The final sample of score matching is 16,492 firm-year observations, which consist of 8246 from MBD firms and 8246 from non-MBD firms. The resulting sample that we use to examine the effect of MBD on conservatism contains firms with MBD and non-MBD firms that do not significantly differ on control variables.

First, we show the results of the logit models that derive the PSM in Panel A of Table 8. The dependent variable is the dummy variable of MBD firms. Table 8 indicates that MBD firms tend to be smaller and have higher debt ratios than non-MBD firms do. We also investigate large amounts of main bank lending in MBD firms. MBD firms use free cash flow less, implying that the monitoring role of the main bank helps to reduce managerial free cash flow.

Next, we show the results of PSM in Panel B of Table 8 to confirm robustness. In Panel B, the negative coefficient (β_7) is also significant and negative, supporting

⁶ On the advises of an anonymous reviewer's comment, we changed the numerator of bank lending from all bank loans to all bank loans minus loans from the main bank to check for possible different roles of main banks and other commercial banks. Furthermore, we also adopted the main bank lending ratio as a proxy for bank lending relationships and checked the robustness of the results. We confirmed that the coefficient (β_7) is also significantly negative, consistent with Hypothesis 1 by un-tabulated results.



Table 8 Logit models predicting on MBD and conservatism [using adopt propensity score matching (PSM)]

Panel A: logit		Panel B: conservatism and main bank relation			
				(1)	(2)
MBD		Conservatism			
MTB	−0.117*** (−7.55)	DR	β_1	−0.011* (−2.56)	−0.010* (−2.41)
Leverage	0.026*** (23.00)	MBD	β_2	−0.002 (−0.44)	−0.002 (−0.40)
Ln(Assets)	−0.192*** (−17.67)	MBD	β_3	−0.007 (−1.14)	−0.007 (−1.19)
Volatility	−0.033 (−0.49)	*DR	β_4	0.191*** (6.48)	0.196*** (6.63)
Volatility ²	−0.048*** (−4.68)	Return	β_5	0.264*** (6.84)	0.258*** (6.62)
Free cash	−2.213*** (−14.67)	DR*return	β_6	0.017 (0.39)	0.015 (0.36)
Bank lending	0.329*** (16.60)	MBD	β_7	−0.154** (−2.79)	−0.154** (−2.79)
Constant	0.04 (0.24)	*DR*return	Constant	0.058*** (20.58)	0.048*** (9.06)
Industry FE	Yes	Constant	Industry FE	No	Yes
Year	Yes	Constant	Industry FE	No	Yes
<i>N</i>	24,012	<i>N</i>	Adjusted <i>R</i> ²	16,492	16,492
Pseudo <i>R</i> ²	0.1507	<i>F</i>	Adjusted <i>R</i> ²	0.139	0.141
			<i>F</i>	141.2**	288.7**

Panel A presents the estimated results of a logit model to reveal the determinants of the main bank relationship. Panel B presents the results of a regression model that examines the relationship between a main bank and accounting conservatism using the Basu (1997)'s model. Estimated data is based on all samples. *T*-statistics are shown in parentheses. See "Appendix" for variable definitions. The results of control variables, industry dummies, and year dummies are not reported.

***, **, *, +Indicate significance at the 0.1, 1, 5, and 10% levels

Hypothesis 1. We confirm the supporting evidence that lower asymmetric timelines arise from both the gain and loss recognition in Table 8. Therefore, we can conclude that our estimated results are robust after using the PSM method.

Discussion and conclusions

In a market-oriented economy like that of the USA, the monitoring process that occurs in a lending relationship mitigates lenders' demand for accounting conservatism (Erkens et al. 2014). However, no previous study examines the relationship between accounting conservatism and monitoring through lending relationships, a system that is analogous to the main bank structure in Japan's bank-dominated



corporate governance system. Therefore, our research question is whether main bank monitoring may substitute for accounting conservatism. To investigate this question, we examine how relationships with main banks influence the demand for conservative accounting in Japanese corporations.

We empirically reveal that firms that have relationships with main banks adopt less conservative accounting. Our findings suggest that main banks play a role in effective monitoring and do not demand conservative accounting. This is due to their effective monitoring, which can reduce information asymmetry and agency problems. In addition, we consider whether main and non-main banks, that is, those with only lending relationships, demand accounting conservatism, as such lenders might require more conservative accounting to mitigate agency problems. We find no significant results for firms connected to commercial banks without stakes. This implies that non-main banks in Japan might demand more conservative accounting compared to main banks. The robustness of our findings is confirmed using the PSM method.

This study makes several contributions. First, our findings develop the role of agency theory as it relates to bank monitoring mechanisms. Our results reveal that monitoring by main banks is likely to be strong enough to substitute for accounting conservatism, but non-main banks may demand accounting conservatism because their monitoring is not an adequate substitute for accounting conservatism. This conclusion can contribute to our understanding of the demand for accounting conservatism as a mitigating factor for agency problems in bank-dominated corporate governance systems like that of Japan. Second, we provide empirical evidence that contributes to banking research regarding main banks and relationship banking. Our findings suggest that relationship banking allows banks to gather private borrower information using their lending technology. Main banks act as monitors from the viewpoints of both lenders and shareholders, unlike commercial banks without stakes. Therefore, monitoring by banks that have only lending relationships does not substitute for conservative accounting in a bank-dominated economy.

There are several limitations in our study. First, we focus only on the role of main banks in monitoring Japanese listed firms. Smaller firms are more likely to depend on their banking relationships because they face difficulties raising capital through financial markets. Thus, monitoring activities by lending banks would be stronger for these relatively smaller client firms, and substitute for accounting conservatism. Second, our study does not investigate whether the demand of main banks for accounting conservatism improves ex-post long-term stock returns or the quality of financial reporting such earnings management. This is also an important task for future research. Third, this study's implications cannot be applied to large corporations in other countries because corporate governance features are different among different national bundles (Zattoni et al. 2009). It is possible that relationship banking may not adequately substitute for accounting conservatism in other countries.

A potential avenue for future research is how the role of main bank systems will change in the future. In the future, main bank monitoring will be demanded by publicly listed SMEs, which face problems related to weaker corporate governance. The main bank system's role will change because many publicly listed SMEs can easily borrow and raise funds in capital markets as a result of the establishment of SME



markets like JASDAQ and Mothers. Since the mid-2000s, entrepreneurs have had the opportunity to go public in Japanese SME markets, and the number of newly listed young firms has dramatically increased since the establishment of these markets (Sakawa and Watanabel 2019). On the other hand, SMEs tend to suffer from severe agency problems, like perquisites or managerial entrenchment investments. To overcome these agency-related problems, main bank systems will be relied on, especially for firms with weaker corporate governance. Bank monitoring is important in SME markets to mitigate agency problems. Both main banks and bank-affiliated VCs act as effective monitors for SMEs (Sakawa and Watanabel 2019).

Our research opens new avenues for future research about alternative mechanisms to the Japanese main bank systems. First, this study suggests that bank lending would not be sufficient to function as effective monitoring mechanisms. Bank-appointed directors in Japan provide incentives for enhancing performance (Colpan and Yoshikawa 2012). Thus, internal control mechanisms like bank-appointed directors or auditors would be important as complements to the monitoring mechanisms of main bank systems. Second, an increase in institutional shareholders might substitute for the current role of main bank systems. According to survey results in 2018, over half of institutional shareholders are dissatisfied with corporate governance quality in Japan (Solomon 2019). Therefore, institutional shareholder monitoring might be an alternative to main bank systems in the future.

Acknowledgement We would like to thank for Guest Editor Derek Lehmborg and Shige Makino. Earlier version of this paper was presented at 2018 annual conference of AJBS (Academy of Japanese Business Study), AIB (Academy of International Business), and AAA (American Accounting Association). We also thank for Allan Bird, James Hagen, Tom Roehl, Fumiko Takeda, Jason Talakai, and Kazuhiko Yoshikawa for their comments on earlier drafts, which helped improve this article. This study is financially supported by the Grant-in-Aid for Young Scientists (A) (MEXT/JSPS KAKENHI Grant Number 17H04784), the Grant-in-Aid for Scientific Research (C) (MEXT/JSPS KAKENHI Grant Number 17K03695), and the Grant-in-Aid for Scientific Research (B) (MEXT/JSPS KAKENHI Grant Number 17KT0036). All remaining errors are solely our owns.

Appendix

See Table 9.



Table 9 Variable definitions

Variable	Definition
Earnings	Net income divided by the beginning of fiscal year market value of equity
DR	Indicator variable that takes the value of 1 if stock returns (<i>Ret</i>) are negative, and 0 otherwise
Ret	Stock returns over the fiscal year
MBD	It is equal to 1 if the proportion of main bank shareholdings are positive, otherwise it is 0
MBS	The proportion of main bank shareholdings
Bank lending	The sum of all bank loans divided by the market value of the firm
Non-MB lending	Non-main bank loan divided by the market value of the firm (non-main bank loan = the sum of all bank loans – main bank loans)
MTB	The market value divided by book value of capital of the firm
Leverage	The sum of debt divided by total assets
MV	Logarithm of the market value of the firm
CEO ownership	The percentage of CEO ownership
Ln(Assets)	Logarithm of total assets
Volatility	Stock volatility during 3 years
Volatility ²	Square of stock volatility (<i>Volatility</i>) during 3 years
Free cash	Cash flows from operating activities and investing activities divided by total assets

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