Ownership Structure and Market Efficiency

Stockholder/Manager Conflicts at the Dawn of Japanese Capitalism*

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Abstract

We present a framework to analyze the impact of ownership structure on stockholder/manager conflicts. We first predict that, in an inefficient market, investors motivate managers to pursue a higher return on equity instead of a higher return on asset and that this focus on short-term performance leads to leverage distortion. Using a sample of late nineteenth- to early twentieth-century Japanese firms, we show that mediocre performing firms boosted the return on equity by bond flotation, and a higher president-ownership concentration raised the return on asset and controlled bond leverage. President-ownership concentration offsets market inefficiency.

Keywords: stockholder/manager conflicts; multitask moral hazard; ownership structure; financial leverage; self-fulfilling distortion; skewness-adjusted variation coefficient.
JEL: G32; L23; O16; K22.

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1 Introduction

On whether ownership structure matters in stockholder/manager conflicts, Smith (1937[1776]) concluded it does, and was concerned that a diffused ownership structure might cause conflicts between shareholders and managers due to information asymmetry and lack of monitoring incentives for shareholders. Smith's capital market anxiety is another aspect of the same suggestion by Modigliani and Miller (1958) that if the financial markets were perfect, ownership structure should not matter. Linking the benchmarks, Jensen and Meckling (1976) and Fama (1980) predicted that discipline by more efficient capital markets and managers markets would discourage moral hazards of managers and majority shareholders.

We track changes in ownership structure, financial leverage, performance, and market valuation during the Japanese modernization. To do this, we construct a dataset of all firms listed on the Tokyo Stock Exchange from 1878 to 1910 by collecting financial statement data. Japan in the late nineteenth century was one of the early cases of non-US nations that succeeded in nurturing a capitalist economy.

We consider the possibility of leverage distortion by non-owner managers to manipulate the return on equity (ROE) in the short term instead of maximizing the return on asset (ROA). For a focused and practical prediction, we deploy a multitask moral hazard model tailored for managerial incentives. Shareholders can use two proxies to measure non-owner managerial performance—ROE and ROA. Shareholders might want to motivate non-owner managers by a performance-based payment using those proxies. Meanwhile, managers can reduce the ROE variance by leverage distortion. This is a shareholder maximization problem. Suppose a sufficiently inefficient and large market where investor information asymmetry is severe and shareholders cannot govern themselves by relational contracts. Then, it can be optimal for shareholders to reward the ROE instead of ROA and save the quality premium to be paid to risk-averse non-owner managers. Although the moral hazard of non-owner managers is predictable, anonymous shareholders encourage it in a self-fulfilling way.

In the inefficient Japanese market from the late nineteenth century to the early twentieth century, market participants predominantly rewarded the ROE but not the ROA. Responding to that, poorly and mediocre performing firms tended to mechanically raise the return on

equity by the leverage of bond flotation. By contrast, firms whose share concentrated at the president pursued the growth in the ROA, generally contained the leverage by bond flotation but raised it if it was to accompany the growth in the ROA. As a result, a president-ownership concentration led to the growth in the ROA but was irrelevant to the ROE and the leverage by bond flotation contributed to the ROA only in case of the top tier firms. President-ownership concentration offset the market inefficiency. Those facts seem to explain the significant role of ownership concentration in the non-US markets today.

The rest of the paper is organized as follows. Section 2 briefly describes the historical development of Japanese corporate finance under the corporate law modeled on German law. Section 3 introduces related literature. Section 4 presents a model to capture the self-fulfilling financial leverage distortion by risk-averse managers in the context of stockholder/manager conflicts under the separation of ownership and management. Thus, among possible stockholder/manager conflicts discussed by Jensen (2000), we focus on leverage distortions. We deduce a few hypotheses to be empirically tested. We predict that non-owner managers have incentives to raise a more than optimal leverage. Moreover, in an inefficient market with information asymmetry about non-owner manager actions, investors encourage leverage distortion to save the risk premium to be paid as part of risk-averse non-owner manager compensations. Section 5 describes the dataset we build. Section 6 examines whether ownership structure affected performance, and how the market rewarded corporate performance. We also test whether the Commercial Code of 1899 enactment affected the impact of ownership structure on performance. Section 7 focuses on bond flotation distortion. Section 8 concludes and discusses results.

2 Retrospection in German-Japanese resemblance

After the 1868 Meiji Restoration, the Japanese government adopted the civil law from continental Europe. The Commercial Code of 1899, modeled on German law, completed corporate law. The rising power of Germany inspired Japan's modernization in the adoption of the German-style constitution from 1890 to 1945 and the German-style commercial code

from 1899 to date. The effort at taking inspiration from Germany included the establishment of the Industrial Bank of Japan in 1897 to support crucial industries with a government debt guarantee (Lehmbruch (2001) and Vitols (2001)). The shared legal foundation is a basis for establishing corporate governance features that emphasize not only shareholder value but also stakeholder interests in contemporary civil law countries; Japan, Germany, and France (Shleifer and Vishny (1997); Tirole (2001); Salazar and Raggiunti (2016)).

However, we cannot characterize the challenges faced by Germany, Japan and other emerging powers from the late nineteenth century to the early twentieth century only by an effort of the domestic industrialization of a small closed economy. In the first age of globalization from the 1870s to the 1910s (Mauro, Sussman and Yafeh (2006), pp. 1–45; Thomadakis, Gounopoulos, Nounis and Riginos (2017); Betrn and Huberman (2016); Varian (2018)), internationalization of financial markets—the well-integrated international financial markets centered at the London market and efficient cross-border capital flow—as well as the free trade of goods was also of vital interests. Japan embraced advantage of the imposed free trade (Nakabayashi (2014); Kawashima (2018)) and, furthermore, adopted the gold standard (Mauro et al. (2006), pp. 49–54; Nakabayashi (2012)).

Before the First World War, the financial markets of the industrial world were even more deeply integrated, and the cross-border capital flow was active (Rajan and Zingales (2003); Mauro et al. (2006)). National financial markets were well embedded in international financial markets and showed minor differences. The German economy before the First World War was a competitive market and its civil law characteristics did not influence German corporate finance and governance (Fohlin (2007) and Burhop and Lübbers (2009)).

Japanese and German corporate governance began to change gradually post-First World War and in earnest during the Second World War. Cartels gained bargaining power in Weimar Germany when state-direction was combined with capital property relations and brought about the "Social Market Economy" in the Federal Republic of Germany. Similarly, state coordination was institutionalized during the Second World War, and post-war Japan inherited state-guided characteristics through "industrial policies." The transformations in Japan and Germany accompanied a rise in the role of the banking sector in corporate finance under the

stringent regulations introduced in the 1920s and 1930s and survived until the deregulation in the 1980s (Okazaki (1999); Jackson (2001); Vitols (2001); Ferguson and Voth (2008)).

Thus, the distinction between common law countries, represented by the US and the UK, and civil law countries represented by Japan and Germany, became significant due to structural changes from the 1920s to the 1940s when the latter formed an axis. While the axis shared legal origins dating back to the late nineteenth century, the heterogeneity of the industrial world was smaller under British dominance before the First World War.

Therefore, we begin our study not from La Porta, Lopez-de Silanes and Shleifer (2008)'s view on the post-Second World War divide between common law and civil law countries, but from a data-driven approach. As we later demonstrate, the Japanese market until the early twentieth century was not efficient and hence, ownership structure mattered. The difference between the common law and civil law distinction is inconsequential to this fact.

The Japanese experience, particularly in the period when the separation of ownership and management according to Berle and Means (1933) and Chandler (1977) was underway, would be a promising case. It transformed itself from the samurai's nation to a modern capitalist economy without sharing history with the West, as many emerging economies did. After toppling the Shogunate in 1868, the new imperial government began its modernization efforts. In 1878, the Tokyo Stock Exchange and the Osaka Stock Exchange were established. Furthermore, the Commercial Code of 1899 stipulated legal requirements for a joint-stock company and standardized financial statement forms. More information became publicly available and prompted further expansion of the stock and bond markets.

From the late nineteenth century, Japanese corporate finance and governance experienced two distinctive phases. First was the entrepreneurial boom of the mid-1880s. The cotton-spinning, railway, and other modern industries incurred massive initial expenses by taking the form of joint-stock companies. They issued corporate shares while relying on bank loans. Second phase was a reduction in bank loan reliance and an increase in bond flotation from the late 1890s (Hoshi and Kashyap (2001), pp. 15–50). From the late 1890s, senior employees began to climb to management positions and be promoted to board members. Functional diversification of the board toward professional management meant the shareholders faced a

possibility of managerial moral hazard.

Studies on advanced nations' experiences in the nineteenth and early twentieth centuries such as Borg, O. and Leeth (1989), Leeth and Borg (1994, 2000), and Banerjee and Eckard (2001) on the US, Franks, Mayer and Wagner (2006) and Kling (2006) on Germany, Hamano, Hoshi and Okazaki (2009) on Japan also provide us with contemporary policy implications. Financial markets of advanced economies had been tightly regulated until the 1980s. Most advanced economy regulations were introduced as a response to the financial markets collapse followed by the Great Depression in the 1930s. Amid the Great Depression, advanced nations tightened corporate finance regulations, reckoning severe market distortion due to asymmetric information. For example, the US enacted the Securities Act of 1933 and Securities Exchange Act of 1934. This created the Securities and Exchange Commission and established the Generally Accepted Accounting Principles in the 1930s. Among advanced nations, regulations in Japan and Germany were made particularly stringently; the banking sector replaced the stock and bond markets as the primary source of corporate finance.

In the US, the more stringent banking sector regulations induced households to reallocate financial assets from bank to brokerage accounts in the 1970s. The banks demanded deregulation, which led to disintermediation and a brokerage-banking re-convergence from the 1980s to the 1990s. The development of information and communication technologies that improved financial market efficiency validated the deregulation.

Other advanced nations followed the US experience from the 1980s. In the reform efforts of Japan and Germany, a cornerstone has been the stock and bond market deregulation. The stock and bond market deregulation and the subsequent disintermediation from the 1980s meant the recovery of the pre-Great Depression direct finance. Borg et al. (1989), Leeth and Borg (1994, 2000), Banerjee and Eckard (2001), Franks et al. (2006), Kling (2006), Hamano et al. (2009), Nakabayashi (2017) on the pre-Great Depression stock markets of advanced nations shared the viewpoint. Likewise, cross-country overviews such as La Porta et al. (2008) give regulatory alternatives. However, one of the most basic questions is not addressed: Did the market discipline work or did ownership structure complement a potentially imperfect market under lighter regulations in each nation before the Great Depression?

Most nations have implemented structural reforms to recover vibrant stock and bond markets without being conscious about how markets worked under lighter regulations, to what extent they were distorted due by asymmetric information, and to what extent the ownership structure complemented the potentially imperfect pre-Great Depression market. This study attempts to lay a foundation for understanding the origin of the Japanese capital market alongside previous works on pre-regulated markets. Reflecting on Japan's century-old experiences of ownership structure changes would supply meaningful lessons to Japan's ongoing structural reforms and also other nations' reforms.

3 Relevant literature

When residual claimants do not directly perform residual control, a moral hazard such as managerial exploitation of shareholders may arise (Smith (1937[1776]), pp. 699–799). It might be the stockholder/manager conflict Smith (1937[1776]) feared, which Byrd, Parrino and Pritch (1998) and Parrino, Poteshman and Weisbach (2005) revisited. It might also be stockholder/bondholder conflicts by controlling-shareholders who are often founders as Jensen and Meckling (1976) highlighted. It is expected to be severe when controlling-shareholders do not invest "real capital" in the firm (Morck, Wolfenzon and Yeung (2005)).

A remedy for moral hazard is an active secondary market for corporate shares (Holmstrom and Tirole (1993)). The threat of acquisition and replacement of managers is expected to discipline current managers, as argued since Jensen and Meckling (1976) and Fama (1980).

A question regarding this view is whether ownership structure matters for corporate governance. Demsetz and Lehn (1985) rejected a possible relationship between ownership concentration and performance for major US-listed firms, later supported by Himmelberg, Hubbard and Palia (1999) and Demsetz and Villalonga (2001). Using US data, Anderson and Reeb (2003) did not find evidence for minority shareholder exploitation by founding owner-managers. Morck, Shleifer and Vishny (1988) using US data found weak evidence that founding family participation by founding family on boards might deteriorate performance. Helwege, Pirinsky and Stulz (2007) described the evolution of listed firms using a 1970–2001 US

initial public offering dataset and found that better performers have become faster and more widely-held after being listed and that agency costs do not significantly affect the ownership structure evolution.

As Shleifer and Vishny (1986), Bolton and Scharfstein (1996), Mahrt-Smith (2005), Gorton and Kahl (2008), Aslan and Kumar (2012), and Dhillon and Rossetto (2015), among others, predict, there is an ownership structure diversity among US firms, and there must be a rationale for this diversity. Empirical results on the irrelevance of the difference in ownership structure do not contradict theoretical predictions and the reality of diversity. Consider an efficient market. A sufficiently efficient market implies market participation by price distortion and resource reallocation through arbitrage transactions. Thus, on equilibrium, we see multiple ownership structure types but hardly find statistical differences in performance among them.

Meanwhile, Davies, Hillier and McClogan (2005) using British data found a co-deterministic relationship between ownership structure and performance. A characteristic of continental European ownership structure is blockholding (Enriques and Volpin (2007)). However, the structural implications are mixed. Using European data, Laeven and Levine (2008) showed that multiple blockholders help prevent managers from exploiting small shareholders, which indicates that ownership structure matters for performance. Ben-Nasr, Boubaker and Rouatbi (2015) demonstrated, using French data, that ownership structure does affect financial leverage; that is, firms with a larger ownership-management divides are prone to extended debt maturity, while multiple blockholder presence curbs such distortions. Although Julian and Mayer (2001), using German data, deny the ownership structure effect on performance, their results t do not reject the hypothesis by Laeven and Levine (2008). Blockholders often control major German firms and that the banking sector dominates German corporate finance, although this has been gradually changing ever since the last two or three decades (Ringe (2015)).

Pindado, Requejo and de la Torre (2014), using Western European data, extracted an inverse-U-shaped relationship between ownership concentration and performance of family firms; performance increases to a threshold in ownership concentration and decreases beyond

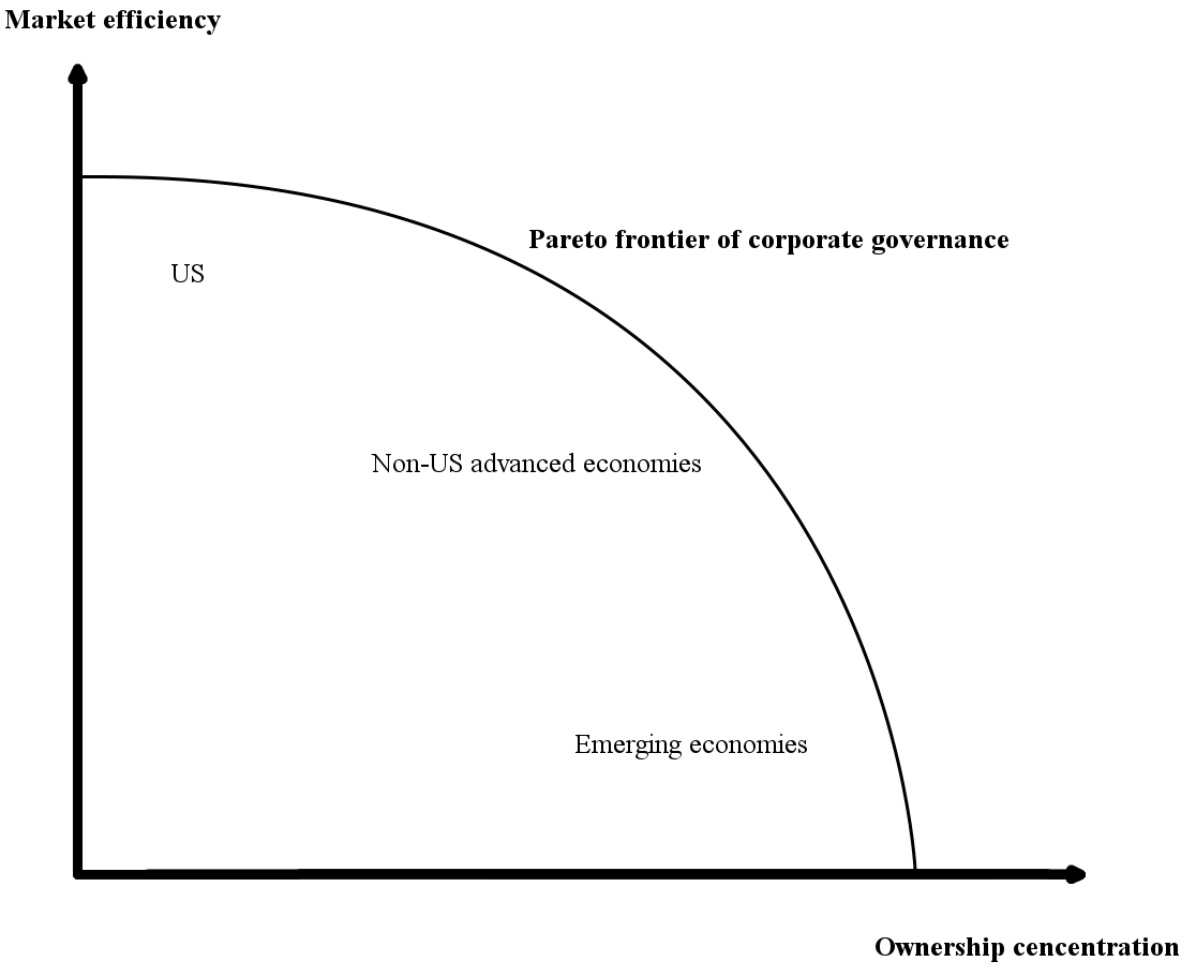
that. In non-family firms, ownership power is more favorable. Hamadi and Heinen (2015), using Belgian data, found that market valuation of non-family firms tends to monotonically increase in the degree of ownership concentration while the relationship is inversely U-shaped in family firms. Abdallah and Ismail (2017), using data from the Gulf Cooperation Council, also showed that a smaller ownership concentration should be accompanied by better governance to achieve the same performance. Using Ukrainian data, Mykhayliv and Zauner (2017) found that the state ownership tends to lower the level of investment while the management ownership has not significant impact on investment. Haider, Liu, Wang and Zhang (2018) found that the state ownership and resulting soft financial constraints improve corporate performance particularly in more corrupted countries by a dataset from 81 nations.

Japan is no exception among such non-US economies. The institutional backdrop of post-war Japan is relatively complicated. After Japan's surrender, the US attempted to transform Japan's market into the "widely-held" market such as the US by procuring conglomerate corporate shares and selling them to small investors and corporate employees. As a result, Japan became a "widely-held" market along with the US and the UK (La Porta, Lopez-de-Silanes and Shleifer (1999)).

Contrary to the US, however, diffused ownership did not nullify ownership discipline. Lichtenberg and Pushner (1994) found a positive relationship between insider ownership concentration and performance. Morck, Nakamura and Shivdasani (2000) validated the result by showing that managerial ownership monotonically contributed to corporate valuation. While post-war Japan-specific factors such as the main bank system made the relationship relatively ambiguous (Gedajlovic, Yoshikawa and Hashimoto (2005)), the overall tendency is that a more concentrated managerial ownership is positively correlated with better performance (Gedajlovic and Shapiro (2002)). Using data in the 2000s, Aman and Nguyen (2013) found that institutional ownership improves corporate credit rating. Sakawa and Watanabel (2018), using data from the late 2000s to the early 2010s, demonstrated that parent firm's control contributes to the growth of subsidiary firm. Thus, despite the US's experiment to transform the Japanese market in its image, there exists a positive relationship between ownership concentration and performance-valuation like in non-US advanced economies.

The differing observations between the US and non-US countries indicate that the significance of ownership structure is dependent on a condition that the US satisfies but others do not; a sufficiently efficient market. Let us summarize observations of previous works on two dimensions of market efficiency and ownership concentration. To close to the Pareto frontier on the plane, firms must be traded in a perfectly efficient market, be exclusively owned, or be between the extremes. The US is in the northwest of the plane, emerging economies are on the southeast, and non-US advanced economies are between them. As an economy departs from the west, ownership matters more in the economy (Figure 1).

Figure 1: Pareto frontier of corporate governance



The less efficient the market, the greater ownership concentration must be to offset in-

efficiency and curb distortion. In particular, we share a common concern about the stockholder/manager conflicts under managerial risk-aversion with Parrino et al. (2005). While Parrino et al. (2005) evaluated possible distortions in investment decision with the leverage as given, we focus on possible leverage distortions by risk-averse managers.

4 Model

4.1 Model of self-fulfilling leverage distortion

Among the possible stockholder/manager conflicts mentioned by Jensen (2000), we focus on leverage distortions by risk-averse managers. We make predictions by applying Holmstrom and Milgrom (1991)'s multitask principal-agent model to the context of an undesirable self-fulfilling equilibrium in an imperfect market (Diamond and Dybvig (1983); Goldstein and Pauzner (2004); Kunieda and Shibata (2016)).

For simplicity, we consider an extreme case where managers do not own shares. Assuming a two-dimensional task for a manager, the first dimension, t_1, is to increase the ROE and the second, t_2, is to increase the ROA. We standardize managerial human resource endowment as 1 such that $t_1 + t_2 = 1$. Let C denote the total personal cost to be incurred by the manager. We assume that the effort costs to raise the ROE and the ROA are identical. We further assume that C is strictly convex such that $C_{11}C_{22} - C_{12}^2 > 0$ where $C_{11} \equiv \partial^2 C/\partial t_1^2$, $C_{22} \equiv \partial^2 C/\partial t_2^2$, and $C_{12} \equiv \partial^2/\partial t_1 \partial t_2$. The identical costs in both dimensions imply that $C_{11} = C_{22}$. Thus, under the strict convexity assumption, $C_{11} = C_{22} > C_{12}$. Note that we do not exclude the possibility that efforts in both dimensions are complements such that $C_{12} < 0$.

Let B_1 and B_2 denote the marginal effort contribution in each dimension such that $B_1 \equiv \partial \mathrm{ROE}/\partial t_1$ and $B_2 \equiv \partial \mathrm{ROA}/\partial t_2$. For simplicity, we assume that marginal contribution of the first best efforts for both ROA and ROE are identical and standardized such that $B_1 = B_2 = 1$. The following theoretical predictions also hold when allowing $B_1 \neq B_2$. Given the random market shock, we assume that the ROE and ROA are realized such that $\mathrm{ROE} = t_1 + \epsilon_1$ and $\mathrm{ROA} = t_2 + \epsilon_2$, where $\epsilon_1 \sim N(0, \sigma_1^2)$, $\epsilon_2 \sim N(0, \sigma_2^2)$, and $\epsilon_1 \epsilon_2 \equiv \sigma_{12}$.

We further assume that the manager is risk-averse such that his utility function is approxi-

mated by an absolute-constant-risk-averse utility function, $u\left(w-C\right)=1-\exp\left[-r\left(w-C\right)\right]$, where w is the remuneration and r is the constant absolute risk-averse coefficient. Conventional wisdom encourages managers to be risk-tolerant. However, as many empirical works have shown, managerial compensations in contemporary US firms are largely designed to reduce managerial risk (Blanchard, Lopez-de Silanes and Shleifer (1994); Murphy (1999); Kraft and Niederprüm (1999) and Bertrand and Mullainathan (2001)). The most persuasive explanation of the phenomenon is that managers are risk-averse humans (Murphy (2002)).

Since Knight (1921), the ability to bear risk and uncertainty, which is transformed into subjective risk (Savage (1954)), has centered on the essential managerial abilities. The argument is consistent with the emphasis on the risk aversion of managers. Firms that take a higher risk tend to make massive payments to firm executives notably in the US. Those should be if managerial utility is marginally diminishing over remuneration, that is, if their utility function is concave. The concavity of the utility function is equivalent to risk aversion of the agent. Curvature of the utility function is the measure of risk aversion.

For simplicity, we temporarily assume that $\mathrm{E}\left[\mathrm{ROE}\right]=\mathrm{E}\left[\mathrm{ROA}\right]$. In a perfect market under symmetric information, any financial leverage distortion is impossible. Hence, $\sigma_1^2=\sigma_2^2$ and $\sigma_{12}=1$, since random shock arises only in the current profit—the common numerator. However, in an imperfect market, managers can mechanically stabilize or increase the ROE by manipulating leverage, withholding the information about the manipulation.

Suppose that the market evaluates managers by the ROE as well as the ROA, which is not manipulable by the financial leverage, and that the market is inefficient. Then, risk-averse managers would distort the distribution of the manipulable ROE such that $\sigma_1^2<\sigma_2^2$ and $\sigma_{12}<1$ and its expected value is than those of the ROA. We see this type of manipulation in emerging markets whose transparency is still yet to be completed (de Wet and du Toit (2007)). However, this is also an issue in advanced economies (Bergstresser, Desai and Rauh (2006)). Japan's early-stage experience should provide practical lessons to contemporary investors.

Note that for shares to be actively traded and for sufficient liquidity to be maintained, the market needs a sufficient number of "uninformed" investors who know only publicly available information (Kyle (1985); Admati and Pfleiderer (1988); Collin-Dufresne and Fos (2016)).

For analytical simplicity, we proceed with holding the assumption that $\mathrm{E}[\mathrm{ROE}] = \mathrm{E}[\mathrm{ROA}]$, $\epsilon_1 \sim N(0, \sigma_1^2)$, and $\epsilon_2 \sim N(0, \sigma_2^2)$, $\epsilon_1\epsilon_2 \equiv \sigma_{12}$. Relying on the liquid market's monitoring power (Holmstrom and Tirole (1993)), to motivate risk-averse managers, their compensations are designed to reflect stock prices, either directly by stock options or indirectly by bonuses. We standardize the compensation schedule as

$$(1) \qquad w = \alpha + \mathrm{STP} = \alpha + \beta_1 \mathrm{ROE} + \beta_2 \mathrm{ROA} = \alpha + \beta_1(t_1 + \epsilon_1) + \beta_2(t_2 + \epsilon_2),$$

where STP is the firm's stock price, and α is the minimum transfer that satisfies the individual rationality constraint by equality.

We have $\mathrm{E}[u(w - C)] = 1 - \exp[-r(\mathrm{E}[w] - C - r\mathrm{V}[w]/2)] = 1 - \exp\left[-r\left(\boldsymbol{\beta}^T\boldsymbol{t} - C(\boldsymbol{t}) - r\boldsymbol{\beta}^T\boldsymbol{\Sigma}\boldsymbol{\beta}/2\right)\right]$ where $\boldsymbol{t} = (t_1, t_2)^T$, $\boldsymbol{\beta} = (\beta_1, \beta_2)^T$, and $\boldsymbol{\Sigma}$ denotes the covariance matrix whose diagonal elements are σ_1^2 and σ_2^2 and off-diagonal elements are σ_{12}. The manager then chooses $\boldsymbol{t}$, given remuneration schedule $\boldsymbol{\beta}$, such that $\boldsymbol{t} = \arg\max_{\boldsymbol{t}} \boldsymbol{\beta}^T\boldsymbol{t} - C(\boldsymbol{t}) - r\boldsymbol{\beta}^T\boldsymbol{\Sigma}\boldsymbol{\beta}/2$. Its first order condition to maximize the managerial payoff is $\boldsymbol{\beta}^T = \partial C(\boldsymbol{t})/\partial \boldsymbol{t}$, which is the incentive compatibility constraint of the manager.

Given $\partial C(t)/\partial t = \boldsymbol{\beta}^T$, Shareholder j of n total shareholders maximizes the total surplus multiplied by share owned such that $\max s_j\left[B(\boldsymbol{t}) - C(\boldsymbol{t}) - r\boldsymbol{\beta}^T\boldsymbol{\Sigma}\boldsymbol{\beta}/2\right]$, where s_j denotes stock holding ratio of shareholder j, and $\sum_{j=1}^{j=n} s_j = 1$, given the incentive compatibility constraint of the manager.

The first order condition of shareholder maximization gives the optimal vector of incentive weights, $\boldsymbol{\beta}^* = (\partial B/\partial \boldsymbol{t})\left[\boldsymbol{I} + r\boldsymbol{\Sigma}\nabla C(\boldsymbol{t})\right]^{-1}$, where $\boldsymbol{I}$ is a unit matrix and $\nabla C(\boldsymbol{t})$ is a Hessian matrix of $C(\boldsymbol{t})$. Therefore, under the assumptions $B_1 = B_2 = 1$ and $C_{11} = C_{22}$, we have optimal incentive vector $\boldsymbol{\beta}^*$ as follows.

$$(2) \qquad \begin{aligned} \beta_1^* &= \frac{1 + r(\sigma_2^2 - \sigma_{12})(C_{11} - C_{12})}{1 + r\left[(\sigma_1^2 + \sigma_2^2)C_{11} + 2\sigma_{12}C_{12}\right] + r^2(\sigma_1^2\sigma_2^2 - \sigma_{12}^2)(C_{11}^2 - C_{12}^2)}, \\ \beta_2^* &= \frac{1 + r(\sigma_1^2 - \sigma_{12})(C_{11} - C_{12})}{1 + r\left[(\sigma_1^2 + \sigma_2^2)C_{11} + 2\sigma_{12}C_{12}\right] + r^2(\sigma_1^2\sigma_2^2 - \sigma_{12}^2)(C_{11}^2 - C_{12}^2)}. \end{aligned}$$

We immediately have the following lemma.

Lemma 1. *Self-fulfilling distortion:*

(i) In an efficient market, the incentive is not distorted.

(ii) In an inefficient market, the incentive is distorted toward an overemphasis on the return on equity.

(iii) Distortion is increasing in the degree of market inefficiency.

Proof. (i) In an efficient market, $\sigma_1^2 = \sigma_2^2$. That implies $\beta_1 = \beta_2$ which is the first best under $B_1 = B_2$.

(ii) In an inefficient market, $\sigma_1^2 < \sigma_2^2$ due to the manipulated financial leverage. That implies $\beta_1^* > \beta_2^*$, which deviates from the first best under $B_1 = B_2$.

(iii) The more inefficient the market is, the smaller σ_{12} is. Furthermore,

$$\frac{\partial\left(\beta_1/\beta_2\right)}{\partial\sigma_{12}} = \frac{r^2\left(\sigma_2^2-\sigma_1^2\right)\left(C_{11}-C_{12}\right)^2}{\left[\left(r\sigma_1^2-r\sigma_{12}\right)\left(C_{11}-C_{12}\right)+1\right]^2} > 0,$$

in an inefficient market where $\sigma_1^2 < \sigma_2^2$.

□

Specifically, if managerial distortion successfully reduces ROE risk, then the variance of the ROE would become smaller than that of the ROA, which is standardized by the expected value and the skewness (Kraus and Litzenberger (1976); Scott and Horvath (1980); Adrian and Rosenberg (2008); Conrad, Dittmar and Ghysels (2013)). That is, $(\sigma_1/\mathrm{E}\left[\mathrm{ROE}\right])\|\gamma_1\| < (\sigma_2/\mathrm{E}\left[\mathrm{ROA}\right])/\|\gamma_2\|$, where σ_1 and σ_2 are standard deviations and $\gamma_1 \equiv \mathrm{E}\left[\left(\mathrm{ROE}-\mathrm{E}\left[\mathrm{ROE}\right]\right)^3\right]/\sigma_1^3$ and $\gamma_2 \equiv \mathrm{E}\left[\left(\mathrm{ROA}-\mathrm{E}\left[\mathrm{ROA}\right]\right)^3\right]/\sigma_2^3$ are the skewness of ROE and ROA respectively.

Thus, our statement is described by variances standardized by the mean and the third-order central moment; or equivalently, by the skewness adjusted variation coefficients, instead

of raw variances as follows: If the market is perfectly efficient, then

$$\begin{aligned} &\left|\frac{\sigma_1^2}{\mathrm{E}\left[\mathrm{ROE}\right]} \times \frac{\sigma_1^2}{\mathrm{E}\left[\left(\mathrm{ROE}-\mathrm{E}\left[\mathrm{ROE}\right]\right)^3\right]}\right| = \\ &\left|\frac{\sigma_1/\mathrm{E}\left[\mathrm{ROE}\right]}{\gamma_1}\right| = \left|\frac{\sigma_2/\mathrm{E}\left[\mathrm{ROA}\right]}{\gamma_2}\right| \\ &= \left|\frac{\sigma_2^2}{\mathrm{E}\left[\mathrm{ROA}\right]} \times \frac{\sigma_2^2}{\mathrm{E}\left[\left(\mathrm{ROA}-\mathrm{E}\left[\mathrm{ROA}\right]\right)^3\right]}\right|; \end{aligned} \tag{3}$$

and, if the market is inefficient, then

$$\left|\frac{\sigma_1/\mathrm{E}\left[\mathrm{ROE}\right]}{\gamma_1}\right| < \left|\frac{\sigma_2/\mathrm{E}\left[\mathrm{ROA}\right]}{\gamma_2}\right|. \tag{4}$$

Investors can be aware that the skewness-adjusted variation coefficient of the ROE is smaller than that of the ROA by a cross-sectional comparison and hence can infer that some managers might have distorted the financial leverage to smoothen or increase the ROE mechanically. However, given ones' small share, individual investors do not have incentives to investigate what a specific firm is doing, and because of this, they rely on the market price to know monitor firm performance. It encourages free-riding among investors. The resulting financial leverage distortion implies that the skewness-adjusted variation coefficient of the ROA is higher than that of the ROE. Given that, investors increase the ROE weight to save risk premium to be paid to risk-averse managers, which induces managerial overemphasis on the ROE. Financial leverage distortion mechanically attains an ROE increase.

Risk aversion in an inefficient market where managers can withhold information about their financial leverage manipulation implies that the distortion is encouraged by investors and arises in a self-fulfilling way. Although investors reckon that emphasis on short-term ROE would distort the leverage and reduce the long-term value of the firm, everyone is free-riding each other and the myopic emphasis on the ROE continues.

A way to imperfectly remove the distortion is to have a dominant shareholder who owns long-term shares. The adverse effects on long-term profitability of distorted leverage intended to mechanically smoothen or increase the ROE become discernible in time when confronting the repayment of more than optimal debt. If an uninformed shareholder pursues short-term

transactions, then he would believe that he can successfully sell at a profit to another uninformed investor before the distortion is finally revealed rather than make costly efforts to curb the distortion.

Short-sighted trades by small uninformed investors pursuing a higher ROE is an individually optimal response to one another, and hence can be an equilibrium strategy. Alternatively, a high ROE might be correctly perceived as a signal of leverage distortion. If so, large buyers expect that correction of the distortion would lead to a better long-term performance by block holding and find a reason to buy. If a current shareholder perceive the possibility of distortion but he does not have an incentive and a claim to correct it, the possible distortion is a reason to sell for him. In that case, a market that rewards the ROE brings about incremental improvement of resource allocation through transfer of ownership. Trade transfers ownership between equally uninformed investors but from a market participant who is more likely to make a wrong decision to one who is more likely to make a right decision in the sense of Bond and Eraslan (2010). Thus, if there already exists a dominant shareholder to seek long-term growth in the share price, or if an investor finds an opportunity to become a dominant shareholder and correct distortion, he has an incentive to refuse or remove distortion.

The return on a commitment to long-term hold can be greater only if he recognizes the short-term divergence between the share price and the fundamentals unknown to other market participants. This means that he is an informed investor. The best-informed position is to be on the board. If he manages the firm, he would know the business fundamentals better than outsiders. A higher manager-ownership concentration would reduce the agency problem because of having a higher claim and being better informed.

Earlier cases for the advantages of ownership concentration included the privately-owned British cotton-spinning firms in the industrial revolution. The firms addressed the concern of moral hazard suggested by Smith (1937[1776]). A more recent case of public firm ownership concentration by a founding family is an early generation of rising East Asian family firms (Claessens, Djankov and Lang (2000)). In Japan, from the late nineteenth century to the early twentieth, a single dominant shareholder implied family ownership.

However, whether they can be long-lived is another question. Founding family exploitation

of minority shareholders, highlighted by Jensen and Meckling (1976), is a challenge. Another is successor talent. Consanguineous descendants of the talented are not necessarily talented. A Japanese choice is adopting a talented adult as a successor of the family business. The system dating back to the late seventeenth century from farmer to samurais has disciplined Japanese family businesses. On average, family firms perform better than non-family firms, different from other advanced economies (Mehrotra, Morck, Shim and Wiwattanakantang (2013)).

Paraphrasing implications of Lemma 1, our hypotheses to be empirically tested are as follows:

H1 In an inefficient market where the skewness-adjusted variation coefficient of the ROE is smaller than that of the ROA, the stock prices are more responsive to the ROE than the ROA.

H2 In an inefficient market, a higher president-ownership concentration implies a smaller financial leverage distortion.

H3 In an inefficient market, a higher president-ownership concentration implies a better performance measured by the ROA.

5 Data

5.1 Ownership structure

As Berle and Means (1933) and Chandler (1977) observed in US cases; Foreman-Peck and Hannah (2013) in British cases; and Yui (1979, 1989, 1992), Miyamoto and Abe (1999), and Nakamura (2000, 2007) in Japanese cases, senior employees were promoted to be managers and independent were hired businessmen as "professional managers" among leading companies from the 1890s to the 1900s. Furthermore, Miwa and Ramseyer (2002) showed that "prominent" managerial board participation positively contributed to corporate performance in Japanese cases in the early twentieth century.

These studies, however, did not deal with the possible effects of ownership structure changes within the board. To differentiate the ownership structure, we introduce two simple

measures. First is the president's stock- holding ratio. Second is the product of the president's stockholding ratio and that of the board member with the smallest stockholding. The first measure is expected to capture the moral hazard effect that decreases in the president's stockholding ratio. In other words, the performance of the case firm is expected to increase in this measure (H2 and H3). The second measure is to examine how the degree of managerial ownership consolidation affects performance. When the board structure is closer to shareholder representative, the value of the second measure is greater. Meanwhile, if an employee is promoted to a board member, the value of the second measure is expected to become smaller. The measure evaluates how the deviation from the classical form of the board and the employee promotion to board member could affect performance (H2 and H3).

In the entire Tokyo market, having small shareholders, ownership concentration was considerable. Overall, the top 1% largest shareholders owned 53% of shares of listed firms as of 1897 (Table 1). We exploit the ownership variance for our estimates.

INSERT Table01 HERE

5.2 Description of dataset

Our sample covers all 95 firms (i) listed on the Tokyo Stock Exchange from the first half of 1878 to the second half of 1910 (t). The financial statements of the firms are available in the business archives of the Japan Digital Archives Center delivered by Maruzen-Yushodo.[1] Note that firms predominantly owned by conglomerates such as Mitsubishi and Mitsui were not listed and are not included in our samples. Thus, distortion due to substantial conglomerate protection by the government is not captured. We manually collected information about financial status and the stockholding to build a panel dataset of 95 firms.

Financial status variables we use are sales ($\mathrm{SAL}_{i,t}$), total assets ($\mathrm{TAS}_{i,t}$), paid-in stock ($\mathrm{STK}_{i,t}$),[2] outstanding bank loans ($\mathrm{LON}_{i,t}$), outstanding bond ($\mathrm{BND}_{i,t}$), profit in the current

[1] `https://j-dac.jp/top/eng/index.html` Last accessed: September 12, 2016.

[2] The Japanese Commercial Code then, as its counterparts in the West, required a joint stock company to specify the face value of its share and permitted partial payment at subscription and hence there existed two kinds of "capital" as legal terms; the capital stock registered, which was the total sum of face value of issued shares, and the paid-in capital, which was the amount really invested. Thus, the paid-in stock is the capital in an ordinary sense.

term ($\mathrm{PRF}_{i,t}$), total dividend ($\mathrm{DVD}_{i,t}$)[3], and balance brought forward ($\mathrm{BBF}_{i,t}$) for firm i in term t. Discrepancies of the total observation numbers come from unstandardized financial statements, particularly before the enactment of the Commercial Code of 1899.

As measures of ownership structure, we calculate the president's stockholding ratio ($\mathrm{SCEO}_{i,t}$), the stockholding ratio of the board member with the smallest ratio ($\mathrm{SMIN}_{i,t}$), and their product ($\mathrm{CNSL}_{i,t} \equiv \mathrm{SCEO}_{i,t} \times \mathrm{SMIN}_{i,t}$) for firm i in term t.

Regarding the share prices, we use average prices $\mathrm{STP}_{i,t}$ for firm i in term t published in Tokyo Stock Exchange (1928).[4] The observations are fewer than that of financial reports because over-the-counter exchanges were active.

To control for the financial market conditions when estimating determinants of bank loans and bond flotation, we use average bank interest rates in the prefecture of Tokyo surveyed by the Bank of Japan.[5] The interest rates are available only from the second half of 1886. Descriptive statistics are shown in Table 2. The dataset is available in Mendeley Data and Data in Brief.

INSERT Table02 HERE

We use cross-section fixed effects model as an estimation method to control for invariant variables during the sample period, such as long-established routines, historical legacy, corporate culture, corporate philosophy, and other constant factors. We can then identify the effect of ownership structure changes on financial leverage and performance. When using cross-section fixed effects model, we need to control for exogenous, and often cyclical, shocks. Thus, we use the growth in the real gross national product ($\Delta\mathrm{GNP}_t \equiv \mathrm{GNP}_t - \mathrm{GNP}_{t-1}$) as a control variable.[6]

In our estimates below, we stick to fixed effects models because of a concern that error terms and independent variables might be correlated. With our dataset, the Hausman pretests do not necessarily reject the pretest null hypothesis that the random effects model is correct.

[3]The sum of ordinary dividend and special dividend in the term.

[4]Tokyo Stock Exchange (1928), "Sho tokei (Statistics)," pp. 125–261.

[5]Historical Statistics: Institute for Monetary and Economic Studies, Bank of Japan (`http://www.imes.boj.or.jp/hstat/`: Last accessed on September 18, 2016).

[6]The GNP series from 1877 to 1884 is from Teranishi (1983), p. 181 and those from 1885 to 1910 are from Ohkawa, Takamatsu and Yamamoto (1974), p. 225. The GNP series in those sources are the annual basis, and hence we produced bi-annual series by linear supplements.

Furthermore, we have confirmed that the random effects models do not qualitatively change our results. However, given the concern on the Hausman pretest (Guggenberger (2010)), we conservatively adopt the fixed effects model. We want to warrant reproducibility by sharing our dataset in Menedeley Data and Data in Brief.

6 Structure of ownership and efficiency of the market

6.1 Responsiveness and prediction power of the market

We first evaluate whether the Japanese market from 1878 to 1910 was distorted due to the market inefficiency. The skewness-adjusted variation coefficient of the ROE ($\mathrm{ROE}_{i,t}(\equiv \mathrm{PRF}_{i,t}/\left(\mathrm{STK}_{i,t}+\mathrm{BBF}_{i,t}\right)$ and that of the ROA ($\mathrm{ROA}_{i,t} \equiv \mathrm{PRF}_{i,t}/\mathrm{TAS}_{I,t}$) are shown in Table 3.

INSERT Table03 HERE

The skewness-adjusted variation coefficient of the ROE becomes smaller as managers mechanically smoothen or raise the ROE by leverage distortion. Thus, a change in the gap between the skewness-adjusted variation coefficient of the ROE and that of the ROA tracks the evolution of the market distortion. Table 4 shows that the gap rose over time. As seen in the number of samples, the number of listed firms also increased. With the market size being fixed, an increase in the number of listings might lower the stock liquidity and suppress efficiency.

Regarding the efficiency of the Tokyo Stock Exchange, Nakabayashi (2017), using micro data in the 1890s, presented that the Bank of Japan's world's first unconventional monetary policy in the 1890s substantially lowered equity risk premium, as the unconventional monetary policies by major central banks from the late 2000s to the 2010s held down risk premia in the bond markets. Hamano et al. (2009) pointed out inefficient pricing due to low liquidity in the Tokyo Stock Exchange in the early twentieth century. Capitalization of the Tokyo Stock Exchange continued to rise from 50% of the gross domestic product in 1920 and hit the pre-war hight, 122% in 1936 (Hoshi and Kashyap (2001), p. 39). Still, Bassino and Lagoarde-Segot (2015) demonstrated that the price index of the Tokyo Stock Exchange did not satisfy

the weak form efficiency, using data in the 1930s.

Our result shows that distorted incentives of managers remained to be an issue in the entire sample period in line with our hypothesis H1 on the difference in the skewness-adjusted variation coefficients. The finding is consistent with those of previous works on the inefficient Tokyo market before the Second World War.

We then test hypothesis H1 on the market responsiveness to the ROE and the ROA. We first regress the growth in the stock price ($\Delta \log(\mathrm{STP}_{i,t})$) on the growth in the ROE ($\Delta\mathrm{ROE}_{i,t}$), the growth in the ROA ($\Delta\mathrm{ROA}_{i,t}$) in line with (1), and the growth in real gross national product ($\Delta\mathrm{GNP}_t$) to control for cyclical shocks common to all cross sections as follows:

$$\Delta \log(\mathrm{STP}_{i,t}) = \beta_0 + \beta_1 \Delta\mathrm{ROE}_{i,t} + \beta_2 \Delta\mathrm{ROA}_{i,t} + \beta_3 \Delta\mathrm{GNP}_t + \mu_i + \epsilon_{i,t}, \tag{5}$$

where μ_i is the dummy variable for firm i and $\epsilon_{i,t}$ is the error term.

When separately including $\Delta\mathrm{ROE}_{i,t}$ and $\Delta\mathrm{ROA}_{i,t}$ in specifications 4–1 and 4–2, both have a significantly positive coefficient. However, following (5), once we control for both in specification 4–3, only $\Delta\mathrm{ROE}_{i,t}$ has a significantly positive coefficient. The market predominantly responded to the ROE rather than ROA. The result supports our hypothesis H1 on short-sighted ROE emphasis by an inefficient market.

We also test the market response to the dividend. If the market is sufficiently efficient such that payout reveals no additional information privately withheld by firms, this term is expected to have a significantly negative coefficient to keep shareholder value constant as predicted by Miller and Modigliani (1961). If dividend growth reveals additional information to predict future cash flow increase, the term is expected to have a significantly positive coefficient, as predicted by Sasson and Huffman (1986). Our estimate specifications thus are

$$\Delta \log(\mathrm{STP}_{i,t}) = \beta_0 + \beta_1 \Delta\mathrm{ROE}_{i,t} + \beta_2 \Delta\mathrm{ROA}_{i,t} + \beta_3 \left[\frac{\mathrm{TOD}_{i,t}}{\mathrm{TAS}_{i,t}}\right] + \beta_4 \Delta\mathrm{GNP}_t + \mu_i + \epsilon_{i,t}, \tag{6}$$

When only $\mathrm{TOD}_{i,t}/\mathrm{TAS}_{i,t}$ is in specification 4–4, it has a significantly positive coefficient.

The result is robust when (6) is applied in specification 4–5. The market responded to the payout as a positive signal, which indicates a low level market efficiency.

INSERT Table 4 Here

6.2 Ownership structure and performance

We now analyze the ownership structure and performance relationship. We regress the ROE ($\mathrm{ROE}_{i,t}$), the ROA ($\mathrm{ROA}_{i,t}$), and the return on sales (ROS, $\mathrm{ROS}_{i,t}$) on two ownership structure indicators: 1) the president's stockholding ratio, $\mathrm{SCEO}_{i,t}$, and 2) degree of the ownership consolidation within the board characterized as $\mathrm{CNSL}_{i,t} = \mathrm{SCEO}_{i,t} \times \mathrm{SMIN}_{i,t}$, where $\mathrm{SMIN}_{i,t}$ denotes the stockholding ratio of the board member with the smallest stockholding ratio. The ROA ($\mathrm{ROA}_{i,t}$) captures efficiency in using corporate total asset, and the ROS ($\mathrm{ROS}_{i,t}$) measures how large the margin is or how operational costs are saved. Our interest is in whether the ownership structure affects efficiency in asset usage and operations.

The first indicator directly measures firm controllability by the president who is often the founding owner in the sample period. The second one measures whether the board functions as the consolidated representative of shareholders. If the ownership structure diffuses or employees are promoted as board members, then $\mathrm{CNSL}_{i,t}$ decreases. A decrease in $\mathrm{CNSL}_{i,t}$ implies that the board becomes less representative of shareholders and, hence, they might more likely deviate from the maximization of shareholder value. We also insert the sales ($\mathrm{SAL}_{i,t}$) as a regressor to control for cyclical but heterogeneous changes in business volumes.

Thus, for the ROE ($\mathrm{ROE}_{i,t}$), we run

$$
\begin{aligned}
\mathrm{ROE}_{i,t} &= \beta_0 + \beta_1 \mathrm{SCEO}_{i,t} + \beta_2 \mathrm{SAL}_{i,t} + \beta_3 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t}, \\
\mathrm{ROE}_{i,t} &= \beta_0 + \beta_1 \mathrm{CNSL} i,t + \beta_2 \mathrm{SAL}_{i,t} + \beta_3 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t},
\end{aligned} \tag{7}
$$

for the ROA ($\mathrm{ROA}_{i,t}$),

$$
\begin{aligned}
\mathrm{ROA}_{i,t} &= \beta_0 + \beta_1 \mathrm{SCEO}_{i,t} + \beta_2 \mathrm{SAL}_{i,t} + \beta_3 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t}, \\
\mathrm{ROA}_{i,t} &= \beta_0 + \beta_1 \mathrm{CNSL}_{i,t} + \beta_2 \mathrm{SAL}_{i,t} + \beta_3 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t},
\end{aligned} \tag{8}
$$

and for the return on sales ($\mathrm{ROS}_{i,t}$), dropping the sales from regressors,

$$
\begin{aligned}
\mathrm{ROS}_{i,t} &= \beta_0 + \beta_1 \mathrm{SCEO}_{i,t} + \beta_2 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t}, \\
\mathrm{ROS}_{i,t} &= \beta_0 + \beta_1 \mathrm{CNSL}_{i,t} + \beta_2 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t}.
\end{aligned} \tag{9}
$$

The results are presented in Table 5. We find that the president-ownership concentration ($\mathrm{SCEO}_{i,t}$) did not significantly improve the ROE ($\mathrm{ROE}_{i,t}$, specification 5–1), but substantially improved the ROA ($\mathrm{ROA}_{i,t}$, specification 5–3) and the ROS ($\mathrm{ROS}_{i,t}$, specification 5–5). Furthermore, a higher consolidation of ownership within the board ($\mathrm{CNSL}_{i,t}$) improved all of the ROE, ROA, and ROS (specifications 5–2, 5–4, and 5–6).

INSERT Table05 HERE

Thus, we can conclude that the higher president-ownership concentration or higher consolidation of ownership within the board contributed to long-term growth and profitability by raising asset usage and operations efficiency. The results support our hypothesis H3 on the positive impact of president-ownership concentration on the ROA.

6.3 Impact of the Commercial Code of 1899 enactment

In 1899, the Commercial Code came into force. It was modeled on German law and introduced German corporate law for corporate governance. An immediate change was greater transparency in the disclosure of financial status. It obligated joint-stock companies to disclose their financial status in a detailed and standardized form. It made more corporate financial status information publicly available and might have reduced distortion due to asymmetric information. We insert the interaction term between the dummy variable of enactment ($\mathrm{d1899}$) (which takes a value 1 if the year is 1899 or later and 0 if otherwise) and the ownership structure variables ($\mathrm{d1899} \times \mathrm{SCEO}_{i,t}$, $\mathrm{d1899} \times \mathrm{CNSL}_{i,t}$), and the enactment dummy variable itself ($\mathrm{d1899}$) into specifications (7), (8), and (9) to examine the effect.

The results are presented in Table 6. All specifications indicate that the Commercial Code did not affect performance on its own. However, the positive interaction term $\mathrm{d1899} \times \mathrm{SCEO}_{i,t}$

coefficient in specification 6–5 suggests that the Code enactment improved the operational efficiency of firms with president-ownership concentration. The Code was intended to make the market more transparent. However, its enactment did not make ownership discipline less compelling. Ownership concentration and the judiciary system's development were not substitutes but complements in that stage.

INSERT Table06 HERE

By Tables 5 and 6, contrary to modern US firms, we conclude that ownership structure was relevant. The results indicate that the Japanese market was not sufficiently efficient and allowed for self-fulfilling distortion predicted by Lemma 1.

7 Distorted financial leverage

7.1 Financial leverage and performance

We have shown that president-ownership concentration improved asset usage efficiency in the inefficient market. Our prediction on its cause is that smaller ownership concentration would allow risk-averse managers to distort leverage and manipulate the ROE as a response to the market inefficiency (H2).

To examine the validity of the hypothesis, we first regress the ROE ($\mathrm{ROE}_{i,t}$) on two channels of financial leverage; the bank loans ($\mathrm{LON}_{i,t}$) and the outstanding bond ($\mathrm{BND}_{i,t}$), over the paid-in capital ($\mathrm{STK}_{i,t}$) and balance brought forward ($\mathrm{BBF}_{i,t}$),

$$\begin{aligned}\mathrm{ROE}_{i,t} = \beta_0 + \beta_1 \frac{\mathrm{LON}_{i,t}}{\mathrm{STK}_{i,t} + \mathrm{BBF}_{i,t}} + \beta_2 \frac{\mathrm{BND}_{i,t}}{\mathrm{STK}_{i,t} + \mathrm{BBF}_{i,t}} \\ + \beta_3 \mathrm{SAL}_{i,t} + \beta_4 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t}.\end{aligned} \tag{10}$$

The results are shown in Table 7. Specification 7–1, including the entire sample, does not show a significant tendency. The result hints at a heterogeneous effect depending on corporate profitability. Thus, specifications 7–2, 7–3, 7–4, 7–5, and 7–6 separate the sample into ROE ranges: less than 0%, 0% to 10%, 10% to 20%, 20% to 30%, and greater than 30%. For the

sub-sample where the ROE is less than 0% and less than 10$ (specifications 7–2 and 7–3), we see that the leverage by the outstanding bond significantly contributed to the ROE. For sub-sample between 20% and 30% of the ROE, the outstanding bond slightly contributed to the ROE (specification 7–5).

INSERT Table07 HERE

To further investigate leverage effects, we next regress the ROA ($\mathrm{ROA}_{i,t}$) on the financial leverages,

$$\mathrm{ROA}_{i,t} = \beta_0 + \beta_1 \frac{\mathrm{LON}_{i,t}}{\mathrm{STK}_{i,t} + \mathrm{BBF}_{i,t}} + \beta_2 \frac{\mathrm{BND}_{i,t}}{\mathrm{STK}_{i,t} + \mathrm{BBF}_{i,t}} + \beta_3 \mathrm{SAL}_{i,t} + \beta_4 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t}. \tag{11}$$

Table 8 shows that for the range of the ROE higher than 30% (specification 8–6), the outstanding bond positively contributed to the ROA. Thus, excluding the most profitable firms, financial leverages did not improve asset usage efficiency.

INSERT Table08 HERE

Next, we regress the ROS ($\mathrm{ROS}_{i,t}$) on the leverages,

$$\mathrm{ROS}_{i,t} = \beta_0 + \beta_1 \frac{\mathrm{LON}_{i,t}}{\mathrm{STK}_{i,t} + \mathrm{BBF}_{i,t}} + \beta_2 \frac{\mathrm{BND}_{i,t}}{\mathrm{STK}_{i,t} + \mathrm{BBF}_{i,t}} + \beta_3 \Delta \mathrm{GNP}_t + \mu_i + \epsilon_{i,t}, \tag{12}$$

where we drop $\mathrm{SAL}_{i,t}$ from the regressors to avoid a mechanical correlation. The results are in Table 9. We observe that in the ROE ranges between 0% and 10%, and 10% and 20% (specifications 9–3 and 9–4), the outstanding bond negatively affected. Meanwhile, the bank loans results are mixed, showing a negative impact in the ROE range 10 to 20% (specification 9–4) and a positive one in the ROE range 0 to 10% (specification 9–3).

INSERT Table09 HERE

Therefore, concerning the most profitable firms whose ROE was higher than 30%, the bond leverage positively contributed to the asset usage efficiency (specification 8–6 in Table 8). The leverage by the outstanding bond negatively affected the ROS in the ROE range of 0 to 20% (specifications 9–3 and 9–4 in Table 9). By contrast, the impact of the outstanding bond on the ROE was positive in the ROE range less than 10% (specifications 7–2 and 7–3 in Table 7). The results indicate leverage distortion to smoothen or increase the ROE mechanically among mediocre performing firms.

7.2 Ownership structure and financial leverage

From Lemma 1, we predict that smaller ownership concentration in an inefficient market implies a greater financial leverage distortion to smoothen or increase the ROE mechanically at the expense of optimal capital structure (H2). To specify a possible distortion, we first regress the financial leverage changes by the bond flotation ($\Delta\left[\mathrm{BND}_{i,t}/(\mathrm{STK}_{i,t}+\mathrm{BBF}_{i,t})\right]$) on ownership structure changes (—considering a possible association between ownership structure changes and changes in the ROA ($\Delta\mathrm{ROA}_{i,t}$)), with controlling for business volume changes by the growth in sales ($\Delta\mathrm{SAL}_{i,t}$) and changes in the Tokyo market interest rate ($\Delta\mathrm{TKR}_t$), as follows:

$$
\begin{aligned}
\Delta\left[\frac{\mathrm{BND}_{i,t}}{\mathrm{STK}_{i,t}+\mathrm{BBF}_{i,t}}\right] &= \beta_0+\beta_1\Delta\mathrm{SCEO}_{i,t} \\
&\quad +\beta_2\Delta\mathrm{SAL}_{i,t}+\beta_3\Delta\mathrm{TKR}_t+\beta_4\Delta\mathrm{GNP}_t+\mu_i+\epsilon_{i,t}, \\
\Delta\left[\frac{\mathrm{BND}_{i,t}}{\mathrm{STK}_{i,t}+\mathrm{BBF}_{i,t}}\right] &= \beta_0+\beta_1\mathrm{SCEO}_{i,t}+\beta_2\Delta\mathrm{SCEO}_{i,t}\times\Delta\mathrm{ROA}_{i,t}+\beta_3\Delta\mathrm{ROA}_{i,t} \\
&\quad +\beta_4\Delta\mathrm{SAL}_{i,t}+\beta_5\Delta\mathrm{TKR}_t+\beta_6\Delta\mathrm{GNP}_t+\mu_i+\epsilon_{i,t},
\end{aligned}
\tag{13}
$$

and

$$
\begin{aligned}
&\Delta\left[\frac{\mathrm{BND}_{i,t}}{\mathrm{STK}_{i,t}+\mathrm{BBF}_{i,t}}\right] \\
&=\beta_0+\beta_1\Delta\mathrm{CNSL}_{i,t}+\beta_2\Delta\mathrm{SAL}_{i,t}+\beta_3\Delta\mathrm{TKR}_t+\beta_4\Delta\mathrm{GNP}_t+\mu_i+\epsilon_{i,t}, \\
&\Delta\left[\frac{\mathrm{BND}_{i,t}}{\mathrm{STK}_{i,t}+\mathrm{BBF}_{i,t}}\right] \\
&=\beta_0+\beta_1\Delta\mathrm{CNSL}_{i,t}+\beta_2\Delta\mathrm{CNSL}_{i,t}\times\Delta\mathrm{ROA}_{i,t} \\
&\quad+\beta_3\mathrm{ROA}_{i,t}+\beta_4\Delta\mathrm{SAL}_{i,t}+\beta_5\Delta\mathrm{TKR}_t+\beta_6\Delta\mathrm{GNP}_t+\mu_i+\epsilon_{i,t}.
\end{aligned}
\tag{14}
$$

The results are presented in Table 10. First, we observe that president-ownership concentration ($\mathrm{SCEO}_{i,t}$) tended to lower the financial leverage by the bond flotation (specification 10–1). However, we also observe that it raised the leverage by the bond flotation when it was accompanied by an increase in the ROA ($\mathrm{ROA}_{i,t}$) as shown by the significantly positive coefficient of the interaction term ($\Delta\mathrm{SCEO}_{i,t}\times\Delta\mathrm{ROA}_{i,t}$) in specification 10–2. The president-ownership concentration was likely to control financial leverage unless it was associated with improvement in asset usage efficiency. The result is consistent with our hypothesis H2 on the leverage distortion reduction by ownership concentration.

INSERT Table10 HERE

By running the same regressions for the changes in the leverage by an increase in bank loans, we find no significant impact of the ownership structure as shown in Table 11. Leverage distortion due to a diffused ownership structure was severe in the bond market but not with bank loans.

INSERT Table11 HERE

7.3 Bond flotation as the channel of distortion

A higher president-ownership concentration led to an increase in the ROA (Table 5). Higher leverage through the bond flotation increased the ROA for top firms with higher than 30% ROE (Table 8). A higher president-ownership concentration lowered the financial leverage through

the bond flotation but raised it if a rise in the ROA accompanied it (Table 10). The president-ownership concentration of ownership never affected the ROE (Table 5). Meanwhile, greater leverage through the bond flotation raised the ROE in the range of less than 10% (Table 7).

Given the results, we conclude that mediocre performing firms whose ownership structure was more diffused were more prone to the distortion of financial leverage through over-reliance on the bond flotation. Mediocre performing firms in the ROE range of less than 10% deceived the market when raising the leverage to smoothen or increase the short-term ROE mechanically. These results are mutually consistent and support our hypotheses H2 on a reduction in the leverage distortion by a higher ownership concentration.

Mediocre performing firms were particularly inclined to distort the financial leverage in the inefficient Japanese market from 1878 to 1910. A higher president-ownership concentration controlled the bond flotation but raised the bond flotation in the case where it contributed to an increase in the ROA. Thus, in the inefficient market, a higher ownership concentration contributed to better leverage, as predicted by our hypothesis H2.

8 Conclusion

The inconsequential ownership structure in modern US firms is possibly explained by market discipline (Demsetz and Lehn (1985); Himmelberg et al. (1999) and Demsetz and Villalonga (2001)). This seems to be the case because of the sufficient degree of efficiency of the modern US market.

By contrast, our results show that ownership structure substantially affected corporate performance in the Tokyo market from the late nineteenth century to the early twentieth century. Pricing in the Tokyo market predominantly rewarded the ROE but not the ROA. Contrary to the ROA, the ROE is mechanically manipulable by leverage distortion. Investors can decern it. However, suppose that the market is so inefficient that it is considerably costly to specify the leverage distortion by each firm and that the discount rate of investors is substantially high. Then, it is optimal for investors to reward the ROE instead of the ROA. The ROE is manipulable by managerial leverage distortion, hence, investors can save the risk premium to

be paid to risk-averse managers by rewarding the ROE rather than the ROA. It sacrifices the long-term performance of the investment. However, it is beyond the scope of uninformed and short-sighted investors.

The way to offset the market weakness is an ownership concentration centered on the president who is often the founder. A long-sighted and informed president pursue long-term growth in the firm's valuation. Our results show that a higher president-ownership concentration led to a higher ROA, but it did not affect the ROE. Enactment of the Commercial Code of 1899 augmented the impact of the president-ownership concentration. Market transparency and the ownership discipline were complements rather than substitutes.

A higher president-ownership concentration tended to hold down the leverage by bond flotation unless it was to boost the ROA. Higher bond leverage raised the ROA only for the top tier firms. Meanwhile, mediocre performing firms were tempted to raise the bond leverage to boost the ROE.

By contrast, we do not find evidence of bank loan distortion. The different results for corporate bonds and bank loans are consistent with what we saw in Japan in the after the deregulation. Agency problem is more significant in the bond market as banks faced by disintermediation improved their efficiency in screening (Anderson and Makhija (1999); Uchida and Satake (2009); Nakagawa and Uchida (2011); Uchida and Udell (forthcoming)).

In summary, the inefficient Tokyo market from the late nineteenth century to the early twentieth century allowed managers to manipulate the ROE by bond flotation. A higher president-ownership concentration suppressed the adverse effect of the market inefficiency. Thus, our work, along the lines of Morck et al. (2000), Gedajlovic and Shapiro (2002), Pindado et al. (2014), and Hamadi and Heinen (2015), provides more evidence that ownership matters in non-US markets.

We observed that the management-ownership concentration enabled the firm to pursue long-term growth. A remaining question is whether ownership concentration on its own, which was not necessarily at the management, helped. Case studies support the possibility. Railway industry in the late nineteenth was one of the most technology intensive one. Thus, the tendency was promotion of experts into management (Nakamura (2000)). Then,

the other way of shareholder/manager conflicts arose. Small- and medium-sized shareholders who tended to sell shares in short order preferred payout to investment for long-term growth. Typically, large shareholders who tended to be "buy-and-hold" type helped management avoid under-investment (Nakamura (2014)). In case of another leading industry in the age, the cotton spinning (Nakamura (2015); Dong, Gong, Peng and Zhao (2015)), large "buy-and-hold" type shareholders tended to persuade small- and medium-sized shareholders to approve investment suggested by managers rather than demand payout in shareholders annual meetings (Yuki (2011)). These case studies indicate a possibility that ownership concentration itself improved management in an emerging Japan, as Abdallah and Ismail (2017) showed for Gulf Cooperative Council region.

Our results also have a policy implication. Prevalence of family firms in non-US nations often attracts attention because it might accompany a divide between management and control—typically as stockholder/bondholder conflicts—and hurt efficiency (Claessens et al. (2000) and Hamadi and Heinen (2015)). The exploitation of other stakeholders by the founding owner is precisely the issue on which Jensen and Meckling (1976) focused. However, we should also admit the virtue of blockholding that includes founding families. If the market is not sufficiently efficient to contain stockholder/manager conflicts, something else must cancel it out. Next to the efficient market, concentrated ownership is among the second-best alternatives. That is why family firms still prosper in non-US nations. Desirable reforms in those nations make the market more transparent without restricting blockholding.

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Table 1 Distribution of ownership, 1897.

Shares owned	Individuals				Institutions				Total			
	Number of shareholders	share	Number of shares	share	Number of shareholders	share	Number of shares	share	Number of shareholders	share	Number of shares	share
1-99	467	24.4%	22,043	1.5%	2	4.5%	189	0.0%	469	24.0%	22,232	1.0%
100-499	962	50.3%	209,432	14.5%	10	22.7%	2,571	0.3%	972	49.7%	212,003	9.5%
500-999	207	10.8%	140,402	9.7%	7	15.9%	3,917	0.5%	214	10.9%	144,319	6.5%
1,000-1,999	151	7.9%	201,586	14.0%	6	13.6%	9,808	1.3%	157	8.0%	211,394	9.5%
2,000-2,999	50	2.6%	120,260	8.3%	4	9.1%	8,182	1.0%	54	2.8%	128,442	5.8%
3,000-3,999	22	1.2%	73,142	5.1%	2	4.5%	7,286	0.9%	24	1.2%	80,428	3.6%
4,000-4,999	9	0.5%	40,137	2.8%	1	2.3%	4,000	0.5%	10	0.5%	44,137	2.0%
5,000-5,999	13	0.7%	68,844	4.8%	1	2.3%	5,250	0.7%	14	0.7%	74,094	3.3%
6,000-6,999	4	0.2%	25,318	1.8%	0	0.0%	0	0.0%	4	0.2%	25,318	1.1%
7,000-7,999	3	0.2%	22,524	1.6%	2	4.5%	14,221	1.8%	5	0.3%	36,745	1.7%
8,000-8,999	2	0.1%	16,766	1.2%	3	6.8%	25,694	3.3%	5	0.3%	42,460	1.9%
9,000-9,999	2	0.1%	18,625	1.3%	1	2.3%	9,575	1.2%	3	0.2%	28,200	1.3%
10,000-	20	1.0%	482,785	33.5%	5	11.4%	691,558	88.4%	25	1.3%	1,174,343	52.8%
Total	1,912	100.0%	1,441,864	100.0%	44	100.0%	782,251	100.0%	1,956	100.0%	2,224,115	100.0%

Table 2 Descriptive statistics of firms listed at the Tokyo Stock Exchange, from the first half of 1878 to the second half half of 1910.

Number of individual firms (cross sections) / variables	95	Number of total observations	Unit	Mean	Median	Maximum	Minimum	Standard deviation	Skewness	Kurtosis
Amount of sales in the current term	SAL	1,101	Yen	1,673,988	524,863	19,305,644	600	2,818,222.923	2.791	11.617
Total assets as of the current term	TAS	1,119	Yen	15,717,824	3,651,671	301,457,885	52,168	35,907,995.178	5.014	31.721
Paid-in stock as of the current term	STK	1,077	Yen	6,111,014	1,600,000	102,000,000	25,000	12,036,180.793	4.681	32.877
Bank loans as of the current term	LON	1,119	Yen	375,992	0	13,146,042	0	1,083,525.975	4.911	36.511
Outstanding bond as of the current term	BND	1,119	Yen	1,471,965	0	93,568,012	0	8,000,257.208	7.924	70.028
Profit in the current term	PRF	1,081	Yen	388,115	97,992	18,084,554	-1,318,361	837,159.095	9.887	188.851
Total dividends in the current term	DVD	979	Yen	283,615	75,000	3,648,813	0	480,640.730	2.721	12.120
Balance brought forward as of the end of the current term	BBF	1,113	Yen	88,170	10,195	2,316,513	-1,065,271	241,258.728	3.750	26.400
Average share price in the current term	STP	323	Yen	89.1015	68.3000	425.5000	6.2400	76.721	1.818	6.290
Return on equity: =PRF/(STP+BBF)	ROE	1,040	percent	8.1012%	6.2254%	104.6430%	-104.7981%	0.108	1.598	33.371
Return on asset: =PRF/TAS	ROA	1,080	percent	3.3989%	2.9467%	34.6725%	-33.8713%	0.038	0.875	23.463
Stock holding ratio of the president as of the current term: =[Shares owned by President]/[Total Share]	SCEO	610	percent	5.1408%	2.7633%	70.0000%	0.0000%	0.071	4.248	30.622
Stock holding ratio of the director whose stock holding ratio is the smallest in the board as of the current term: [Share owned by the board member]/[Total Share]	SMIN	610	percent	1.1309%	0.7000%	10.0000%	0.0000%	0.015	3.360	17.700
Measure of ownership consolidation in the board: =SCEO×SMIN	CNSL	610	per ten thousand	8.7819‰	2.0000‰	130.0000‰	0.0000‰	0.002	3.630	16.941

Notes : All values are nominal terms. Japan had adopted the silver standard until September 1897 and hence its exchange rate against th US dollar and the Sterling pound had been voltile. From October 1897 to the First World War, Japan adopted the gold standard. The fixed exchange rate stiputed by the Coinage Act of 1897 was JPY100=USD49.875 and the rate was sustained by the monetary policy of the Bank of Japan until the breakout of the First Word War.

Table 3 Skewness-adjusted variation coefficient from the first half of 1878 to the second half of 1910.

peirod	ROE	ROA	Degree of distortion
	a	*b*	*b* – *a*
1878–1888	0.3185	0.3425	0.0239
Number of observations	59	72	
1889–1899	0.3891	0.4877	0.0986
Number of observations	245	250	
1900–1910	24.8754	119.7480	94.8726
Number of observations	736	758	
1878–1910	0.8355	1.2643	0.4288
Number of observations	1,040	1,080	

Notes: ROE: return on equity. ROA: return on asset.

Table 4 Determinants of the stock prices (STP), from the first half of 1879 to the second half of 1910.

Dependent variable	$\Delta\log(STP_{i,t})$		$\Delta\log(STP_{i,t})$		$\Delta\log(STP_{i,t})$		$\Delta\log(STP_{i,t})$		$\Delta\log(STP_{i,t})$	
	4−1		4−2		4−3		4−4		4−5	
estimation method	panel least squares		panel least squares		panel least squares		panel least squares		panel least squares	
Cross section fixed effect	fixed		fixed		fixed		fixed		fixed	
Independent variables		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic
Constant	-0.0046	-0.22	-0.0085	-0.40	-0.0042	-0.20	0.0021	0.11	0.0022	0.11
$\Delta ROE_{i,t}$	1.5407	3.66 ***			2.2891	3.24 ***			-0.0242	-0.38
$\Delta ROA_{i,t}$			2.4061	2.12 **	-2.4499	-1.31			-1.5132	-0.74
$\Delta(TOD_{i,t}/TAS_{i,t})$							7.4979	4.30 ***	9.3439	3.22 ***
ΔGNP_t	0.0000	0.22	0.0001	0.37	0.0000	0.16			0.0000	0.34
adjusted R^2		0.04		-0.01		0.04		0.07		0.08
Log likelihood		-3.38		-7.75		-2.40		9.39		12.66
F statistic		1.33		0.92		1.35		1.69 **		1.69 **
Number of individual firms (cross sections)		24		25		24		23		22
Number of total observations		217		218		217		209		201

Notes : STP: Stock price offirm i in semiannual period. ROE: returon on equity. ROA: return on asset. TOD: total payouf of dividend. TAS: total assets. GNP: Groth National Product. ***, **, and * denote significance of 1, 5, and 10 percent levels respectively.

Table 5 The return on equity (ROE), return on asset (ROA), and return on sales (ROS) and the stock ownership structure, from the second half of 1878 to the second half of 1910.

Dependent variables	$ROE_{i,t}$		$ROE_{i,t}$		$ROA_{i,t}$		$ROA_{i,t}$		$ROS_{i,t}$		$ROS_{i,t}$	
	5–1		5–2		5–3		5–4		5–5		5–6	
estimation method	Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares	
Cross section fixed effect	fixed		fixed		fixed		fixed		fixed		fixed	
Independent variables		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic
Constant	0.0678	8.37 ***	0.0688	11.44 ***	0.0292	10.44 ***	0.0317	14.96 ***	-0.3955	-3.90 ***	0.0351	0.47
$SCEO_{i,t}$	0.0945	0.83			0.0943	2.45 **			11.9172	7.90 ***		
$CNSL_{i,t}$			7.0553	2.29 **			2.8618	2.76 ***			223.2661	5.32 ***
$SAL_{i,t}$	0.0000	8.41 ***	0.0000	8.56 ***	0.0000	6.77 ***	0.0000	6.76 ***				
ΔGNP_t	-0.0001	-3.52 ***	-0.0001	-3.55 ***	0.0000	-2.97 ***	0.0000	-3.09 ***	-0.0003	-0.64	-0.0004	-0.96
adjusted R^2		0.47		0.48		0.42		0.42		0.18		0.12
Log likelihood		599.53		591.10		1,225.36		1,226.28		-909.40		-927.25
F statistic		8.21 ***		8.36 ***		6.86 ***		6.90 ***		2.76 ***		2.17
Number of individual firms (cross sections)		67		67		70		70		70		70
Number of total observations		560		560		582		582		582		582

Notes : ROE: returon on equity. ROA: returon on asset. ROS: returon on sales. SCEO: ownership share of the CEO. CNSL:Ownership consolidation within the board = SCEO×SMIN, where SIMIN: ownership shaer of the board member whose onwership was smallest withiint the board. SAL: sales. GNP: gross national product. ***, **, and * denote significance of 1, 5, and 10 percent levels respectively.

Table 6 Impacts of the Commercial Code on the asset and operation efficiency, from the second half of 1878 to the second half of 1910.

Dependent variables	$ROE_{i,t}$		$ROE_{i,t}$		$ROA_{i,t}$		$ROA_{i,t}$		$ROS_{i,t}$		$ROS_{i,t}$	
	6–1		6–2		6–3		6–4		6–5		6–6	
estimation method	Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares	
Cross section fixed effect	fixed		fixed		fixed		fixed		fixed		fixed	
Independent variables		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic
Constant	0.0829	5.53 ***	0.0817	7.15 ***	0.0313	6.23 ***	0.0345	8.77 ***	-0.1119	-0.59	-0.1238	-0.78
$SCEO_{i,t}$	0.0555	0.24			0.1086	1.47			1.0395	0.37		
$d1899 \times SCEO_{i,t}$	0.0397	0.17			-0.0186	-0.25			13.0829	4.59 ***		
$CNSL_{i,t}$			8.2257	1.39			3.1851	1.65 *			192.4261	2.48 **
$d1899 \times CNSL_{i,t}$			-1.2086	-0.20			-0.3774	-0.19			37.1312	0.46
d1899	-0.0220	-1.31	-0.0198	-1.39	-0.0034	-0.58	-0.0045	-0.89	-0.3508	-1.58	0.2326	1.17
$SAL_{i,t}$	0.0000	8.57 ***	0.0000	8.74 ***	0.0000	6.83 ***	0.0000	6.85 ***				
ΔGNP_t	-0.0001	-3.51 ***	-0.0001	-3.54 ***	0.0000	-2.96 ***	0.0000	-3.09 ***	-0.0003	-0.62	-0.0004	-0.98
adjusted R^2		0.47		0.48		0.42		0.42		0.21		0.13
Log likelihood		601.08		592.83		1,225.98		1,227.04		-895.13		-925.62
F statistic		8.03 ***		8.19 ***		6.67 ***		6.72 ***		3.16		2.15
Number of individual firms (cross sections)		67		66		70		70		70		70
Number of total observations		560		552		582		582		582		582

Notes : ROE: return on equity. ROA: return on asset. ROS: return on sales. SCEO: Share of ownership of the CEO. d1899: Dummy variable of enactment of the Civil Code of 1899, takes 1 if year is 1899 or later and 0 otherwise. CNSL: Ownersship consolidation within the board = SCEO×SMIN, where SMIN: the ownership share of the board member whose ownership was smallest within the board. ***, **, and * denote significance of 1, 5, and 10 percent levels respectively.

Table 7 The return on equity (ROE) and the financial leverage, from the second half of 1878 to the second half of 1910.

Dependent variables	$ROE_{i,t}$		$ROE_{i,t}$		$ROE_{i,t}$		$ROE_{i,t}$		$ROE_{i,t}$		$ROE_{i,t}$	
	7–1		7–2		7–3		7–4		7–5		7–6	
estimation method	Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares	
Cross section fixed effect	fixed		fixed		fixed		fixed		fixed		fixed	
Independent variables		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic
Constant	0.0639	14.69 ***	-0.1969	-1.92	0.0469	39.50 ***	0.1448	30.77 ***	0.2266	18.02 **	0.2806	2.69 **
$LON_{i,t}/(STK_{i,t}+BBF_{i,t})$	0.0097	1.24	-0.0137	-0.04	0.0013	0.74	-0.0106	-0.49	-0.0168	-0.17	-0.0169	-0.06
$BND_{i,t}/(STK_{i,t}+BBF_{i,t})$	0.0012	0.31	2.7259	2.21 **	0.0041	4.10 ***	-0.0023	-0.69	0.0870	1.74 *	1.1332	1.39
$SAL_{i,t}$	0.0000	7.31 ***	0.0000	-2.32 **	0.0000	6.10 ***	0.0000	-2.83 ***	0.0000	0.55	0.0000	2.14
ΔGNP_t	-0.0001	-3.70 ***	0.0003	1.36 *	0.0000	-1.75 *	0.0000	0.54	0.0000	1.24	0.0000	0.08 **
adjusted R^2		0.63		0.54		0.49		0.22		0.24		0.33
Log likelihood		1,184.50		57.67		1,991.91		364.04		132.96		21.81
F statistic		10.18 ***		3.18 ***		9.59 ***		2.05 **		1.91 **		2.24 *
number of individual firms (cross sections)		89		24		82		37		15		9
Restriction of observation by ROE	no restriction		ROE≤0%		0%<ROE≤10%		10%<ROE≤20%		20%<ROE≤30%		30%<ROE	
Number of total observations		1,031		52		746		148		54		31

Notes: ROE: return on equity. LON: bank borrowing that did not include outstanding bond. STK+BBF=own capital, wheree STK=paid in stock and BBF=Balance broght forward (retained earnings). ***, **, and * denote significance of 1, 5, and 10 percent levels respectively.

Table 8 The return on asset (ROA) and the financial leverage, from the second half of 1878 to the second half of 1910.

Dependent variables	$ROA_{i,t}$		$ROA_{i,t}$		$ROA_{i,t}$		$ROA_{i,t}$		$ROA_{i,t}$		$ROA_{i,t}$	
	8–1		8–2		8–3		8–4		8–5		8–6	
estimation method	Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares	
Cross section fixed effect	fixed		fixed		fixed		fixed		fixed		fixed	
Independent variables		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic
Constant	0.0334	19.94	-0.0707	-1.37	0.0241	24.63 ***	0.0754	28.94 ***	0.1146	12.88 ***	0.1013	4.22
$LON_{i,t}/(STK_{i,t}+BBF_{i,t})$	-0.0018	-0.61	-0.0279	-0.16	-0.0022	-1.48	-0.0292	-2.44 **	-0.0134	-0.20	-0.0127	-0.18
$BND_{i,t}/(STK_{i,t}+BBF_{i,t})$	-0.0007	-0.45	1.0002	1.62	-0.0006	-0.72	-0.0008	-0.44	-0.0413	-1.17	0.5041	2.68 **
$SAL_{i,t}$	0.0000	1.79 *	0.0000	-1.65	0.0000	2.61 ***	0.0000	-8.35 ***	0.0000	-3.11 ***	0.0000	-0.29
ΔGNP_t	0.0000	-2.61 ***	0.0001	1.26	0.0000	-0.69	0.0000	-1.04	0.0000	1.29	0.0001	0.75
adjusted R^2		0.32		-0.08		0.32		0.76		0.78		0.73
Log liklehood		2,169.01		93.48		2,135.60		451.61		151.63		67.34
F statistic		6.36 ***		0.86		5.15 ***		12.77 ***		11.70 ***		7.86 ***
number of individual firms (cross sections)		89		24		82		37		15		9
Restriction of observation by ROE	no restriction		ROE≤0%		0%<ROE≤10%		10%<ROE≤20%		20%<ROE≤30%		30%<ROE	
Number of total observations		1,031		52		746		148		54		31

Notes: ROA: return on asset. LON: outstanding bank borrowing. STK+BBF=own capital, where STK= paid in capital and BBF=Balance brought forward (retained earnings). BND: outstanding corporate bond liability. SAL: sales. GNP: gross national product. ***, **, and * denote significance of 1, 5, and 10 percent levels respectively.

Table 9 The return on sales (ROS) and the financial leverage, from the second half of 1878 to the second half of 1910.

Dependent variables	$ROS_{i,t}$		$ROS_{i,t}$		$ROS_{i,t}$		$ROS_{i,t}$		$ROS_{i,t}$		$ROS_{i,t}$	
	9–1		9–2		9–3		9–4		9–5		9–6	
estimation method	Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares		Panel least squares	
Cross section fixed effect	fixed		fixed		fixed		fixed		fixed		fixed	
Independent variables		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic		*t* statistic
Constant	0.2522	6.21 ***	-1.2166	-0.31	0.3050	35.39 ***	0.3528	29.63 ***	0.4509	15.35	0.6997	2.82 **
$LON_{i,t}/(STK_{i,t}+BBF_{i,t})$	0.1123	1.16	0.8750	0.06	0.0675	3.80 ***	-0.3112	-4.43 ***	-0.9404	-2.16	-0.2063	-0.13
$BND_{i,t}/(STK_{i,t}+BBF_{i,t})$	-0.0164	-0.34	0.6668	0.03	-0.0177	-1.83 *	-0.0289	-2.69 ***	-0.0347	-0.15	2.2648	0.75
ΔGNP_t	-0.0003	-1.00	-0.0041	-0.43	0.0000	-0.03	-0.0001	-1.78 *	0.0003	2.08	-0.0006	-0.26
adjusted R^2		0.10		-0.44		0.59		0.84		0.65		0.39
Log likelihood		-1,401.04		-137.61		283.71		187.88		50.67		-33.89
F statistic		2.28 ***		0.40		13.76 ***		20.35 ***		6.75 ***		2.78 **
number of individual firms (cross sections)		89		24		82		37		33		9
Restriction of observation by ROE	no restriction		ROE≤0%		0%<ROE≤10%		10%<ROE≤20%		20%<ROE≤30%		30%<ROE	
Number of total observations		1,031		52		746		148		54		31

Notes : ROS: return on sales. LON: outtanding bank borrowing. STK+BBF=own capital, where STK= paid in capital and BBF = balance broaght forward (retained earnings). BND: Outstanding corporate bond liability. GNP: gross national product. ***, **, and * denote significance of 1, 5, and 10 percent levels respectively.

Table 10 Determinants of the changes in outstanding bond (BND), from the first half of 1887 to the second half of 1910.

Dependent variables	$\Delta[BND_{i,t}/(STK_{i,t}+BBF_{i,t})]$		$\Delta[BND_{i,t}/(STK_{i,t}+BBF_{i,t})]$		$\Delta[BND_{i,t}/(STK_{i,t}+BBF_{i,t})]$		$\Delta[BND_{i,t}/(STK_{i,t}+BBF_{i,t})]$	
	10–1		10–2		10–3		10–4	
estimation method	Panel least squares		Panel least squares		Panel least squares		Panel least squares	
Cross section fixed effect	fixed		fixed		fixed		fixed	
Independent variables		*t* statistic		*t* statistic		*t* statistic		*t* statistic
Constant	0.0011	0.56	0.0018	0.90	0.0013	0.63	0.0019	
$\Delta SCEO_{i,t}$	-0.1238	-1.88 *	-0.0475	-0.63				
$\Delta SCEO_{i,t} \times \Delta ROA_{i,t}$			14.2044	2.03 **				
$\Delta CNSL_{i,t}$					-0.0302	-0.01	-0.5787	-0.22
$\Delta CNSL_{i,t} \times \Delta ROA_{i,t}$							-45.9281	-0.56
$\Delta ROA_{i,t}$			-0.1619	-2.59 **			-0.1795	-2.78 ***
$\Delta SAL_{i,t}$	0.0000	-0.01	0.0000	1.23	0.0000	-0.06	0.0000	1.50
ΔTKR_t	0.0007	0.34	0.0011	0.54	0.0002	0.08	0.0002	0.10
ΔGNP_t	0.0000	0.97	0.0000	0.52	0.0000	0.95	0.0000	0.48
adjusted R^2		0.02		0.07		0.01		0.05
Log likelihood		808.57		818.37		806.58		813.64
F statistic		1.20		1.61		1.11		1.40
Number of individual firms (cross sections)		43		42		43		42
Number of total observations		397		390		397		390

Notes : BND: Outstanding corporate bond liability. STK+BBF=own capital, where STK=paid in capital, BBF=balance brought forward. SCEO: Share of ownership of the CEO. ROA: return on asset. CNSL: ownership consolidation withint the borad=SCEO×SNIN, where SMIN=share of the board member whose ownership share was smallest within the board. TAR: market interest rate in Tokyo prefecture. GNP: gross national product. ***, **, and * denote significance of 1, 5, and 10 percent levels respectively.

Table 11 Determinants of the changes in bank loans (LON), from the first half of 1887 to the second half of 1910.

Dependent variables	$\Delta[LON_{i,t}/(STK_{i,t}+BBF_{i,t})]$		$\Delta[LON_{i,t}/(STK_{i,t}+BBF_{i,t})]$		$\Delta[LON_{i,t}/(STK_{i,t}+BBF_{i,t})]$		$\Delta[LON_{i,t}/(STK_{i,t}+BBF_{i,t})]$	
	11−1		11−2		11−3		11−4	
estimation method	Panel least squares		Panel least squares		Panel least squares		Panel least squares	
Cross section fixed effect	fixed		fixed		fixed		fixed	
Independent variables		*t* statistic		*t* statistic		*t* statistic		*t* statistic
Constant	-0.0185	-0.54	-0.0185	-0.53	-0.0190	-0.56	-0.0190	-0.55
$\Delta SCEO_{i,t}$	-0.2910	-0.27	0.0342	0.03				
$\Delta SCEO_{i,t} \times \Delta ROA_{i,t}$			55.1128	0.44				
$\Delta CNSL_{i,t}$					-1.6403	-0.32	-10.2520	-0.22
$\Delta CNSL_{i,t} \times \Delta ROA_{i,t}$							-2.5717	0.00
$\Delta ROA_{i,t}$			-0.6215	-0.56			-0.6353	-0.56
$\Delta SAL_{i,t}$	0.0000	-0.05	0.0000	0.22	0.0000	-0.06	0.0000	0.26
ΔTKR_t	0.1136	3.17 ***	0.1147	3.15 ***	0.1129	3.17 ***	0.1130	3.13 ***
ΔGNP_t	0.0004	1.60	0.0004	1.52	0.0004	1.61	0.0004	1.51
adjusted R^2		-0.04		-0.05		-0.04		-0.05
Log likelihood		-307.90		-305.52		-307.88		-305.63
F statistic		0.64		0.63		0.64		0.62
Number of individual firms (cross sections)		43		42		43		42
Number of total observations		397		390		397		390

Notes : LON: outstanding banking borrowing. STK+BBF=own capital, where STK=paid in capital, BBF=balance brought forward. SCEO: ownership share of the CEO. ROA: return on asset. CNSL: ownership consolidation withint the borad =SCEO×SMIN, where SMIN=ownership share of the board member whose ownership share was the smallest within the board. SAL: sales: TKR: market interest rate in Tokyo prefecture. GNP: gross national proeuct. ***, **, and * denote significance of 1, 5, and 10 percent levels respectively.