

# **The Role of Financial Conglomerates in Industry Formation: Evidence from Meiji Japan, 1868-1912 \***

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### Abstract

Large conglomerates known as *zaibatsu* have long been credited with leading Japanese industrialization during the Meiji Period (1868-1912). I develop a new dataset collected from corporate genealogies and estimate the likelihood of a firm being an industry pioneer with discrete choice econometric methods. I find *zaibatsu* are indeed more likely to lead entry into new industries relative to independent startup firms. This result is due to their diversification, which provides both internal financing and risk-sharing. Ironically, excessive diversification may be responsible for *zaibatsu* losing their technological leadership to other entrepreneurs in later years.

JEL classifications: L25, N85, O14, O33

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## Introduction

Japan's rapid industrialization at the end of the nineteenth century is commonly attributed to the leadership of large, family-owned conglomerates known as *zaibatsu*. These firms had the advantages of size, which gave them sufficient scale to adopt capital-intensive technology; family ownership, which conferred autonomy from shareholders seeking short-term profit; diversified holdings, which spread risk and allowed for internal financing of investments; employment of well-educated salaried managers; and access to natural resources like metals and coal.<sup>1</sup> The benefits of these features were especially magnified in Japan during the Meiji Period (1868-1912), which shared with other late developing economies weak institutions, poor infrastructure, and immature capital markets.<sup>2</sup> Consequently, it has been argued that these conglomerates “[provided] the impetus to the country's modern economic development,” without which Japanese success would not have been nearly as rapid or assured.<sup>3</sup>

Belying these apparent advantages, however, are a number of uncomfortable observations. First, Japanese industries were primarily labor-intensive during this period, with the economy transitioning to heavier sectors starting in the 1900s.<sup>4</sup> This suggests that *zaibatsu* had few opportunities to exploit scale economies,

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<sup>1</sup>Morikawa, *Zaibatsu*, pp. 12-14; Fruin, *Japanese Enterprise*, pp. 3-5.

<sup>2</sup>Gerschenkron, *Economic Backwardness*.

<sup>3</sup>Morikawa, *Zaibatsu*, p. xvii. An obvious counterfactual is the Chinese economy in the late Qing dynasty, which did not have analogs to Japanese *zaibatsu*. Although Chinese officials attempted to initiate industrialization with their *kuan-tu shang-pan* program, which encouraged entrepreneurial activity and investment under governmental supervision, its failure to gain traction did not spur additional reform. Rather, the imperial government viewed modernization efforts as alien to Chinese culture and discouraged both private sector activity and institutional change. In contrast, after its repeated failures in direct industrial investment, the Japanese government supported industrialization indirectly through infrastructure and education, and encouraged private sector activity, especially the development of national champions like *zaibatsu*. See Brown, “Transfer,” and Hou, “Reflections,” for discussions of Chinese industrialization in the late 1800s.

<sup>4</sup>That is, during the Taishō Period (1912-1926). Even if they were able to capitalize on scale, it was only on the eve of World War I and the corresponding disruption of European trade that *zaibatsu* had a large market to serve; Morikawa, *Zaibatsu*.

especially given that many of their holdings were commercial (for example, shipping, merchandising).<sup>5</sup> Second, despite their substantial wealth, *zaibatsu* did not lead development of two important early sectors, cotton spinning and railways, which derived much of their funding from issued stock.<sup>6</sup> Evidence of *zaibatsu* leadership in developing new industries is also underwhelming: new data indicate that of the 109 privately started industries in the Meiji Period, only 12 were pioneered by *zaibatsu*.<sup>7</sup> Other scholars claim that these conglomerates owed their pathbreaking efforts to government patronage, not to their own merits or intrinsic qualities.<sup>8</sup> More recent work suggests *zaibatsu* employed few university graduates during the Meiji Period and lagged their competitors in using new technology thereafter.<sup>9</sup>

Notwithstanding these concerns, the visibility of *zaibatsu* has generated a substantial body of research. Numerous studies have asserted that *zaibatsu* led the introduction and use of foreign technology in Japan's early period of industrialization, although these claims are supported mainly by anecdote, case studies, or cross-country comparisons.<sup>10</sup> The few papers that use quantitative data to compare *zaibatsu* behavior to other firms are limited to financial records dating primarily from the Taishō Period (1912-1926), leaving what occurred in prior years unclear.

This paper attempts to fill in some of these gaps, particularly on the issues of industrial and technological leadership. I test the hypothesis that *zaibatsu* are more likely to be industry pioneers compared to their unaffiliated rivals, controlling for characteristics such as ownership, degree of diversification, and industry type. My main finding is that *zaibatsu* are indeed more likely to be pioneers, and this owes to their diversified nature. That is, diversification may have enabled *zaibatsu* to take greater risks in their investments and subsidized costs using revenues from existing operations and retained earnings. In the absence of developed financial markets, these features may have given *zaibatsu* the edge over smaller independent firms.<sup>11</sup>

Ironically, I also find that diversification appears to impede *zaibatsu* from maintaining their technological leadership later the period. One explanation is that past an optimal number of industries the administrative costs and managerial difficulties of entering, much less pioneering, new sectors begin to outweigh the benefits of risk sharing.<sup>12</sup> Specifically, I find that highly diversified *zaibatsu* are less likely to pioneer additional industries starting in the mid 1880s, even in innovative sectors where their advantages are more pronounced. This behavioral change corroborates other research that shows Meiji-era *zaibatsu* technologically lagging

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<sup>5</sup>*Ibid.* While commerce did allow for economies of scope, the attributes of size and wealth are less meaningful. Scope economies differ from scale economies in their reliance on the savings from fixed costs (for example, shared facilities, distribution channels) rather than variable costs (for example, shared inputs, learning curves). Another way of distinguishing the two is that scope economies typically involve production of multiple, unrelated goods while scale economies are usually from increased production of the same (or similar) goods.

<sup>6</sup>Morikawa suggests that these sectors were too large for *zaibatsu* families to fund on their own; *ibid.*, p. 27.

<sup>7</sup>This number excludes the 20 new industries started by the government. It can be argued that the absolute number of first-entry firms does not adequately capture economic impact due to differences among industries (such as number of entrants). Also, later entrants in an industry can still lead in scale of operations.

<sup>8</sup>*Ibid.*, p. 23; Nakagawa, "Business strategy," pp. 2-12.

<sup>9</sup>Frankl, "Analysis," p. 1001; and Fruin, *Japanese Enterprise*.

<sup>10</sup>"[Japan] lacked the basic commercial and financial infrastructure and the technical and managerial skills essential to introduce and operate Western industrial technology"; Morikawa, *Zaibatsu*, p. x. See also Fruin, *Japanese Enterprise*.

<sup>11</sup>*Ibid.*; Morikawa, *Zaibatsu*, pp. 93-94.

<sup>12</sup>Other explanations include rent-seeking and loss of entrepreneurship; Morck and Nakamura, "Business groups," pp. 8-9.

behind independent firms and younger conglomerates in the Taishō and early Shōwa (1926-1989) Periods.<sup>13</sup>

At the heart of the analysis is the assumption that the timing of an industry’s initial appearance approximates when its production technology was introduced to Japan.<sup>14</sup> As a latecomer to industrialization, Japan could borrow existing technologies without needing to develop them itself. Thus, it seems reasonable to consider the first Japanese firm in a new sector as the first adopter of the technology, with all the associated costs and risks. By extension, determining whether *zaibatsu* affiliation corresponds to industry pioneers provides a way to assess one aspect of their purported leadership in Japanese development.

A consequence of the “first appearance, first adoption” assumption is that my analysis eschews the need for financial records, few of which existed before the twentieth century. Instead, I develop a new establishment-level dataset from the Meiji Period, which I gathered from corporate genealogies. These genealogies arguably comprise the oldest source of firm information across industries for Japan. Furthermore, by focusing on the Meiji Period, when Japan began to industrialize, I avoid drawing anachronistic conclusions that use more detailed documentation from later years.<sup>15</sup>

Other departures from existing research include grouping Meiji-era *zaibatsu* together and using a cross-section of industries in the economy.<sup>16</sup> Given that discussions of Japanese industrial development refer to *zaibatsu* collectively, it makes sense to weigh the importance of their shared features like family ownership and diversification. Similarly, considering a wide range of industries allows one to compare differences in factor intensity and corresponds with late development theory’s emphasis on multi-sector coordination.

## Conventional wisdom on the significance of *zaibatsu*

As a late developing economy with immature financial and legal institutions, Meiji Japan seems to provide an ideal context for *zaibatsu*-led industrialization.<sup>17</sup> In particular, given the need for capital mobilization

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<sup>13</sup>Frankl, “Analysis,” p. 1001.

<sup>14</sup>Outside the late development context, there is an important difference between the development of new technology and its application, since developers may not have the resources to bring the technology into production. This is not to say that the first firm to introduce new technology will necessarily succeed, as other firms may prefer to observe market reception before committing their resources or to learn from the experience of the first firm.

<sup>15</sup>This is important not only to better understand the genesis of modern Japanese industries in the late 1800s, but also to circumvent the distortions associated with the global depression in the 1920s and militarization in the 1930s; see Ohkawa and Rosovsky, *Japanese Economic Growth*, and Lockwood, *Economic Development*.

<sup>16</sup>*Zaibatsu* used for the analysis include Mitsui, Mitsubishi, Sumitomo, Yasuda, Furukawa, and Ōkura. These six are the biggest and oldest *zaibatsu* established before and during the Meiji Period (with the first four referred to generally as ‘The Big Four’). Distinguishing them from newer *shinko zaibatsu* that emerged in the 1900s is typical in Japanese discussions of prewar enterprises, but not in analytical work; an exception is Frankl, “Analysis.”

<sup>17</sup>Note that “late development” compares the contemporaneous level of development between global leading economies and followers. In the late 1800s, Japan was at an early stage of industrial development relative to those in western Europe and the United States, but not to East Asian economies. Gerschenkron’s *Economic Backwardness* is the seminal work outlining the contours of late development theory, which itself draws from Rostow’s *Stages* framework of economic development.

Until 1893, when Japan promulgated its first commercial code for corporate ownership, protection of property rights remained uncertain; see Loenholm, *Commercial Code*, and Morikawa, *Zaibatsu*, p. 43. See also Crawcour, “Development,” and Teranishi, “Were banks?” for a discussion of pre-Meiji financial institutions; and Morck and Nakamura, “Business groups,” for a summary of broader changes during this period as well as public-private industrial coordination.

and broad-based development, *zaibatsu* attributes like diversified holdings, internal financing, family wealth and ownership, and access to natural resources and skilled labor would be highly advantageous.<sup>18</sup> Before the second world war, these features allowed *zaibatsu* to import physical capital and technology from abroad; employ skilled foreigners and graduates from newly established Japanese universities; and expand into new markets.<sup>19</sup> Independent firms, on the other hand, were typically under-capitalized due a wealthy merchant class reluctant to invest in unfamiliar technology; high dividend payments that left little retained earnings for expansion; and weak capital markets plagued with ill-defined property rights and high barriers to equity finance.<sup>20</sup>

Nevertheless, some scholarship disputes these factors as motivating *zaibatsu* leadership and suggests these conglomerates emerged only through government assistance.<sup>21</sup> Throughout this period, the government sponsored study trips and foreign employment; invested in roads, telegraphs, utilities and transport facilities; and subsidized strategic sectors like shipping, construction, armaments, and mining, all which tended to benefit *zaibatsu* given their fields of operation and international exposure.<sup>22</sup> More controversial were the personal relationships between *zaibatsu* families and government officials, with *zaibatsu* allegedly receiving preferential treatment in contracts and the privatization of public enterprises during the 1880s.

Proponents of this perspective, however, also find it difficult to substantiate their claims, such as identifying the direction of causality or demonstrating that *zaibatsu* received benefits disproportionate to the risks involved. For example, Mitsui claims it invested in industries like coal mining, textiles, and machinery because of their anticipated importance to economic growth and potential profitability.<sup>23</sup> Whether government-*zaibatsu* relationships on balance benefited the latter is questionable, considering that some came close to bankruptcy due to changes in political administration or public pressure for competition.<sup>24</sup> Many *zaibatsu* also emerged with no official patronage, having been established well before the Meiji Period or operating in trades that received little public investment, and their purchase of state assets below book value may have had less to do with favoritism and more with government haste to staunch continued losses. More generally, public goods like education and infrastructure are non-excludable and thus were available to both *zaibatsu* and independent entrepreneurs. Finally, others note that Japan's takeoff occurred toward

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<sup>18</sup>Various definitions exist for *zaibatsu*, including oligopolistic enterprises, multi-subsidary organizations (similar to the German Konzerns), and groups of diverse firms. For the purpose of this discussion, I follow Morikawa's definition of *zaibatsu* being a family-owned, diversified conglomerate; see Morikawa, *Zaibatsu*, p. xvii.

A number of empirical studies of modern firms find these and other characteristics are associated with industry first entry and leadership. For weak external capital and labor markets, see Gertner et al, "Internal versus external markets," and Gromb and Scharfstein, "Entrepreneurship," respectively. For firm scale, see Schoenecker and Cooper, "Role"; entry costs, see Han et al, "Entry barriers"; access to technology, see Lillian and Yoon, "Timing"; and use of existing resources, see Lieberman and Montgomery, "First mover advantage."

<sup>19</sup>Morikawa, *Zaibatsu*, pp. xvii-xxiv; Fruin, *Japanese Enterprise*, pp. 3-5.

<sup>20</sup>Morikawa, *Zaibatsu*, pp. 4, 57, 93-94. The promulgation of the 1893 commercial code encouraged firms to seek equity finance; however, single shares on the Tokyo Stock Exchange were denominated in increments of 50 yen, out of reach for the average Japanese with an annual income of 15 yen in 1895.

<sup>21</sup>Nakagawa, "Business strategy," pp. 3-12.

<sup>22</sup>For discussions of government industrial activity and involvement with private entrepreneurs, see Lockwood, *Economic Development*; Morikawa, *Zaibatsu*; Morck and Nakamura, "Business groups"; and Yamamura, "Success?"

<sup>23</sup>Morikawa, *Zaibatsu*, p. 66.

<sup>24</sup>*Ibid.*, pp. 20-26.

the end of the century, post-dating most of the government's industrial activities.<sup>25</sup>

Similarly, research comparing the performance of *zaibatsu* to other private firms finds mixed evidence supporting *zaibatsu* technological leadership. Frankl, using financial records for 130 firms between 1915 and 1937, analyzes the effect of *zaibatsu* affiliation on equity returns and risk profiles. She finds that Meiji-era *zaibatsu* had more volatile returns on equity than its competitors.<sup>26</sup> In addition, these *zaibatsu* were slow to adopt new technology and to expand into new industries and markets. Two other studies, in contrast, find the average *zaibatsu* outperforming independent firms and having less volatile returns, which the authors attribute to concentrated ownership and the holding company structure.<sup>27</sup>

The discrepancy in findings partly depends on whether a study distinguishes Meiji-era *zaibatsu* from newer ones, something Frankl does and the others do not. Yet it may be the case that none of these studies apply to an earlier period with different institutional and market conditions.<sup>28</sup> Another concern recognized by the authors is that using records from a modest sample of large firms introduces bias to the results and overlooks contributions from smaller or non-traded firms.<sup>29</sup> Since the latter may not have been required to document their finances, results excluding them may not generalize for the whole of the economy. Thus, a more comprehensive firm-level dataset from the Meiji Period would help to clarify the role of *zaibatsu* in industry formation and innovation.

## New data based on corporate genealogies

A problem common to historical studies of economic development is the lack of data. Few developing countries have the capacity to create and maintain detailed information on industries and firms, and Japan in the nineteenth century was no exception.<sup>30</sup> Nevertheless, potentially valuable information may be found in an overlooked resource: corporate genealogies, which track firms from their origins to modern times. In particular, genealogies provide dates of establishment, ownership and source of setup finance, industry classification, and geographic location.<sup>31</sup> Despite being less quantitative than financial reports, these data can be used to assess relationships between firms and sectors while controlling for the abovementioned characteristics. More importantly, they often represent the oldest reliable evidence of firm activity across the industrial spectrum. I use as my primary data source for this study the *Shuyō Kigyō no Keifuzu*, a compilation of corporate genealogies edited by the business historians Shintaro Yagura and Yoshiro Ikushima.<sup>32</sup>

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<sup>25</sup>Ohkawa and Rosovsky (*Japanese Economic Growth*) characterize Japanese modernization in terms of long expansions and date the first wave of Japanese industrialization between 1901 and 1917; p. 20. See also Morikawa, *Zaibatsu*, p. 57.

<sup>26</sup>Frankl, "Analysis," p. 1012.

<sup>27</sup>Miyajima et al, "Corporate governance"; Okazaki, "Role." Okazaki argues that this is due to the efficiency of internal monitoring of firms by the holding company, as opposed to shareholder monitoring of joint-stock firms.

<sup>28</sup>For example, Japan regained full tariff autonomy in 1911. Okazaki's study uses data for 135 firms between 1922 and 1936. Miyajima et al's sample of 600 firms includes 50 from the late Meiji Period, begins in 1900.

<sup>29</sup>Frankl, "Analysis," p. 1003.

<sup>30</sup>For example, the *Long Term Economic Statistics of Japan* begins its industrial series in 1887 and are only available at the national level; see Ohkawa, *Nihon*.

<sup>31</sup>Not all the observations contain every piece of information, for example, some lack their establishment location. The discrepancies are apparent in the different sample sizes provided in the summary statistics and econometric results.

<sup>32</sup>Yagura and Ikushima, *Shuyō*. Additional data include firm financial reports from the *Eigyō Hokokusho Shusei* collection and various Japanese industry indices and firm case studies; see Yushodo, *Eigyō*; Asia Research, *Outline*; Dodwell, *Industrial*

The *Shuyō* compilation includes genealogies for 1,089 firms that were listed on the Tokyo Stock Exchange as of September 1984, contain over 14,000 unique establishment observations, and date back to the early nineteenth century or earlier.<sup>33</sup> One concern to using genealogies is that they do not represent a random sample of business activity because of firm survivor bias, meaning that they contain only establishments that survived long enough to be recorded.<sup>34</sup> This bias is partly mitigated in the *Shuyō* because the genealogies explicitly identify asset transfers from bankrupt or merged establishments to successful ones. Thus, despite firm failure or reorganization, both surviving and deceased firms remain on record.<sup>35</sup> The inclusion of failed establishments is particularly relevant in manufacturing sectors since they typically leave behind transferable assets, unlike firms in some service industries that require little capital investment or equipment. Figure 1 shows the number of startup establishments over the Meiji Period.

[Figure 1 here]

Industries can be identified through the company name or editorial annotation, and I retroactively apply industry codes from the 1984 edition of the *Standard Industrial Classification for Japan* (JSIC) to each observation.<sup>36</sup> Typically, company names in Japan have three parts: personal/geographic name + industrial activity + industrial operation/facility (for example, Ishitsuka + Bottle Manufacturing + Factory), although there are many that use a combination of only the first two identifiers. There are also some exceptions to the single-industry-per-establishment identification, excluding conglomerates. For example, Kotahara Coach and Rail is classified in both the Local Railway (JSIC four-digit code 4021) and Light Passenger Vehicle Transport (JSIC4 4141) industries.<sup>37</sup> For establishments without any industry indicator in the genealogies, which represent less than ten percent of the sample, I search for Japanese firm names in electronic databases as well as industry reports.

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*Groupings*; Mitsubishi Public Affairs Committee, *Brief History of Mitsubishi*; Ohsono, *Charting*; Russell, *House of Mitsui*. Given the scarcity of reports from the Meiji Period, most of the firms in the *Eigyō* collection postdate those in the current dataset.

<sup>33</sup>Yagura and Ikushima, *Shuyō*. Note the difference between establishment and firm, with the latter possibly including multiple establishments (like *zaibatsu*). See the section on methodology for details.

<sup>34</sup>The dataset used in this paper contains only the establishment dates of *zaibatsu* affiliates and independent firm startups. It does not indicate a firm's subsequent success or failure, although this will be considered in future research.

<sup>35</sup>The authors also cross-reference establishments that appear in multiple genealogies and track the ancestry of failed establishments, providing a way to verify a firm's startup status.

<sup>36</sup>Statistics Bureau of Japan, *Standard Industrial Classification*. The Japanese SIC system resembles the American SIC system (replaced in 1997 with the North American Industry Classification System), but is not a one-to-one mapping. Like its American counterparts, the Japanese system classifies industries hierarchically, from broader industry groups (two-digits) to narrow ones (four-digits). For example, a two-digit code of 05 refers to Metal Mining; a three-digit code of 053 refers to Iron Ore Mining; and a four-digit code of 0534 refers to Chromium (a type of iron ore) Mining.

Although the classification of Japanese industrial sectors did not begin until 1930 and the system has been revised a number of times since, retroactive classification does not alter the historical record. This is because industrial distinctions made in later years do not preclude the existence of those distinctions during the Meiji Period; rather, it better differentiates broad industries later recognized to be related but different. Also, codes for industries that did not exist in the Meiji Period do not have to be used, while those that did and do not appear in the 1984 system can be additively included.

<sup>37</sup>Also, the move toward abbreviation, multiple personal names, and deletion of industrial activity has largely occurred in the post-World War II period; see Yagura and Ikushima, *Shuyō*.

## Assessing industrial leadership through firm entry

For my analysis, I use a cross-sectional probit model to estimate relative likelihoods of entry between establishments. Under the hypothesis that *zaibatsu*-affiliated firms are more likely to be first entrants in new industries, I set the entry outcome (first entry or not) as my dichotomous dependent variable. In addition to the main independent variable for *zaibatsu* affiliation, I include ownership type and how diversified a firm is (in other words, the number of industries a firm operates in at the time of entry), both considered essential differences between *zaibatsu* and independent firms.<sup>38</sup> To capture the decreasing marginal benefit of diversification, I include the square of the firm's number of industries. I also use an indicator variable for technological innovation, which considers whether an industry uses technology that is new to the domestic market or is similar to an existing industry. In addition to interaction terms between each of these variables, I account for factors like regulatory change, market demand, and industry preferences with time and industry group dummy variables. The estimated equation takes the following form:

$$\begin{aligned} Pr(Y = 1) &= \Phi(X_i\beta_i + X_j\beta_j + X_k\beta_k), \text{ where} \\ Y &= \text{industry pioneer} \\ \Phi & \text{ is the cumulative normal distribution function} \\ X_i &= \text{firm-level variables (affiliation, ownership, diversification)} \\ X_j &= \text{industry-level variables (innovativeness, JSIC2 indicators)} \\ X_k &= \text{interaction terms among } X_i \text{ and } X_j \\ X_t &= \text{year indicator variables} \end{aligned}$$

The key independent variable is firm affiliation, which takes the value of zero for an independent establishment (in other words, startup) or one for membership in a *zaibatsu*. I include affiliates of all the major *zaibatsu* established in the first half of the Meiji Period or earlier: Mitsui, Mitsubishi, Sumitomo, Yasuda, Furukawa, and Ōkura, with some exclusions noted later in this section. I define affiliation as being listed explicitly as subsidiaries or major divisions in each conglomerate's respective genealogy, which is based on company records and published histories.<sup>39</sup> While this definition of affiliation may omit some informal relationships or subdivisions, it maintains consistency with how the entire dataset was constructed. This variable also captures unobserved differences between a *zaibatsu* firm and an unaffiliated one not already identified by other variables like operational scale and work force quality. I hypothesize that *zaibatsu* affiliation is positive associated with first entry.

The variable for firm ownership type takes the value of one for joint-stock firms or zero for privately-held, non-traded firms.<sup>40</sup> Since one prominent characteristic of *zaibatsu* is family ownership, this variable

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<sup>38</sup>Morikawa, *Zaibatsu*. Other differences like employment of highly skilled labor, access to natural resources, and relationships with the central government are not identifiable with existing data.

<sup>39</sup>For example, Russell, *House of Mitsui*. *Zaibatsu* subsidiaries and divisions are treated as separate establishments in the analysis. This does not affect the estimation because multi-establishment firms are not repeating in the same industry, and the error terms are clustered by industry as well.

<sup>40</sup>There are a number of sub-categories within these two types: joint-stock ownership includes both limited and unlimited liability, and non-traded ownership includes individual proprietorship or partnership (unlimited and limited liability) as well as mutual associations; see Yagura and Ikushima, *Shuyō*.

may indicate the importance of investment autonomy and monitoring.<sup>41</sup> Anecdotal evidence suggests that equity-financed firms, unlike those with internal or debt-based financing, were small and undercapitalized by their need to pay dividends.<sup>42</sup> In addition, concentrated ownership may allow a firm to make longer-term investments since financing was less subject to business cycle volatility and investor impatience.

This variable also addresses the issue of corporate monitoring through holding companies, which was important in both the pre- and postwar eras. Prior to the adoption of the 1893 Commercial Code, which standardized incorporation procedures and defined fiduciary responsibilities, the limited ability of outside investors to monitor management and dominant owners may have hindered the public listing of firms.<sup>43</sup> Although incorporation existed since the 1860s, the lack of institutions governing business practice or protecting property rights remained until the 1890s.<sup>44</sup> These two factors suggest a positive correlation between non-traded ownership and first entry.

Industry diversification, measured in the number of industries a firm is in at the time of establishment, appears twice in the estimation. By definition, a conglomerate is a multi-sector firm; however, independent firms that simultaneously enter multiple industries at the time of establishment can be considered diversified as well. This variable increases in magnitude for each *zaibatsu* over the Meiji Period. Since diversifying across industries reduces volatility in revenues and spreads industry-specific risk, it is reasonable to expect diversified firms being more likely to lead entry in new sectors.

On the other hand, having many different industry holdings, especially in technologically advanced and capital-intensive sectors, poses organizational and strategic challenges and may deter further diversification.<sup>45</sup> In other words, synergies may exist between certain firms and industries but not for others, and there may be an optimal number of industries for a single firm to operate in, beyond which the costs of multiple holdings exceed the benefits. Some examples include disputes between the directors of the Mitsui trading company and Mitsui bank over investment strategy and irrational investment choices by the founder of the Furukawa *zaibatsu*.<sup>46</sup> I account for this decreasing marginal benefit by including separately the square of diversification.

The rationale for focusing on industry innovativeness is that pioneering sectors that use technologies similar to those already in the market incurs less entry risk and demonstrates less leadership. This is because another firm had already borne the cost of foreign adoption, which presumably is more than adapting technology from a domestic source. Firms using derivative technology are also aware of how the original has been received by the market and some of its operational difficulties. I differentiate between these two types of industry pioneering with an indicator variable for technology innovativeness. It takes a value of one for an industry that is the first to be established out of its broader industry grouping, and zero for industries that are not. An example of this is the three-digit industry grouping “251: Glass Manufacturing,”

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<sup>41</sup>This also allowed *zaibatsu* to avoid public disclosure of their finances; Morikawa, *Zaibatsu*, p. 43. That said, many held controlling interests in publicly traded firms and there were many independent non-traded firms.

<sup>42</sup>*Ibid.*; Teranishi, “Main bank system.” For example, many listed firms were run for short-term profit and were incorporated for a predetermined time period, between three to ten years; see Fruin, *Japanese Enterprise*.

<sup>43</sup>Loenholt, *Commercial Code*.

<sup>44</sup>Rosovsky, *Capital Formation*.

<sup>45</sup>This applies primarily to the nineteenth and early twentieth centuries, before multi-divisional enterprises and professional management became the norm; see Morikawa, *Zaibatsu*, pp. 23, 113; and Chandler, “Decision making.”

<sup>46</sup>Morikawa, *Zaibatsu*, pp. 66, 74.

which includes the related four-digit industries of “2511: Plate Glass,” “2514: Glass Container,” and “2515: Scientific Glassware.” If there were no glass manufacturing industries prior to 1871, when the Ishitsuka Bottle Manufacturing Factory was founded, then only the four-digit industry “2514” would be coded as innovative. Based on *zaibatsu* advantages and the claim that, *ceteris paribus*, Japanese entrepreneurs were “reluctant to invest in modern industries in which they lacked experience,” I expect the interaction between *zaibatsu* and innovativeness to be positive.<sup>47</sup>

The weakness of private capital and lack of robust financial intermediaries suggest problems mobilizing investment funding for capital-intensive industries, and play to the advantages of *zaibatsu* affiliation. However, since no data exist to quantitatively measure the capital intensity of Japanese industries during this period, I instead use major industry dummies (two-digit JSIC) to account for inter-industry differences, and cluster standard errors by four-digit industry to control for random industry shocks.<sup>48</sup> To identify shared influences, I interact pairs of the following independent variables: *zaibatsu* affiliation, diversification, diversification<sup>2</sup>, ownership, and industry innovativeness.<sup>49</sup> I also include year indicator variables to capture temporal shocks to institutions and market conditions.

As for exclusions, I remove government firms from the sample on the grounds that the behavior of such firms is not obviously driven by market factors. I also remove all sectors that were established prior to the Meiji Period since they are less well-documented and unlikely to use technology borrowed from abroad; these include primary sector activities, traditional apparel/food manufacture, retailing, and other miscellaneous services.<sup>50</sup> For duplicate appearances in the dataset due to changes in name or ownership, only the first appearance is included in the analysis. Establishments in foreign countries are omitted as well.

## Probit results

Between 1868 to 1912, 1,958 entrants could be identified by a four-digit JSIC code.<sup>51</sup> Including the restrictions mentioned above, the dataset reduces to 1,478 entrants, of which 1,446 were independent firms and 32 were affiliated with *zaibatsu*. Of the 109 new industries started with private funding, 12 were pioneered by *zaibatsu* and 97 by independent entrepreneurs.<sup>52</sup> Additional summary statistics are in Table 1, which shows breakdowns by firm affiliation for various firm- and industry-level characteristics and the numbers of industry pioneers in parentheses.

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<sup>47</sup>*Ibid.*, p. 4.

<sup>48</sup>An alternative is to use contemporaneous American manufacturing capital labor ratios; however, the number of establishments with such a measure of factor intensity may be too small to make meaningful comparison with other specifications. Similar reasoning precludes the use of prefecture-based variables like population density. On the other hand, indicators of broadly-defined factor intensity (heavy, light) include all observations and are used to check for robustness; see that section.

<sup>49</sup>Diversification and diversification<sup>2</sup> are not interacted together.

<sup>50</sup>This exclusion reduces the number of *zaibatsu* affiliates from 89 to 32. Some excluded sectors include agriculture, aquaculture/fisheries, forestry, coal mining, soy sauce production, sake brewing, all merchandising and dining, recreational establishments, pawnshops and moneychanging.

<sup>51</sup>Entrants include both individual firms as well as industry divisions within multi-industry companies (for example, conglomerates). In addition to the aforementioned data exclusions, I omit from analysis 173 establishments that could not be identified by industry.

<sup>52</sup>See appendix for a complete list of new industries, including industries started by the government.

[Tables 1 and 2 here]

The large disparity in absolute number of independent to *zaibatsu* establishments belies substantial behavioral and organizational differences at the industry level. For example, *zaibatsu* are disproportionately represented in innovative industries (75 percent of establishments) compared to independent firms (23 percent). As expected, *zaibatsu* are nearly ten times as diversified as independent firms and more likely to have closed, privately-held ownership.

One quarter of *zaibatsu* establishments are in the heavy industries, which is intuitive given their financial advantages over independent entrepreneurs.<sup>53</sup> The remaining establishments are in non-manufacturing, which may reflect *zaibatsu* origins: both Mitsui and Ōkura began in merchandising (dry goods, groceries), Mitsubishi in shipping, Sumitomo and Furukawa in mining, and Yasuda in finance.<sup>54</sup> *Zaibatsu* have six first entries for both industry groups. After applying the aforementioned exclusions, there are no light industry establishments for *zaibatsu*. Independent entrepreneurs are represented in all three categories, and have similar numbers of industry pioneers for each. Pairwise correlations in Table 2 are largely consistent with the summary statistics. As hypothesized, first entry is positively correlated with *zaibatsu* affiliation, diversification, and private equity ownership.<sup>55</sup> *Zaibatsu* affiliation is positively correlated with diversification, closed ownership, and both innovative and heavy industries.

[Table 3 here]

Results from the probit regressions are given in Table 3, and suggest that features associated with *zaibatsu* increase the likelihood of industry first entry.<sup>56</sup> To ease interpretation, coefficients are reported as marginal effects, which measure the change in probability for an infinitesimal change in continuous variables and a discrete change in categorical variables. Thus, the specification in column 1 shows *zaibatsu* affiliation (row 1) increasing by 31 percent the probability of industry first entry compared to non-affiliation.<sup>57</sup>

Column 2 adds firm characteristics and their interactions in the model. In particular, by separately considering both a firm's diversification and ownership type, the *zaibatsu* affiliation variable can be interpreted as the residual benefit of belonging to a conglomerate (for example, operating scale, labor quality). The results suggest that closed ownership (row 4) is advantageous to industry first entry (26 percent), regardless of affiliation. The interaction between *zaibatsu* and diversification (row 6) shows that for every additional industry held by a conglomerate, the likelihood of first entry increases by nearly six percent.

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<sup>53</sup>Heavy industries include chemicals, machinery, metal processing, and utilities, while light sectors include food processing, ceramics and glass, paper and wood products, textiles, and miscellaneous manufactures; this classification follows Rosovsky, *Capital Formation*, p. 29.

<sup>54</sup>Morikawa, *Zaibatsu*.

<sup>55</sup>The positive correlation between first entry and innovative industries obtains from a large number of innovative industry monopolies. Due to a high average number of establishments in non-manufacturing sectors, both heavy and light industries have proportionally more first entries.

<sup>56</sup>An alternative to the probit model, which uses a standard normal distribution to estimate probabilities, is the logit model, which uses a logistic distribution. The results from logit regressions are qualitatively similar to those of the reported probit results across specifications.

<sup>57</sup>Calculations are performed using only statistically significant coefficients. I control for data heteroskedasticity by estimating and reporting Eicker-White standard errors, which are clustered by four-digit industry to account for industry-specific shocks.

It is appropriate, however, to consider the cumulative effect of all control variables, which I do using a typical *zaibatsu* (non-traded, ten industries) and a typical independent firm (joint-stock, single sector).<sup>58</sup> Accounting for all significant variables, a *zaibatsu* is 82 percent more likely to be an industry pioneer compared to its independent rival. In other words, four out of five industry pioneers are likely to be affiliated with *zaibatsu*, which is approximately the proportion of heavy industries (75 percent) that they pioneer. Including industry characteristics (innovativeness, industry dummies) in column 3 provides an even stronger finding: a *zaibatsu* affiliate is certain (with probability exceeding 100 percent) to be the industry pioneer compared to an independent firm.<sup>59</sup>

With time dummies (column 4), the findings are more nuanced. While diversification continues to aid expansion into new sectors, its costs begin to outweigh the benefits for highly diversified firms. This can be seen from the opposite signs on the coefficients for diversification (row 2) and its square (row 3). Furthermore, being a non-traded private firm no longer appears to increase the likelihood of first entry, which may be due to the development of the domestic financial system, improved property rights, and integration into world markets over the course of the period. In this specification, the probability that a typical *zaibatsu* affiliate will pioneer an innovative industry is greater than that for a typical independent firm, but less for non-innovative industries.<sup>60</sup>

[Figure 2 here]

For greater precision, I substitute actual *zaibatsu* diversification over time and obtain somewhat striking results. Figure 2 compares the net probability (in other words, the difference in likelihoods between a non-traded, diversified *zaibatsu* and joint-stock, single-sector independent firm) of first entry as *zaibatsu* diversification increases. Their relative advantage in pioneering a non-innovative industry falls below that for an independent firm starting in 1887, when average *zaibatsu* diversification reached nine industries. For innovative industries, the year threshold occurs in 1898, when *zaibatsu* operate on average in 13 sectors. Even more surprising is that in the years prior to losing their entry advantage, the difference in probabilities never favors *zaibatsu* by more than ten percent. These trends suggest that *zaibatsu* fell behind independent firms technologically earlier than previously suspected.<sup>61</sup>

<sup>58</sup>A ten-sector *zaibatsu* is approximately the average number of sectors (9.81) held by these conglomerates over the period, during which independent establishments remain essentially undiversified (1.04); see Table 1.

<sup>59</sup>The difference between first entry probabilities (column 3) for a typical *zaibatsu* and a typical independent firm in an innovative industry is:

$$Pr_Z(Y=1^{st} \text{ Entry}) - Pr_I(Y = 1^{st} \text{ Entry}) = 1.526 - 0.003 = 1.523$$

For first entry into a non-innovative industry, the difference is 1.246 (*zaibatsu* advantage).

<sup>60</sup>The difference between first entry probabilities (column 4) for a typical *zaibatsu* and a typical independent firm in an innovative industry is:

$$Pr_Z(Y=1^{st} \text{ Entry}) - Pr_I(Y = 1^{st} \text{ Entry}) = 0.072 - 0.021 = 0.051$$

For first entry into a non-innovative industry, the difference is  $-0.084$  (independent advantage).

<sup>61</sup>In other words, before the Taishō Period; see Frankl, “Analysis,” p. 1001.

## Robustness in subsamples and alternative specifications

To check whether the model is correctly specified, I test whether the coefficients are jointly different from zero. All specifications pass at the one percent level of significance. I also test for functional form and omitted variable bias with a specification link test.<sup>62</sup> A significance level above five percent is generally interpreted as failure to reject the hypothesis (in other words, model is not incorrectly specified). Aside from the first specification (column 1), all other specifications are above this threshold, which means that the null hypothesis of no omitted variables cannot be rejected.

[Table 4 here]

Given the predictions of *zaibatsu* losing their first entry advantage later in the period, I take subsets of the data after those threshold years and rerun the previous regression (Table 3, column 4). In column A of Table 4, I use only establishments in new industries dating from 1887, when *zaibatsu* are predicted to retain their first entry advantage for innovative industries, but not for non-innovative ones. Results indicate that *zaibatsu* are no more likely to pioneer any industry than an independent firm. As for the subset of establishments since 1898, data non-variation and concerns about sufficient sample size prevent me from performing the same analysis. Nevertheless, the lack of significance starting from 1887 suggests the propensity for *zaibatsu* to lead entry was short-lived.

In column B, I test whether the promulgation of the 1893 Commercial Code affected the likelihood of first entry. Considered a significant milestone for Japanese investors and financial markets, the code provided a legal framework to protect property rights; thus, entrepreneurs may have found it easier to finance investments externally, offsetting the internal financing advantage of *zaibatsu*. This appears to be the case, as I reject the hypothesis that *zaibatsu* are more likely to lead entry than independent firms in the sample of establishments dating from 1894, the first full year that the code was implemented.

Finally, I use an alternative specification to check the interaction between *zaibatsu* affiliation and capital intensity (column C). Aggregating industries by factor intensity may give insight in whether these conglomerates invested in sectors that fully exploited their operational scale and family wealth. The results indicate that *zaibatsu* are over 40 percent more likely to pioneer a heavy industry than an independent firm.<sup>63</sup> Non-traded ownership adds ten percentage point to their leadership propensity while diversification offers none, which supports the assertion of weak external capital markets. Even more important is the interaction term between *zaibatsu* and heavy industry (row 9), which increases first entry probability by 36 percent. This suggests that an unidentified aspect of *zaibatsu* affiliation, like operational scale or government preference,

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<sup>62</sup>This test takes the fitted values of the residual from the original regression, squares them, and reinserts them into the model as an additional variable. The modified model is estimated to check for significance in the new variable. The null is that the model has no omitted variables, and if correctly specified, the squares of the residuals should not be significant (since they would not show a pattern that could be explained with additional control variables).

<sup>63</sup>For innovative industries, the difference in first entry probabilities is:

$$Pr_Z(Y=1^{st} \text{ Entry}) - Pr_I(Y=1^{st} \text{ Entry}) = 0.888 - 0.448 = 0.440$$

For non-innovative industries, the difference is 0.462 (*zaibatsu* advantage).

may be responsible for their leadership in heavier sectors.<sup>64</sup> As a whole, while *zaibatsu* possess characteristics that seem to facilitate first entry into new industries, which may proxy for technology adoption, their leadership is manifest primarily at an extremely early stage of economic development.

## Discussion and further work

One interpretive concern is that while *zaibatsu* may have been more likely to lead entry, their absolute number of first entrants is small, bringing into question their overall impact. This observation assumes that *zaibatsu* and independent firms were similar, when in all probability a single *zaibatsu* affiliate was much larger and more productive. Since this paper employs qualitative measures of industrial activity, it does not directly address this point. Nevertheless, as listed in the appendix, many industries that *zaibatsu* pioneered were capital-intensive or large scale, and thus out of reach for most independent investors. These industries may also have been important for production in other sectors (for example, metal mining for machine manufacture), providing an alternative means for *zaibatsu* to lead industrialization even with large establishment numbers or even first entry. That said, given the relatively meager number of firms and industries used in earlier studies for this time period, one of the strengths of the current dataset is its inclusion of independent firms that would otherwise have no record, thus reducing some sample bias. Moreover, the current dataset serves the purpose of comparing firm activity and technology adoption via qualitative measures like entry and industry formation.

While the main finding of this paper supports the view that *zaibatsu* assisted the development of industry, it also disputes the notion that they were necessarily vanguards of innovation. What accounts for this seemingly important omission in earlier research? One possible explanation is the emphasis on firm characteristics as opposed to industry-level determinants of performance, and the ease in drawing contrasts with case studies. This paper itself leads with stylized facts about *zaibatsu*'s preponderant size and resource access that were deemed critical to innovation and industrial expansion. But even these identifying features are misleading. As mentioned in the introduction, *zaibatsu* were less able to attain scale economies because their holdings were so diverse. This applied especially to those *zaibatsu* that began in trading, shipping, and finance. Thus, additional study of inter-industry synergies and degree of relatedness may improve our understanding of differences in firm performance.

Similarly, interfirm linkages may have been a way for independent entrepreneurs to combat conglomerate dominance or to overcome capital market deficiencies. This was the case in postwar Japan, where independent firms unable to internalize transaction costs through merger used networks to increase efficiency.<sup>65</sup> This scenario may have applied to prewar Japan as well, and could be explored by expanding the current dataset into panel form. A panel dataset may also be useful for studying firm longevity in the Meiji Period,

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<sup>64</sup>Despite there being no *zaibatsu* light establishments in the sample, they still would be favored for first entry compared to independent investors, but much less so. For innovative industries, the difference in first entry probabilities is:

$$Pr_Z(Y=1^{st} \text{ Entry}) - Pr_I(Y=1^{st} \text{ Entry}) = 0.304 - 0.226 = 0.078$$

For non-innovative industries, the difference is 0.100 (*zaibatsu* advantage).

<sup>65</sup>Gao, *Japan's*.

complementing this paper's focus on firm establishment. There is increasing interest to understand what enables firm survival, whether through productivity differences, intra-firm synergies, investment in research and development, or trade. Recent studies of establishment survival suggest that, conditioned on firm characteristics, multi-unit American firms were more likely to close plants than standalone firms because of operational heterogeneity.<sup>66</sup>

This paper also remains silent on two important influences: government and trade. Among other policies, the government sponsored model factories at the beginning of the Meiji Period to jump-start industrialization. Later, it privatized these enterprises (with many purchased by *zaibatsu*) and indirectly supported industry through subsidies and contracts. A major impediment to assessing the government's contribution is the difficulty in disentangling direct and indirect support.<sup>67</sup> Nevertheless, it may be possible to use this dataset to explore the evolution of sectors started by either the government or the private sector, comparing characteristics like rate of entry or factor intensity. One can then better judge the efficacy of state initiative during early economic development.

Not to be neglected is the international context in which Japan industrialized, considering that its rapid growth relied on technology imports and commodity exports.<sup>68</sup> Using commodity trade flow and Meiji firm establishment data, one may be able to gauge the importance of trade by comparing industry growth rates based on export shares. This relationship may also help to explain the remarkable resilience of traditional sectors that grew in tandem with the country's increasingly advanced industries.

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<sup>66</sup>Bernard and Jensen, "Firm structure."

<sup>67</sup>Rosovsky, *Capital Formation*, p. 22.

<sup>68</sup>Lockwood, *Economic Growth*, p. 309.

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## Appendix: List of New Industries in Meiji Period

Industry Name	JSIC4	Year
Coal mining	611*†	1868
Cotton/spun rayon fabric weaving	1441*†	1868
Beer	1322	1869
Foreign exchange bank	6124*	1869
Joint-stock life insurance company	6711*	1869
Machine-reeled raw silk	1411*	1870
Glass containers	2514*	1871
Valves and fittings	2992†	1871
Fabricated pipe and fittings	2993†	1871
Ball and roller bearings	2994†	1871
Piston rings	2995*†	1871
Mold and dies, parts, and accessories	2996†	1871
oastwise freight transport	4323*‡	1871
National railway	4011*†	1872
Postal services	4711*	1872
Water supply installation, draining work	1133*	1873
Cement	2521*†	1873
Ocean transport	4311‡	1873
Ordinary bank	6121‡	1873
Fired bricks	2551*	1875
Foreign style paper	1821	1876
Food processing machinery	2961*†	1876
General civil engineering, building works	911*	1877
Other silk reeling plant	1419†	1877
Construction and mining machinery	2931*†	1877
Spinning machinery	2951*†	1877
Wood working machinery	2962†	1877
Wool spinning mill	1423*†	1878
Rice cleaning	1261	1879
Wheat flour	1263*†	1879
Nitric, phosphoric fertilizers	2011*	1879
Credit cooperative association	6313*	1879
Joint-stock fire/marine insurance company	6721*‡	1879
Flat glass	2511	1880
Water supply	3911*‡	1880

Industry Name	JSIC4	Year
Overseas loan and investment institution	6142*	1880
Credit association and related federation	6312‡	1880
Merchandise forwarding	4621*	1881
Commercial and industrial cooperative bank	6314	1881
Paperboard	1822	1882
Central bank	6111*†	1882
Small business finance corporation	6315	1882
Securities exchange	6631	1882
Medical product preparations	2062*	1883
Canned seafood, seaweed	1221*	1884
Manufactured ice	1341*	1884
Hemp spinning mill	1425	1884
Copper smelting and refining, primary	2711*‡	1884
Power station	3611*	1884
Soda bicarbonate	2021*	1885
Dairy products	1212*	1886
Other paper products	1849	1886
Matches	3486*†	1886
Other electricity establishment	3619	1886
Lead and zinc metal mining	522*‡	1887
Steel pipes and tubes	2644	1887
Lead pencils	3443*	1887
Postal order and transfer savings institution	6141†	1887
Crude petroleum extraction	711*	1888
Twisting yarns	1431*	1888
Paints	2054*	1888
Watches, clocks, and parts, not watchcases	3271*	1888
Other musical instruments	3429*	1888
Local railway	4021*	1888
Light vehicle passenger transport	4141*	1888
Silk spinning mill	1424	1889
Building brick	2532*	1889
Public financial institution for agriculture, forestry, and fishing	6241*†	1889
Unrefined sugar	1251	1890
Soft drinks, carbonated water	1311*	1890

Industry Name	JSIC4	Year
Transport agency	4631*	1890
Textile sanitary fabric	1498*	1892
Machine dyed/finished silk, rayon fabrics	1462	1893
Mutual life insurance company	6712	1894
Plastics	2037*	1895
Asbestos mining	892*	1896
Sugar refining	1252	1896
Wool fabric weaving	1443	1896
Printing ink	2055	1896
Railroad cars	3121	1896
Long term credit bank	6123	1896
Development financial institution	6143	1896
Agricultural cooperative	6231*	1896
Canvas products	1593*	1897
Printing, not mimeograph	1931	1897
Synthetic dyes, organic pigments	2036	1897
Petroleum refining	2111*	1897
Wire drawing	2648	1897
Coke	2131* <sup>‡</sup>	1898
Aluminum smelting and refining, primary	2716	1899
Trust bank	6122*	1899
Basic petrol chemicals	2031	1900
Taxicab operators	4112	1900
Telephone and telegraph, not broadcast	4721*	1901
Other industrial organic chemicals	2039	1902
Motor vehicle bodies and trailers	3112	1896
Bicycles and parts	3131*	1903
Metallic springs	2892*	1904
Power and distribution transformer	3012	1904
Other stone, sand, gravel quarrying	819*	1905
Compound chemical fertilizers	2012 <sup>‡</sup>	1905
Nails	2871*	1905
Other metal smelting and refining, secondary	2729* <sup>†</sup>	1906
Electric bulbs	3031	1906
Sulphur mining	831*	1907

Industry Name	JSIC4	Year
Distilled alcohol	1324	1907
Basic livestock feed	1352*	1907
Leather tanning, finishing	2411*	1907
Looms, knitting machinery	2952	1907
Dyeing and finishing machinery	2953	1907
Generators, motors, rotating electrical machinery	3011	1907
Tramway	4022	1907
Refrigerated warehousing	4521*	1907
Fire and marine reinsurance company	6724	1907
General sawing and planing mill	1611	1908
Rayon, acetate fiber	2041	1908
Coating metal products	2862*	1908
Medical material preparations	2061	1910
Call loan and bill brokerage, not securities	6411	1909
Pastries, cakes	1272	1910
Other fabric weaving	1449	1910
Compressed, liquefied gases	2024	1910
Soaps and synthetic detergents	2052	1910
Aircraft	3151* <sup>†</sup>	1910
Other chemical fertilizer mining	839	1911
Organic fertilizer	1353	1912
Other industrial inorganic chemicals	2029	1912
Fatty acids, hydrogenated oils, glycerin	2051	1912
Ferro-alloys	2623	1912

\*: Innovative Industry (in other words, first four-digit industry established in three-digit industry group)

<sup>†</sup>: Industry pioneered by government enterprise.

<sup>‡</sup>: Industry pioneered by *zaibatsu*.

Table 1: Summary Statistics

	Total	Independent (1 <sup>st</sup> Entry)	<i>Zaibatsu</i> (1 <sup>st</sup> Entry)
Entry in new JSIC4 industries	1,478	1,446 (97)	32 (12)
Entry in innovative industries	341	317 (46)	24 (8)
Average diversification per firm		1.04	9.81
<i>Firm ownership</i>			
Joint-stock	1,018	1,012 (48)	6 (2)
Non-traded	166	140 (32)	26 (10)
<i>Industry by capital intensity</i>			
Heavy	103	95 (35)	8 (6)
Light	145	145 (31)	0 (0)
Non-manufacturing	1,230	1,206 (31)	24 (6)

*Source:* See the text.

Table 2: Correlations

	FIRST	ZAIB	DIV	NONTR	INNOV	HEAVY
First entry	1					
<i>Zaibatsu</i>	0.172*	1				
Diversification	0.179*	0.829*	1			
Non-traded firm	0.264*	0.323*	0.261*	1		
Innovative industry	0.200*	0.183*	0.190*	0.161*	1	
Heavy industry	0.355*	0.105*	0.174*	0.190*	0.214*	1
Light industry	0.187*	-0.049	-0.046	0.167*	0.348*	-0.098*

\*= Significant at the five percent level.  
*Source:* See the text.

Table 3: Probit Results

Dependent Variable: $\Pr(Y = 1^{st} \text{ Entry})$				
	(1)	(2)	(3)	(4)
<i>Zaibatsu</i>	0.308*** (0.096)	-0.070 (0.040)	-0.034** (0.021)	-0.006 (0.005)
Diversification		0.032 (0.071)	-0.014 (0.030)	0.059*** (0.047)
Diversification <sup>2</sup>		0.008 (0.013)	0.005 (0.006)	-0.011*** (0.009)
Non-traded firm		0.259** (0.179)	0.002 (0.029)	0.049 (0.083)
Innovative industry			-0.021 (0.014)	0.002 (0.024)
<i>Selected interaction terms<sup>a</sup></i>				
<i>Zaibatsu</i> · Diversification		0.056** (0.033)	0.089*** (0.060)	dropped <sup>b</sup>
<i>Zaibatsu</i> · Diversification <sup>2</sup>		-0.008 (0.010)	-0.003 (0.005)	0.005*** (0.004)
<i>Zaibatsu</i> · Non-traded		0.776 (0.762)	0.990*** (0.007)	dropped <sup>b</sup>
<i>Zaibatsu</i> · Innovative			-0.020** (0.011)	-0.006 (0.005)
Diversification · Innovative			dropped <sup>b</sup>	-0.031* (0.029)
Diversification <sup>2</sup> · Non-traded		-0.0002 (0.005)	-0.006** (0.004)	0.001 (0.002)
Diversification <sup>2</sup> · Innovative			0.003*** (0.002)	0.004* (0.004)
JSIC2 industry indicator variables			included	included
Year indicator variables				included
<i>N</i>	1,478	1,184	1,130	1,074
<i>R</i> <sup>2</sup>	0.031	0.120	0.455	0.595

\* = Significant at the ten percent level.

\*\* = Significant at the five percent level.

\*\*\* = Significant at the one percent level.

<sup>a</sup> See the text for complete list. All terms with statistically significant values are reported.

<sup>b</sup> Variable dropped from specification due to collinearity or nonvariation.

*Notes:* Coefficients reported as marginal effects. Robust standard errors in parentheses and clustered by four-digit JSIC industry.

*Source:* See the text.

Table 4: Robustness Checks

Dependent Variable: Pr( $Y = 1^{st}$ Entry)			
	(A)	(B)	(C)
<i>Zaibatsu</i>	-0.007 (0.007)	0.007 (0.007)	0.090 (0.185)
Diversification	0.014 (0.016)	0.015 (0.027)	0.072 (0.051)
Diversification <sup>2</sup>	-0.001 (0.001)	-0.003 (0.010)	-0.011 (0.009)
Non-traded firm	0.002 (0.027)	0.016 (0.030)	0.100* (0.116)
Innovative industry	-0.012 (0.011)	-0.012 (0.012)	0.137 (0.148)
Heavy industry			0.472*** (0.144)
Light industry			0.252*** (0.116)
<i>Selected interaction terms<sup>a</sup></i>			
<i>Zaibatsu</i> · Innovative	0.493 (1.216)	0.151 (1.398)	-0.022* (0.012)
<i>Zaibatsu</i> · Heavy			0.362* (0.393)
Innovative · Heavy			-0.024*** (0.013)
Innovative · Light			-0.026*** (0.013)
JSIC2 industry indicator variables	included	included	included
Year indicator variables	>1886	>1893	included
$N$	851	780	1,156
$R^2$	0.587	0.581	0.430

\*= Significant at the ten percent level.

\*\*= Significant at the five percent level.

\*\*\*= Significant at the one percent level.

<sup>a</sup>See the text for complete list. All statistically significant values are reported.

*Notes:* Coefficients reported as marginal effects. Robust standard errors in parentheses and clustered by four-digit JSIC industry.

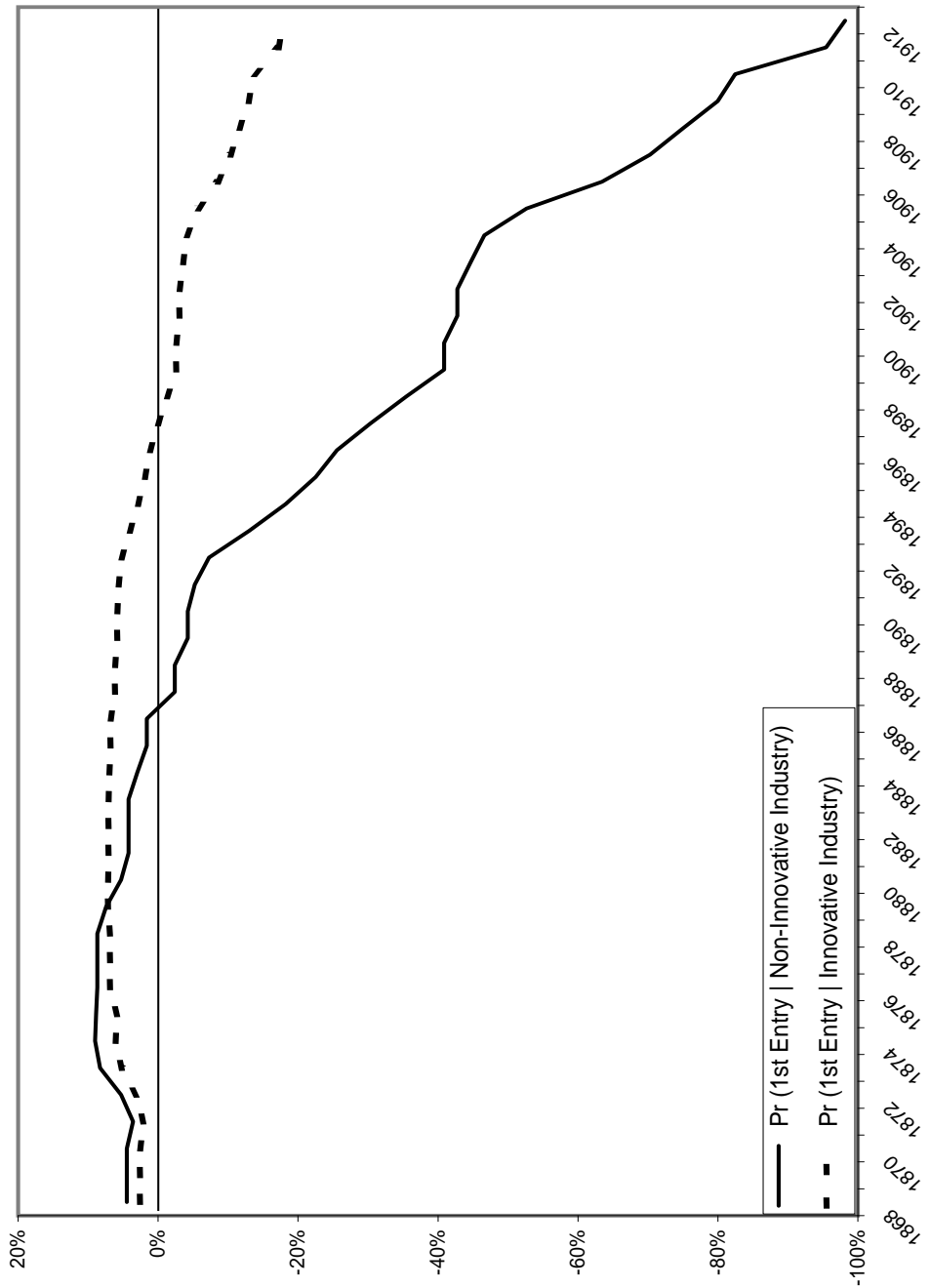
*Source:* See the text.

Figure 1: Number of Startup Establishments, 1868-1912



Source: See the text.

Figure 2: Relative Likelihood of *Zaibatsu* First Entry



Source: See the text.