Flat-footed Giants: Zaibatsu and Industrialization in Meiji Japan, 1868-1912

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Abstract

The half-century spanned by the Meiji Period (1868-1912) witnessed a remarkable transition for Japan, whose rapid economic development propelled the pre-modern agrarian nation to industrialized status. Substantial credit has been given to the large family-owned conglomerates known as zaibatsu in leading this process. This paper challenges this wisdom and questions whether zaibatsu led the development of new industries. Using two separate models, I reject the hypothesis that firms affiliated with zaibatsu were more likely to be early entrants in new industries relative to independent firms. Instead of firm affiliation, I find industry contestability better predicts early entry. Industry contestability may proxy for greater potential market power, high fixed costs, and human capital requirements. These results are robust and obtain across different industries and industry classifications. More generally, they shed light on the behavior of firms during early economic development as well as on the relevance of corporate size and resource access to industry expansion and innovation.

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The Meiji Period (1868-1912) witnessed a remarkable transition for the Japanese economy, whose rapid development propelled the pre-modern agrarian nation to industrialized status. Japanese economic strength was manifest in the dramatic growth of its silk and cotton textile industries, which led the world in exports by the period’s end.\(^1\)

Its heavy industries of iron and steel, non-existent in the mid-nineteenth century, were producing 243,000 tons and 255,000 tons, respectively, for domestic consumption by 1913.\(^2\) The power of its military during the second world war was foreshadowed by its unexpected victories in the wars against China (1895) and Russia (1905). From the 1880s onward, investment in domestic infrastructure of roads, railways, harbors, and the telegraph system grew at the rate of ten percent per annum.\(^3\) Public institutional development grew apace with the establishment of a central bank in 1882, promulgation of a constitution along western traditions in 1889, and adoption of the international gold standard in 1897.

How did Japan manage to overcome its late start? In addition to vigorous government policy, conventional wisdom credits large, multi-industry conglomerates known as *zaibatsu* for “[providing] the impetus for the country’s modern economic development.”\(^4\) The *zaibatsu* ostensibly possessed a number of advantages: size, which allowed them to adopt existing occidental technology and apply it on a large scale; their internal organization based on family ownership, which supposedly provided them with

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2 These quantities accounted for one half and one third of domestic demand, respectively (Lockwood 24).
4 Hidemasa Morikawa, *Zaibatsu, The Rise and Fall of Family Enterprise Groups in Japan* (Tokyo: University of Tokyo Press, 1992) xv-xviii. Various definitions exist for *zaibatsu*, including oligopolistic enterprises, multi-subsidiary organizations (similar to the German *Konzerns*), and groups of diverse firms. For the purpose of this discussion, *zaibatsu* is defined as a family-owned diversified conglomerate.
the flexibility to enter new sectors without shareholder interference; their ability to attract well-educated salaried managers; and their access to natural resources like metals and coal.5 Before WWII, these financial cliques dominated the market, the four largest zaibatsu being Mitsui, Mitsubishi, Sumitomo, and Yasuda, and were reincarnated in the postwar era to help Japan rapidly industrialize again.6

The prominence of the zaibatsu raises questions about the methods they used to grow and prosper, and numerous case studies have discussed their development. Nevertheless, there is a surprising paucity of research analyzing the behavior of the zaibatsu as a group during Japan’s early period of industrialization, that is, during the Meiji Period between 1868 and 1912. One of the few papers that address zaibatsu group performance in the pre-WWII era is directed toward issues of profitability and risk-sharing.7 It finds that the largest and oldest zaibatsu were no different from independently established firms in terms of profitability and sales growth, that their equity returns showed greater instability, and that they lagged behind their independent rivals in diversifying into new industries.8 These results seem hard to reconcile with existing literature, and they contravene the accepted wisdom that zaibatsu were successful industry pioneers that introduced advanced technology to the country. In any case, these results come from a period well after the initial surge of Japanese industrialization in the late nineteenth century. But the question remains as to the role of zaibatsu during Japan’s formative industrial years.

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8 Frankl 1001.
The obstacle to quantitative analysis of Japanese industry in the late 1800s has long been inadequate and incomplete data. Economic studies tend to focus on measures like output quantities and prices, which are unlikely to exist for an agrarian country emerging out of feudalism. In this paper, I circumvent this obstacle by using an alternative measure for development and performance: industry establishment dates. These allow me to extend analysis back into the nineteenth century, when qualitative information about firms and industries is available even if quantitative data are not. Correspondingly, I have created a large dataset of Japanese firms from the Meiji Period. The data are drawn and translated from Japanese-language sources, which to my knowledge have not been used previously for economic analysis.

This approach to studying the zaibatsu and Japanese industrialization improves on the existing literature in a number of ways. First, I analyze a broad sample of zaibatsu instead of individual ones, since discussions about trends in Japanese industrial development generally refer to them as a group and not to any one firm. I examine zaibatsu influence across multiple industries and industry classes rather than a specific industry (eg, the iron and steel industry) to assess their economy-wide impact. Finally, I focus on the Meiji Period, the time during which Japan first began to industrialize.

9 The zaibatsu used for the analysis include Mitsui, Mitsubishi, Sumitomo, Yasuda, Furukawa, and Okura. These six are the biggest and oldest zaibatsu established in the pre- and early Meiji Period (with the first four referred to generally as ‘The Big Four’), and their grouping together for analysis is consistent with Japanese practice in differentiating older from newer zaibatsu that emerged largely after 1900 (ibid).

10 Industry class refers to the classification of industries at varying degrees of specificity; ie, one- through three-digit industry classification codes. For example, a one-digit code of 5 refers to Metal Mining; a two-digit code of 53 refers to Iron Ore Mining; and a three-digit code of 534 refers to Chromium (a type of iron ore) Mining. More discussion about the data and its coding follows in the body text.

Using the Meiji Period to study industrialization has additional advantages, such as circumventing the distortions associated with the global depression in the 1920s and militarization in the 1930s. I am also able to avoid confounding influences like government intervention in the private sector, which is particularly relevant to a late developing country like Japan. Unlike the period before the 1880s, when the government had not yet consolidated authority nor disposed of its operations in silk processing12 and railways; or the period from the 1930s, when it set wartime output targets for manufacturing firms, the high Meiji Period was one in which the private sector was the dominant actor.

My analysis based on industry establishment dates challenges the widely held view that the zaibatsu led the development of new industries in Meiji Japan. I find that affiliation with the zaibatsu had no significant positive correlation with earlier entry into new industries. If anything, zaibatsu had a tendency to lag behind their independent counterparts in establishing innovative sectors during this time. I find that the best predictor of early entry into a new industry is not firm affiliation, but the contestability of the industry, and to a lesser extent the type of firm ownership. Industry contestability may proxy for structural impediments like high fixed costs or human capital requirements as well as represent potential market power. Ownership may correspond to risk aversion and technological inertia. These results obtain across different industries and industry classes as well as for different analytical models.

12 Many of the government-initiated enterprises were unprofitable, which may have accounted for their fire sale prices during privatization. A prominent example is the first modern silk reeling facility, the Tomioka Filature, which the government built according to French design in 1872 and incurred significant losses before selling it to private investors. The government also sought the development of private industry, which it viewed as inconsistent with maintaining profitable industries in the public sector; Johannes Hirschmeier and Tsuneeko Yui, *The Development of Japanese Business* (Cambridge, Mass.: Harvard University Press, 1975) 87.
The remainder of the paper is as follows: Section 1 describes a historical context for zaibatsu in Meiji Japan and discusses existing research. Section 2 surveys the industrial organization theories relevant to this paper, and provides contemporary examples on entry and innovation. Section 3 details the research design and methodology, while Section 4 describes the data. Section 5 presents the analytical results. Section 6 checks for robustness of the findings, and Section 7 both discusses interpretations and suggests directions for further work. Section 8 concludes.

Section 1: Historical Context

Meiji Japan figures prominently in discussions of Rostovian stage theory and Gerschenkronian late development. Stage theory posits that backward countries progress through five stages of development, and that there is a crucial threshold called the “take-off” that separates traditional (i.e., agricultural, feudal) economies from industrial ones.\(^\text{13}\) With its markedly increased investment rate and its new institutions and social infrastructure, Japan crossed this threshold and began a series of expansionary waves that ultimately bore it to first world status.\(^\text{14}\)

Alternatively, the theory of late development asserts that there is an inverse relationship between a country’s “backwardness” and its (potential) rate of economic growth.\(^\text{15}\) That is, less advanced economies can leapfrog over intermediate technologies directly to the state of the art by adopting the practices of the most advanced economies, saving themselves the time, effort, and expense required of pioneers. Gerschenkron


\(^{14}\) Ohkawa and Rosovsky 20.

himself viewed Japan as a paradigmatic example of a developing country that through
technology transfer and resource mobilization was able to converge with leading
industrial nations in a short period of time. Critical to his “backwardness hypothesis” is
the need to marshal substantial resources to take advantage of modern technologies and
to coordinate public and private sector activities. In this view, a modernity-seeking Meiji
government needed the cooperation of private firms to achieve rapid, economy-wide
industrialization. It found its partner in the group of large, family-owned conglomerates
known as *zaibatsu*.

Research on the *zaibatsu* has focused on their role in Japanese industrialization,
their relationships with the government, and their performance relative to that of
independent firms.16 In their studies on the role of *zaibatsu* in Japan before the Pacific
war, both Hidemasa Morikawa and Mark Fruin argue that the national environment was
conducive to industrial growth, and that the *zaibatsu* took the lead in introducing foreign
technology, adopting an innovative management style and corporate organization, and
using skilled labor and natural resources.17

Keiichiro Nakagawa suggests that government patronage accounted for *zaibatsu*
development by providing both the basic social and physical infrastructure needed by
entrepreneurs as well as the initial investment in western technology and equipment.18

The Meiji government, for its part, subsidized foreign education for Japanese students

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16 A comprehensive survey of Japanese business history that provides a context for *zaibatsu* development
can be found in the fifteen-volume series of proceedings from the Fuji Conferences published by the
University of Tokyo and edited by Keiichiro Nakagawa.
17 Morikawa xvii-xxiv; Fruin 3-5.
18 Keiichiro Nakagawa, “Business Strategy and Industrial Structure in Pre-World-War-II Japan,” *The
International Conference on Business History: Strategy and Structure of Big Business*, ed. Keiichiro
Nakagawa, volume 1 (Susono, Shizuoka: Fuji Education Center, 1974) 3-12. This view is controversial,
with authors like Morikawa arguing that there are a number of *zaibatsu* that nearly collapsed due to the
vagaries of political patronage as well as arose without recourse to political mercantilism (3-25).
and employed foreign experts to work and teach, supplying administrators and engineers
to the zaibatsu.\textsuperscript{19} Moreover, the demands of the Sino-Japanese (1894-1895) and the
Russo-Japanese (1904-1905) wars enabled well-connected businessmen to procure
supply contracts in shipping, construction, armaments, and mining.\textsuperscript{20}

A recent paper by Jennifer Frankl compares zaibatsu performance to that of
independent firms in the interwar period, 1915 to 1937. Frankl compiled the financial
records of over 150 prewar public companies, using the two volumes Kabushiki Kaisha
Nenkan and Kaisha Nenkan as well as Mark Fruin’s lists of the largest manufacturing
companies for each year between 1918 and 1930.\textsuperscript{21} The data points she used were for
1915, 1921, 1927, 1932, and 1937, which were chosen because of data availability and
also to exclude wartime distortions. Frankl uses OLS regression to determine if zaibatsu
affiliation had an effect on firm performance and risk characteristics, controlling for firm
size, sector, age, and year. She finds that Meiji-era zaibatsu had greater instability in
their returns on equity compared to both independent firms and the newer zaibatsu of the
Taisho (1912-1926) and Showa (1926-1989) Periods. The newer zaibatsu also appear to
be more profitable and faster growing than either their Meiji counterparts or independent
firms.

\textsuperscript{19} Morikawa 52-53; HJ Jones, \textit{Live Machines, Hired Foreigners and Meiji Japan} (Vancouver: University of
British Columbia Press, 1980) 8-14. The French engineer Paul Brunat, who was responsible for managing
the government-built Tomioka Silk Reeling factory, was paid $600 monthly in current prices, equivalent to
that of government ministers, and foreign silk reelers were paid $80 per month, 50 times the wage of
domestic reelers; see Yukihiko Kiyokawa, “Transplantation of the European Factory System and

\textsuperscript{20} Lockwood 23-25; see also Kozo Yamamura, “Success Illgotten? The Role of Meiji Militarism in Japan’s

\textsuperscript{21} Kabushiki Kaisha Nenkan (Tokyo: Toyo Keizai, various dates); Kaisha Nenkan (Tokyo: Nihon Keizai
Shinbunsha, various dates); Fruin 329-341; Frankl 1003.
Section 2: Theoretical Survey

Managerial Ownership

A fundamental characteristic of the zaibatsu is their family ownership. During the Meiji Period, zaibatsu-affiliated firms were accountable to the central holding company, which was usually headed by a member of the founding family, and needed its approval for important decisions. The scope for autonomous decision-making was small, and many zaibatsu family members directly supervised operations, with one observer remarking that:

“In the case of the newly risen zaibatsu such as Mitsubishi, Yasuda, Furukawa, and Okura, the head of the zaibatsu family had the power to supervise the enterprise. That the originator of an enterprise was often a dictator was a well-known fact, and, indeed, the head of the Mitsubishi family practically had the right of command over the enterprise for two generations.”

Zaibatsu like Mitsubishi were also able to expand early into different industries due to their ability to draw on the personal wealth of their founding families without needing to turn to external investors. This feature was especially relevant to Japanese industry at the time, as the ability of the zaibatsu to finance investment internally in the absence of a well-developed financial system was crucial to retaining earnings for investment. Independently established rivals, on the other hand, were plagued by their need to pay shareholder dividends and as a result remained small and undercapitalized.

In the industrial organization literature, the question of ownership influence on performance can be framed as the debate between agency theory and strategy

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23 Morikawa 94-95.
management. Agency theory suggests that owners who take strong roles in managing their firms do so to improve firm performance, calling this phenomenon the “convergence of interest” hypothesis.\(^{25}\) Agency theorists like David Denis and Diane Denis contend that owner-managers are less likely to expand their firms through diversification.\(^{26}\) This is attributed to the unwillingness of managerial stakeholders to dilute firm value via diversification, unlike non-managerial owners who allow managers to make strategic decisions within limits.\(^{27}\) Conservatism and unfamiliarity with new industries also restrain owners from extending beyond their original industry.

Nevertheless, strategy management theorists like Ahmed Belkaoui and Ellen Pavlik assert that high levels of managerial ownership (ie, above 25 percent) adversely affect firm value-maximization.\(^{28}\) This is due to the “entrenchment hypothesis,” which suggests that managerial owners make non-value-maximizing decisions because their large holdings provide a measure of job security. This theory, coupled with the rentier background of many early Japanese owner-managers (ie, ex-samurai), may explain the failure of firms and the separation of ownership from management in the late 1800s.\(^{29}\)


\(^{26}\) It is important to note that diversification and establishing new industries are not synonymous (since one can diversify into a pre-existing industry), but in the case of Meiji Japan, where much of zaibatsu industrial diversification occurred through introducing new technologies and their attendant industries, there is significant overlap between the two. In other words, zaibatsu expansion largely came through diversifying into new industries. There is an abundant literature on the strategy of diversification itself, notably early studies by Richard Rumelt, which is informative but not particularly topical for this paper. A list of interesting papers on this subject is available from the author upon request.

\(^{27}\) One potential problem with the Denis et al argument is their conflating diversification with value-reduction, which may not be equivalent. Recent work by Yakov Amihud and Baruch Lev, however, clarifies this imprecision by finding that corporate diversification in general is value reducing. Yakov Amihud and Baruch Lev, “Does Corporate Ownership Structure Affect Its Strategy Towards Diversification?” *Strategic Management Journal* 20 (1999) 1063-1069.


\(^{29}\) Fruin 76.
That the *zaibatsu* had substantial managerial ownership (and thus little oversight by external shareholders) did not preclude them from expanding into new and different industries. Morikawa writes “pressure [to diversify] sometimes came from within the *zaibatsu* family, as in the case of the Iwasaki brothers at Mitsubishi,” and that the *zaibatsu* were not monolithic in diversification strategy.\(^{30}\) In fact, one of the “Big Four” *zaibatsu*, Yasuda, remained mostly specialized in the financial service sector, while other major *zaibatsu* like Mitsui and Mitsubishi had more extensive and varied holdings. The Mitsui *zaibatsu*, which in the period between 1892 and 1901 and under the auspices of the Mitsui Bank, held interests in nine unrelated major industries, five of which were from new acquisitions (paper, cotton and silk spinning/reeling, construction, coal mining, railways).\(^{31}\) The *zaibatsu* also were able to benefit from the auction of diverse public enterprises during the early Meiji due to their existing wealth and political connections.\(^{32}\)

For joint stock corporations, however, investor interests determined the direction of the firms; large shareholders “provided adequate leadership, [so] agency costs did not pose many problems.”\(^{33}\) Many of these firms were run for short-term profit and were incorporated for a predetermined time period, between three to ten years.\(^{34}\) Consequently, independent firms did not appear to diversify as early as the *zaibatsu*, but expanded into new sectors only at the time around the First World War.\(^{35}\) That said,

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\(^{30}\) Morikawa xxiii.

\(^{31}\) The respective companies for the nine industries are: Mitsui Bank; Oji Paper; Kanegafuchi (Cotton) Spinning, Maebashi Silk Spinning, and Tomioka Silk Filature; Shibaura Construction; Hokkaido Colliery and Rail; Mitsui Trade House; Mitsui (Metal) Mining; and Mitsukoshi Drapery (Morikawa 59-60).

\(^{32}\) Fruin argues that the *zaibatsu* had no choice but to diversify since the timing of government auctions was unpredictable and the *zaibatsu* found it expedient to make the purchases regardless of industry (91). This point, however, is consistent with profit-maximization even if technology and capital resources were not synergistic between old and new industry holdings.

\(^{33}\) Teranishi 68-69.

\(^{34}\) Fruin 120.

\(^{35}\) Morikawa 94.
external monitoring did not ensure managerial virtue or firm performance; some large shareholders were documented as having colluded with management to the detriment of external capital investors during the Taisho Period (1913-1926).  

Modern Examples

The preceding theories are frequently illustrated with contemporary examples, in this case those of the Korean chaebol and the technology start-ups of recent decades. Studies into the modern day Korean chaebol, which were modeled on the Japanese conglomerates, give insight into Meiji-era zaibatsu through better documentation on their expansion into new industries.

Sea Jin Chang and Unghwan Choi found that firms affiliated with these conglomerates had higher profits and greater efficiency compared to independent firms, but that these results were contingent on structural differences among the firms. These findings contradict those for Japanese conglomerates in both the pre-war and post-war periods, as studied by Frankl and Richard Caves and Masu Uekusa, respectively. They also contrast with a study by Jaewoon Koo and Sunwoo Shin, who find no difference in

36 Teranishi 70.
39 Richard Caves and Masu Uekusa, Industrial Organization in Japan (Washington, D.C.: Brookings Institute 1976) 78. Caves and Uekusa, like Frankl for zaibatsu, had found lower profitability for firms affiliated with keiretsu, which are the post-WWII versions of the zaibatsu. Notwithstanding superficial similarities (eg, three contemporary keiretsu being Mitsui, Sumitomo, and Mitsubishi), keiretsu differed from zaibatsu in ownership and organizational structures, with mutually held securities among group affiliates instead of being family-controlled, and consultation (via councils comprising representatives of each firm) for group-wide decision-making instead of a centralized hierarchy. The chaebol are closer approximations of the zaibatsu rather than the keiretsu.
profits between conglomerates and independent firms.\textsuperscript{40} This result comes in spite of the assumptions of capital market failure and internal financing within the conglomerates, economic conditions that also correspond to Japan in the late 1800s. Even internal financing, whereby a multi-sector firm uses the profits of one division to subsidize a loss-making one or to invest in a new enterprise, is not viewed favorably, despite transaction cost savings and financial system weaknesses. Hyun-Han Shin and Young Park find that fewer liquidity constraints may lead to overinvestment in capital or investment in poorer growth opportunities.\textsuperscript{41}

Similarly, the independent start-up firms of the past two decades, most notably in the information technology field, offer suggestive analogs to firms interested in introducing new technology and establishing state-of-the-art industries. The literature on start-ups in the 1990s suggests that additional factors may affect the decision to establish a firm in a new industry, namely human capital and asymmetric information. Denis Gromb and David Scharfstein find that independent start-ups (as opposed to firms that expand into new sectors) are constrained by the weakness of the external labor market in a hitherto unknown industry, and thus entrepreneurs are less likely to go out on their own.\textsuperscript{42} Established firms, in contrast, are able to redeploy their human capital from unsuccessful ventures to other operations, which in equilibrium should incite greater first entry into new sectors compared to independent agents. Moreover, this redeployment advantage applies as well to firms with internal financing (eg, conglomerates) versus


those that rely on external funds (eg, independent firms), the former being able to reallocate funds more easily than the latter.43

Alternatively, Robert Cressy finds that rather than the availability of financial capital, it is human capital in the form of work experience and education that takes the lead in determining the survival rate of new firms, and thus whether they are established at all.44 Cressy’s argument counters the claim that new start-ups face external financing constraints, and uses the observation that firms typically self-select in whether or not they should seek funding, basing their likelihood of borrowing on their prospects and human capital endowment. This line of reasoning is consistent with a study by David Audrutsch, who provides evidence that agents are more likely to start a company in industries that have greater knowledge asymmetries or exploit new technologies.45 This is because entrepreneurs in new industries are better able to appropriate the value of their innovation compared to operating within existing industries. These characteristics affecting modern industry start-ups apply no less to the zaibatsu and their independent contemporaries of the Meiji Period.46

Finally, Timothy Schoenecker and Arnold Cooper examine which characteristics of firms influence their entry into new industries in their study of personal and business

46 In an interesting contrarian opinion, Chandler heavily discounts the efforts of entrepreneurs in contributing to industrial diversification, and places emphasis instead on scale, which he argues is as important to the modern computer industry as it was to the manufacturing firms of the nineteenth century; Alfred Chandler, “Chandler on Entrepreneurship,” Forbes, 13 November 1989 issue, 16 June 2005 <http://www.ssc.uwo.ca/economics/faculty/jpalmer/Articles/Articles/chandler.html>.
computer manufacturing. They consider the industrial setting as well as firm attributes in determining entry timing, and find industries in which there are strong first mover advantages to have earlier entry. Incumbent firms are also more likely to expand into a new, related sector if they perceive potential competition, and not to diversify (for fear of cannibalizing existing sales) absent that threat. Other aspects, such as access to technology, marketing, and size, are also associated with early entry.

Taken together, these theories and examples are agnostic in predicting whether zaibatsu would be industry pioneers or laggards. That zaibatsu diversified into multiple, unrelated industries suggests that managerial ownership was not an obstacle to innovation; furthermore, they were not constrained financially from doing so. On the other hand, profit-maximizing agents have no incentive to diversify, especially into unrelated sectors that do not allow for scale economies. Failures in the labor and capital markets enhance the advantages inherent in large, established companies, yet at the same time these imperfections afford greater rewards to independent entrepreneurs with a high capacity for risk. Single-sector firms also avoid conflicts of interest from similar production lines as well as disagreements between divisions. My paper addresses this ambivalence by testing whether zaibatsu were earlier entrants in new sectors relative to independently established firms.

Section 3: Methods

The premise of this paper is that fundamental differences underlie firms that are affiliated with zaibatsu and those that are independently established. These include

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access to natural resources (eg, coal, iron); managerial autonomy; the ability to finance investments internally; the employment of highly skilled labor; and relationships with the central government. These are assumed to influence if and when firms enter and help to establish new sectors.

I use two different models to determine whether zaibatsu-affiliated firms had an advantage in entry timing compared to independent firms. I hypothesize that zaibatsu-affiliated firms were earlier entrants in new industries relative to independent firms, and test this with a multivariate OLS regression model. The OLS model has the date of entry (year and month) as the dependent variable and firm affiliation as the independent variable:

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Y_{OLSj} = \alpha + \beta_a X_a + \beta_p X_p + \beta_c X_c + \beta_{a,c} \left[ X_a \times 1(X_{ci}) \right] + \beta_{p,c} \left[ X_p \times 1(X_{ci}) \right] + \beta_k \times 1(X_k) + \beta_g \times 1(X_g),
\]

where

- \( Y_{OLSj} \) = date of firm establishment, where \( j \) can be one of three industry classifications: 1 = one-digit JSIC, 2 = two-digit JSIC, or 3 = three-digit JSIC
- \( \alpha \) = constant
- \( X_a \) = categorical variable for firm affiliation, where \( a \) can take the values: 0 = independent or 1 = zaibatsu
- \( X_p \) = categorical variable for ownership, where \( p \) can take the values: 0 = publicly listed company or 1 = privately held company
- \( X_{ci} \) = categorical variable for industry contestability, where \( i \) can take the values: 0 = highly contestable, 1 = moderately contestable, 2 = minimally contestable, or 3 = uncontested
- \( X_k \) = categorical variable for an industry code within a given class (JSIC1 = 96 major industry groups, JSIC2 = 426 industry groups, and JSIC3 = 1021 sub-industry groups)
- \( X_g \) = categorical variable for the 47 Japanese prefectures

Additionally, I use a logit model to find the probability of zaibatsu-affiliated firms being first movers in a new industry. Here, the dichotomous dependent variable is

48 A third type of affiliation, government, is specified as well to account for firms owned/operated by the public sector, but are excluded from the regression analyses.
whether a firm was a first entrant or not, and the independent variable is the firm’s affiliation:

\[ \text{Prob}(Y_{LOGIT} = 1 | X_a) = F(\beta_v * X_v) = e(\beta_v * X_v) / [1 – e(\beta_v * X_v)], \]

where

- \(Y_{LOGIT} = 1\) if first entrant or 0 if not, where \(j\) can be one of three industry classifications:
  - 1 = one-digit JSIC, 2 = two-digit JSIC, or 3 = three-digit JSIC (as above)
- \(X_a\) = categorical variable for firm affiliation, where \(a\) can take the values:
  - 0 = independent or 1 = zaibatsu (as above)
- \(X_v\) = linear combination of firm affiliation, ownership, industry contestability, and industry code within a given class; ie, the right hand side of the equation for the OLS regression (with the variables as defined above)

One advantage to using these two models is their complementarity, which allows for cross-validation of the results.

Firm affiliation can take one of two values: independently established or zaibatsu-affiliated. Independent firms have no affiliation with any parent company (ie, a start-up), while zaibatsu-affiliated firms are those that were either established by zaibatsu as subsidiaries or divisions or were affiliated through investment (eg, merger, acquisition). This distinction is modeled with categorical (aka, dummy) variables, and zaibatsu-affiliation includes all the major zaibatsu established in the Meiji Period or earlier: Mitsui, Mitsubishi, Sumitomo, Yasuda, Furukawa, and Okura. For the regression analysis, independent firms are the omitted reference group against which all other control variables are compared to.

The two models also control for ownership type, industry fixed effects, and industry contestability. As discussed earlier, ownership is one of the key differences between zaibatsu and independent firms, with the former group privately held by wealthy families and the latter publicly listed as joint stock corporations. Under the 1893
Commercial Code, publicly listed firms were required to issue annual financial statements outlining their activities, listing assets, and providing a balance sheet; private firms, on the other hand, were not required to make this disclosure. Correspodingly, I separate the firms with a binary categorical variable for ownership (eg, privately-held versus publicly listed).

For industry-specific effects, I coded each firm with an industry code from the Standard Industrial Classification for Japan (JSIC), 1984 edition, published by the Statistics Bureau of Japan. This system is analogous to the North American Industrial Classification System (NAICS) used to identify industries. Codes for the firms in the dataset were assigned on the basis of the description in its corporate history. Typically, company names in Japan comprise three parts: personal/geographic name + industrial activity + industrial operation/facility (eg, Ishitsuka + Bottle Manufacturing + Factory), with the most common company names using a combination of the first two identifiers. The JSIC has three levels of industry classification, one-, two- and three-digit codes in increasing order of specificity; eg, JSIC 5: Mining, JSIC 52: Non-ferrous Metallic Ore

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50 There are a number of variations within these two types of ownership: private ownership includes individual proprietorship or partnership (unlimited and limited liability) as well as mutual associations, and public firms came in both limited and unlimited liability flavors (Yagura and Ikushima xxix).
51 The classification of Japanese industrial sectors did not begin until 1930 and has been revised a number of times since. To address this issue, I retroactively apply industrial codes from the 1984 edition, which coincides with the publication date for the corporate genealogies. My rationale for retroactive classification is manifold: a lack of a system in the Meiji Period means retroactively applied codes do not alter the historical record; industrial sector distinctions that were made in later years do not preclude the existence of those distinctions during the Meiji Period; codes for industries that did not exist in the Meiji Period do not have to be used; industries that existed in the past that do not appear in the 1984 system can be additively included without needing to change existing codes.
52 The NAICS recently replaced the United States Standard Industrial Classification (SIC) system to facilitate standardization among the three countries in the North American Free Trade Area, ie, the U.S., Canada, and Mexico. Website for the U.S. Census Bureau, 27 March 2006 <http://www.census.gov/epcd/www/naics.html>.
53 The move toward abbreviation, multiple personal names, and deletion of industrial activity has largely occurred in the post-WWII period. Shintaro Yagura and Yoshiro Ikushima, Shuyo Kigyo no Keifuzu (Tokyo: Yushodo Shuppan, 1986) xvi-xix.
Mining, JSIC 521: Copper Ores.\textsuperscript{54} For each of the three JSIC levels, I use categorical variables, with the most representative code (ie, the code containing the number of firms closest to the mean, absent outliers) as the omitted reference group.

To further distinguish industry-level effects, I include a contestability index, which categorizes industries into four types, ranging from highly contestable to uncontested. Contestability is measured by the average number of firms that exist in a related industry within a given JSIC class; eg, to predict the contestability of the two-digit industry in iron mining, I use the average number of pre-existing firms in other mining industries that share the one-digit code with iron mining.\textsuperscript{55} The rationale for this variable is that a firm will take into consideration the number of firms in closely related industries to predict the contestability of the new industry in which it intends to establish. If a firm observes that there are few (or no) firms in industries that are closely related to the one it wishes to enter, it may believe that being the first entrant will allow it to wield market power in the newly established industry. In other words, industries that appear to have clear first mover advantages may provide a stronger incentive for early firm establishment compared to industries that do not.\textsuperscript{56}

I also interact both firm affiliation and ownership with industry contestability to account for possible correlation between a firm type and industry structure (eg, whether \textit{zaibatsu} or other private firms prefer to enter minimally contestable industries). The

\textsuperscript{54} There is a fourth level of classification that is broader than the JSIC one-digit class. It is not considered in this paper due to its lack of specificity in industry specification.

\textsuperscript{55} The four groupings are as follows: highly contestable (two or more firms on average in a shared JSIC class); moderately contestable (between one and two firms); minimally contestable (between zero and one firm); and uncontested (no pre-existing firm in given JSIC class).

\textsuperscript{56} Schoenecker and Cooper 1131-1132. An earlier study on entry timing into new industry subfields finds that industry incumbents will enter the new subfield if its existing production line is threatened by competition; Will Mitchell, “Whether and when? Probability and timing of incumbents’ entry into emerging industrial subfields,” \textit{Administrative Science Quarterly}, 34 (1989) 208-230.
presence of these interaction terms may help to explain why zaibatsu operate disproportionately more monopolies than independent firms. Theory also suggests that minimally contestable industries may be indicative of entry barriers (e.g., high minimum efficient scale), which zaibatsu may be better able to overcome given their size, internal financing, and access to natural resources. Finally, I include firm-specific characteristics such as capitalization level and the geographic location of a firm’s (main) operations. These are to account for possible entry barriers due to large setup costs and access to (urban) financial institutions to fund investment, respectively.

I imposed a number of restrictions on the data and performed different specification tests on the regression results. I excluded government firms from the regression analysis on the grounds that industrialization was driven primarily by the private sector and that government resources are not comparable to those of private firms. I also removed all firms that entered industries in which the government had been the first mover during the early part of the Meiji or prior. This is to minimize distortions from possible favoritism the government may have shown to well-connected companies (including some zaibatsu) in the period of privatization in the early Meiji. I include only firms in the Meiji Period; those that were established before are excluded. As for firms that changed their names or ownership type, and thus appear to be established in multiple years, the earliest entry is used for the dataset and the others excluded from the analysis.

Section 4: Data

The primary data sources used in this paper are the compilation of corporate genealogies Shuyo Kigyo no Keifuzu, edited by the business historians Shintaro Yagura
and Yoshiro Ikushima, and the collection of semiannual firm financial reports *Eigyo Hokokusho Shusei* collected by the Yushodo Publishing Group.\(^{57}\) The *Shuyo* compilation includes the genealogies for 1,087 firms listed on the Tokyo Stock Exchange as of September 1984, and includes a total of 14,000 firms dating back to the nineteenth century or earlier. The authors include in the genealogy listings the company name, ownership type, entry date, location of establishment, and annotation of industrial activity, all of which they collected from company histories. Besides tracking changes to a given firm’s name or company type, the genealogies also show asset investment/divestment, franchising, and closure. The *Eigyo* collection has financial records of 7,747 firms over the period of 1872 to 1945 categorized by industry. These records provide (in varying degrees of completeness) information such as a firm’s establishment date, capitalization value, a balance sheet of assets and liabilities, employment data, and a list of major stockholders. Additional sources of firm information include Japanese industry indices and firm case studies.\(^{58}\)

**Section 5: Results**

I start with some simple tabulations, then move to pairwise correlations, and finally to multiple regressions. In the period from 1868 to 1912, there were 2,565 firms in the dataset, of which 2,410 were independent firms and 120 were affiliated with a

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\(^{57}\) The *Eigyo Hokokusho Shusei* has six cumulative series, the most recent update in 1998 adding an additional 183 firms. The number of industrial sectors has also increased to 30 since the first series was made in 1966, which had 26 sectors. The first series, available through the Center for Research Libraries, covers the years 1890 to 1945 and contains 917 firms. *Eigyo Hokokusho Shusei*, first series (Tokyo: Yushodo Film Publication, 1966).

Despite the appearance of sample imbalance, the absolute numbers of firms by affiliation are representative of the distribution in the population. This is due to differences in firm size and market presence, which typically were much larger for *zaibatsu*. From the sample, 2,242 could be identified with a JSIC1 code; 2,124 with a JSIC2 code; and 1,744 with a JSIC3 code. Additional summary statistics are given in Table I.

Somewhat unexpected was the existence of firms that were both *zaibatsu*-affiliated and publicly listed. This seeming contradiction makes sense when one realizes that these “public” firms were mostly owned by *zaibatsu*, which may have acquired a public firm without taking it private or entered into a joint venture in which they were major stakeholders.

A disproportionately large number of independent firms are in highly contestable industries relative to total sample representation, while the opposite is true for *zaibatsu*-affiliated firms. As for less contestable industries, the situation is reversed: independent firms are disproportionately fewer than their sample representation and *zaibatsu*-affiliated firms greater. Independent firms are also under-represented as first movers and industry monopolists, while *zaibatsu* are over-represented. Altogether, these relationships support the central hypothesis and existing research that *zaibatsu*-affiliated firms entered industries relatively early over this period.

Moreover, these respective relationships apply across all three JSIC levels, although there are subtle differences depending on the specificity of JSIC level. In all three JSIC levels, independent firms are proportionately fewer than their sample representation.

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59 There are also twenty-three firms that were owned/operated by the government; since this paper is interested in comparing private sector firms, those affiliated with the government are excluded from the analysis.
representation would suggest; however, the disproportion diminishes the more narrowly we specify industry class. This finding holds true for the number of first entrants as well. Since greater specialization within industries occurs later in time, the growing proportion of independent first entrants in narrower industry classes is compatible with research that found Meiji-era *zaibatsu* to be laggards in industrial development during the post-Meiji years.\(^{60}\)

Consistent with the summary statistics, the results from pairwise correlation analysis indicate that *zaibatsu* affiliation is negatively correlated with highly contestable industries. As contestability decreases, the correlation becomes positive and applies for all JSIC levels at high statistical significance. On the other hand, the opposite occurs for independent firms, which are positively correlated with highly contestable industries, and these correlations weaken as contestability decreases. The correspondence between low contestability and *zaibatsu*-affiliation seems reasonable when considering the possible entry barriers that exist for many industries (eg, mining, ship construction), and how wealth and political connections may uniquely equip *zaibatsu* to overcome them.

One interesting finding is that uncontested industries, despite having a positive correlation with *zaibatsu* and negative correlation with independent firms, show markedly weaker correlations relative to those for moderately and minimally contestable industries. This may suggest that *zaibatsu*, despite their preponderance in less contestable industries, are not strongly associated with being the first to enter a completely new industry (ie, one without pre-existing closely related industries).

Furthermore, private ownership has a significant negative correlation with firms in highly contestable industries, and the opposite for less contestable ones. This may

\(^{60}\) Frankl (1999).
indicate unwillingness among public investors to fund enterprises that are not already established and have proven their commercial viability. Private investors, alternatively, may be more willing to take this risk, especially if they have the resources to do so and have assets in different industries. This correlation is supported by both theory and empirical data: diversification among different businesses lowers the average risk profile relative to investing in a single industry. The microeconomic theory of expected utility maximization states that an agent who maximizes expected utility subject to her capacity for risk will invest in a risky asset if she is insured (in the case of the zaibatsu, having stable streams of revenue from pre-existing investments).61

Earlier results notwithstanding, the regression results from both models suggest that zaibatsu affiliation itself has no significant effect on entry timing. Rather, industry contestability and private ownership strongly predict the date of establishment for a firm regardless of affiliation, with the less contestable industries having earlier founding dates and privately-owned firms later entry. A negative coefficient is interpreted as having a lower (or earlier) entry date relative to highly contestable industries (the omitted reference group) and the opposite for positive coefficients; these results apply for all JSIC classes and in both regression models. Moreover, the interaction terms do not consistently show support for zaibatsu-affiliation or private ownership as having any effect on either earlier establishment dates or first entry. These results are particularly telling in the logit model, considering that industries in which government firms were first movers were excluded from the analysis.

Industry-specific results are much more in accord with historical evidence and some theory. Zaibatsu affiliation is positively correlated with the mining and metal

processing sectors, and negatively correlated with the finance, and to a lesser degree, textile sectors. The reverse holds true for independent firms. Since it is well-known that the *zaibatsu* had significant holdings in coal and metal mines and that these industries were both prohibitively costly to set up and capital- and resource-intensive, these correlation results are credible. Furthermore, despite the financial emphasis of the Yasuda *zaibatsu*, as a group the *zaibatsu* were more averse to establishing firms in financial industries relative to independent firms. This is consistent with the premise that firms that can finance investments internally (e.g., *zaibatsu*, private firms) do not need to establish financial institutions to procure funds. As for the textile manufacturing sector, the minimal startup costs, low-skilled labor requirements, and rural dispersion may explain the correlation results.62

For the two models, I test for proper functional form and omitted variable bias with a specification link test. I also control for data heteroskedasticity with Eicker-White standard errors. The specification link test takes the fitted values of the residual from the original model and squares them, and then inserts them back into the model as an additional variable. The adjusted model is then regressed to check for significance in the new variable. The null hypothesis 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). A significance level above 5 percent is generally interpreted as failure to reject the hypothesis (i.e., model is not incorrectly specified). Both models for all three JSIC levels

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62 One concern may be that *zaibatsu* enter industries that are closely related to ones they are already in. If an incumbent *zaibatsu* is a monopoly, then lower contestability in the newer industries would naturally follow, and these results have no predictive power. Fortunately, the *zaibatsu* diversified for the most part into unrelated industries; Fruin 90-91.
exceed this threshold, which means that the null hypothesis of no omitted variables fails to be rejected.

**Section 6: Robustness**

A valid concern with regard to the dataset is that small firms may be under-represented in the corporate genealogies, and these may be early entrants in industries but had failed to survive, grow, or be acquired. While this possibility of small firm censorship exists, in general, I conclude that such objections to the present findings are not persuasive. First, small firms do appear, as demonstrated by firms in the dataset that were established in the pre-Meiji era, most of which were individual proprietorships. Also, the high cost of capital equipment and skilled labor as well as the focus on new technology-oriented industries suggest the improbability of individuals in the Meiji Period financing such investments. Those with sufficient resources and connections to establish firms in these new industries are accounted for in this paper: independently wealthy families, investors using credit or capital markets, and the government. Besides the few rich clans that owned the major *zaibatsu*, there are those whose industrial holdings and wealth enabled them to become regionally and even nationally dominant (as the emergence of new *zaibatsu* in the early 1900s testifies). The genealogies also document the acquisition and disposal of capital assets, which one expects to be the fate of unsuccessful individual ventures.

The issue of misclassified industries may appear to be pervasive, given that some firms had operations in multiple industries but are classified in only one. However, the

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63 Even the *zaibatsu* were unable to single-handedly finance certain investments, such as the Kyushu Railway (capitalized at eleven million yen); these were left for joint stock companies to set up (Morikawa 27).
authors of the corporate genealogies note in their preface that Japanese companies typically included their industry and function in their corporate name during this period, and that the practice of name abbreviation was largely absent in the pre-war era. The authors have also annotated firms with their respective industries if they are not obvious, and they list internal divisions of a single firm, which suggests that multidivisional firms are adequately identified. Other researchers state that most Japanese firms up to WWII were largely single-product oriented (aka, U-form) companies, which was central to their success.64

Without a doubt, additional performance measures at the firm level would improve this paper’s findings, but the lack of documentation prevents their inclusion.65 That said, given the relatively meager number of firms used in earlier studies for this period, one of the strengths of the current dataset is the avoidance of small sample bias. Moreover, the object of this paper is to compare corporate behavior via qualitative measures (ie, entry dates and positions, industry establishment), and in this respect the information provided by the data suffices.

Section 7: Discussion and Extensions

If the zaibatsu were not vanguards of innovation across the range of industries, then why has so much been written that states the contrary? If not leaders in entry, what explains their dominance in the economy, and why were they so poorly served by their supposed strengths?

64 Fruin 3.
65 Capitalization value is typically used to measure firm size. In the dataset, there were 109 joint stock firms that had capitalization values, and I tested this subsample both with and without capitalization as a control variable. Since there were negligible differences (and explanatory power) between the two sets of results, I excluded this variable from the analysis.
One insight from the above analysis is that conventional wisdom may have erred, but reasonably so. This is due to the correspondence between zaibatsu and less contestable industries; since low contestability is directly related to earlier establishment, it is a small (but fallacious) step to conclude that zaibatsu were early entrants throughout the economy. This, along with the lack of inter-industry comparisons, zaibatsu-group analysis, and most importantly, data, may explain the prevalence of existing assumptions.

Another misconception about the zaibatsu is that their market dominance in multiple industries is synonymous with success and talented management. Mitsui is an edifying example, being both the oldest and largest zaibatsu of the time as well as having the most disparate industry holdings. The firm’s ubiquity, however, masked uneven profitability within the conglomerate and only until after 1900, when it devolved management to its separate divisions, did divisional performance improve.\textsuperscript{66} Personal leadership, in particular, influenced greatly long-run performance. While the Mitsui Trading Company was capably led by Takashi Masuda, who believed that skilled personnel determined a firm’s success or failure, Mitsui Bank director Hikojiro Nakamigawa embarked on a diversification spree in manufacturing firms that had to be reversed upon his death.\textsuperscript{67} Even less fortunate was Ichibe Furukawa of the eponymous zaibatsu, which produced 42 percent of the country’s copper; he justified his decision to buy the (unprofitable) Fune mine using company funds with “[I]et me buy it…think of it as my throwing away ¥300,000 on my hobby.”\textsuperscript{68}

Assumptions about zaibatsu success tend to return to the benefits conveyed by size, that larger production runs lower average unit costs, also known as scale economies.

\textsuperscript{66} Fruin 96
\textsuperscript{67} Morikawa 37-38.
\textsuperscript{68} Ibid 74.
Less well known is the fact that *zaibatsu* during the Meiji Period had few opportunities to capitalize on scale economies since their enterprises were mostly unrelated, which decreased their ability to share resources and technologies across industries.\(^6^9\) *Zaibatsu* also had many interests in commerce (eg, transport, trade), which were not subject to scale economies; rather, they allowed for economies of scope.\(^7^0\) The industries in which *zaibatsu* had scale economies were generally for intermediate goods (ie, production inputs), which may have allowed them a broad reach across industries, but simultaneously left them with fewer areas for innovation. This may be due to the greater number of applications for finished goods, which meant more chances for creativity. It was only on the eve of WWI and the market opportunities opened by disrupted European trade that *zaibatsu* were able to increase their interests in manufacturing industries and capitalize on their scale.\(^7^1\)

Size also was less important to industrial expansion and efficiency at the time, despite the absence of a mature banking system and the theory of internalizing transaction costs. This is due to the misleading comparison at the firm level, where *zaibatsu* dominate single independent firms by any measure. A more appropriate comparison would be between *zaibatsu* and a network of allied firms. The lack of bank credit and financial securities meant that independent firms were unable to create forward and backward linkages through investment. As a result, independent firms remained small and intensely specialized. This environment, however, motivated small firms to be

\(^{6^9}\) Fruin 90.

\(^{7^0}\) Fruin 91. Scope economies differ from scale economies in their reliance on the savings from fixed costs (eg, shared facility use, distribution channels) rather than variable costs (eg, 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.

\(^{7^1}\) Morikawa 123.
efficient and to coordinate with each other to provide goods and services, creating interfirm dependencies and alliances that together reduced any inherent size disadvantages. These relationships presaged the later corporate networks of the post-WWII period, with firms having exclusive links to their suppliers, distributors, and banks.\footnote{Morikawa xi.} This type of firm coordination in a sense is the strategy behind Gerschenkronian late development, but writ small instead of at the macro-level.

There are many possible extensions to this line of research, which seeks to reassess the conventional interpretation of Japanese industrialization using new data and methodology. One would involve the role of government policy and whether the industries spawned by government initiative catalyzed economy-wide industrialization. Here I have excluded the public sector from its analysis, but the effects of infrastructure, human capital investment, and nepotism on industry are legion, and warrant additional study. Understanding the nexus between the Japanese government and private sector not only can revise historical misconceptions, but also be edifying to the modern developing world in pursuit of fast-track modernization.

Having done a cross-industry study, it may be illustrative to use the current data to return to industry-specific inquiries, and approach these questions with qualitative (ie, entry timing, industry structure) measures. In particular, the genesis and development of the financial system in Japan may provide insight into how Japan managed to self-finance its early industrialization, and to consider alternatives to the present reliance on foreign capital markets for investment. Another subject is globalization and economic nationalism, and how the speed and direction of technology transfer may be cause for
dependency and mercantilism. A related area would also examine the impact of war and colonialism on industry, beginning with the Sino-Japanese War in 1894.

Section 8: Conclusion

The results of my analysis lend no support to the hypothesis that zaibatsu firms were earlier entrants into new industries. This lack of evidence for zaibatsu leadership in pioneering industries is remarkable given the consensus to the contrary in the historical literature. One should bear in mind, however, that existing studies are primarily based on individual firms or selected industries, not on a cross section of firms from all industries. My findings also challenge some of the theoretical literature by demonstrating that the advantages allegedly conveyed by size, access to resources, and market imperfections are not validated by data analysis.

At the same time, my results are compatible with what we know of Japanese development during the Meiji Period and of industrialization in general. Marquee industries like steel manufacturing and heavy machinery are correctly identified with zaibatsu, but also have humbler antecedents in light industries like textiles and food manufactures. In addition, firms that succeeded in the early period of Japanese industrialization did so by catering to a relatively poor domestic market, and by producing low-quality and low-cost goods. These strategies are more often associated with the Japan’s second period of rapid industrialization in the decades following WWII, and successfully mimicked by the East Asian tigers of South Korea, Hong Kong, Taiwan, and Singapore.
The results for individual industries are also consistent with existing literature, and lend credibility to the findings as a whole. This is shown with concordance between the data and the actual progression of development, which started with mining and textiles and moved to chemicals and utilities (ie, electricity, gas). The significance of industry contestability on entry is supported by theory, which states that less contestable industries offer the advantages of greater potential market power and profits. This structural variable may also proxy for industry characteristics of high fixed costs or human capital requirements that are historically unavailable. Private ownership also appears to have the deleterious effect that strategy management theorists contend, and gives credence to the value of corporate decentralization and professional managers.

Discussions of early Japanese industrialization invariably turn to the role of zaibatsu and their dominance in the private sector. What is less well understood is the general influence that zaibatsu had on the Japanese economy across the gamut of industries instead of the trophy sectors touted in development. This paper argues against the conventional wisdom that the zaibatsu were leaders in industrial innovation and expansion throughout the economy during Japan’s first industrialization drive. More broadly, the results belie the importance given to corporate size and reach, and suggest that industry structure rather than corporate organization may better predict how and when innovation arrives to the market. Japanese development may have been late to the world stage and was given a fillip from large-scale public and private enterprises, but more credit is due to the small independent firms that carried the rest of the economy forward.
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Table I: Summary Statistics

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Source: Yagura and Ikushima 1986.
Table II: Correlation Analysis

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<td>0.055***</td>
<td>0.275***</td>
</tr>
<tr>
<td>Finance</td>
<td>0.189***</td>
<td>-0.158***</td>
<td>-0.292***</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-0.058***</td>
<td>0.013</td>
<td>0.131***</td>
</tr>
<tr>
<td>Textiles</td>
<td>0.057***</td>
<td>-0.056***</td>
<td>-0.030</td>
</tr>
<tr>
<td>Chemicals</td>
<td>0.030</td>
<td>-0.024</td>
<td>0.071***</td>
</tr>
<tr>
<td>Metal</td>
<td>-0.137***</td>
<td>0.131***</td>
<td>0.135***</td>
</tr>
<tr>
<td>Machinery</td>
<td>-0.045**</td>
<td>0.001</td>
<td>0.048**</td>
</tr>
</tbody>
</table>

\(^*\)\(^(*)\): significant to the 1(5(10)) percent level

\(^1\) Mining, wholesale/retail trade, finance, and manufacturing refer to JSIC1 level industries. Textiles, chemicals, metal, and machinery are all JSIC2 level industries within the manufacturing industry at the JSIC1 level.
Table III: OLS Model and Results

\[ Y_{OLSj} = \alpha + \beta_aX_a + \beta_pX_p + \beta_cX_c + \beta_{a,c}[X_a*1(X_{ci})] + \beta_{p,c}[X_p*1(X_{ci})] + \beta_k*1(X_k) + \beta_g*1(X_g), \]

\( Y_{OLSj} \) = date of firm establishment, where \( j \) can be one of three industry classifications:
- 1 = one-digit JSIC, 2 = two-digit JSIC, or 3 = three-digit JSIC
\( \alpha \) = constant
\( X_a \) = categorical variable for firm affiliation, where \( a \) can take the values:
- 0 = independent or 1 = zaibatsu
\( X_p \) = categorical variable for ownership, where \( p \) can take the values:
- 0 = publicly listed company or 1 = privately held company
\( X_{ci} \) = categorical variable for industry contestability, where \( i \) can take the values:
- 0 = highly contestable, 1 = moderately contestable, 2 = minimally contestable, or 3 = uncontested
\( X_k \) = categorical variable for an industry code within a given class (JSIC1 = 96 major industry groups, JSIC2 = 426 industry groups, and JSIC3 = 1021 sub-industry groups)
\( X_g \) = categorical variable for the 47 Japanese prefectures

<table>
<thead>
<tr>
<th></th>
<th>JSIC1</th>
<th>JSIC2</th>
<th>JSIC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zaibatsu</td>
<td>-0.403</td>
<td>0.252</td>
<td>2.111</td>
</tr>
<tr>
<td></td>
<td>(2.416)(^1)</td>
<td>(2.999)</td>
<td>(3.835)</td>
</tr>
<tr>
<td>Private Ownership</td>
<td>3.198</td>
<td>2.152</td>
<td>4.392</td>
</tr>
<tr>
<td></td>
<td>(0.996)***</td>
<td>(1.180)*</td>
<td>(1.602)***</td>
</tr>
<tr>
<td>Moderately Contestable</td>
<td>-21.230</td>
<td>-11.198</td>
<td>-6.066</td>
</tr>
<tr>
<td></td>
<td>(2.153)***</td>
<td>(2.147)***</td>
<td>(1.997)***</td>
</tr>
<tr>
<td></td>
<td>(3.629)***</td>
<td>(2.148)***</td>
<td>(1.681)***</td>
</tr>
<tr>
<td>Uncontested</td>
<td>-27.534</td>
<td>-23.314</td>
<td>-15.677</td>
</tr>
<tr>
<td></td>
<td>(5.885)***</td>
<td>(2.594)***</td>
<td>(2.223)***</td>
</tr>
<tr>
<td>Zaibatsu*Moderately Contestable</td>
<td>13.158</td>
<td>-7.136</td>
<td>(4.187)***</td>
</tr>
<tr>
<td></td>
<td>(4.386)</td>
<td>(4.386)</td>
<td></td>
</tr>
<tr>
<td>Zaibatsu*Minimally Contestable</td>
<td>9.931</td>
<td>-0.132</td>
<td>-3.374</td>
</tr>
<tr>
<td></td>
<td>(6.139)</td>
<td>(4.231)</td>
<td>(4.400)</td>
</tr>
<tr>
<td>Zaibatsu*Uncontested</td>
<td>21.688</td>
<td>0.907</td>
<td>5.252</td>
</tr>
<tr>
<td></td>
<td>(9.896)**</td>
<td>(7.134)</td>
<td>(4.968)</td>
</tr>
<tr>
<td>Private*Moderately Contestable</td>
<td>-8.512</td>
<td>-8.140</td>
<td>-0.751</td>
</tr>
<tr>
<td></td>
<td>(3.987)**</td>
<td>(3.397)**</td>
<td>(3.471)</td>
</tr>
<tr>
<td>Private*Minimally Contestable</td>
<td>11.381</td>
<td>-0.716</td>
<td>-7.895</td>
</tr>
<tr>
<td></td>
<td>(8.764)</td>
<td>(3.598)</td>
<td>(2.579)***</td>
</tr>
<tr>
<td>Private*Uncontested</td>
<td>5.370</td>
<td>-7.702</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.954)</td>
<td>(3.069)</td>
<td>***</td>
</tr>
</tbody>
</table>

N 843 787 660
R-squared 0.414 0.539 0.608
Specification Link Test (P > z) 0.917 0.536 0.142

Baseline comparison is to independent firms in highly contestable industries (ie, omitted reference groups). Results for JSIC codes and prefectures are omitted for clarity.

\(^1\) Eicker-White standard errors are in parentheses, which take into account variable hetereoskedasticity.
\((***)\): significant to the 1(5(10)) percent level
Table IV: Logit Model and Results

\[
\text{Prob}(Y_{LOGITj} = 1 \mid X_a) = F(\beta_v X_v) = \frac{e(\beta_v X_v)}{[1 - e(\beta_v X_v)]},
\]

\(Y_{LOGITj} = 1\) if first entrant or 0 if not, where \(j\) can be one of three industry classifications:
1 = one-digit JSIC, 2 = two-digit JSIC, or 3 = three-digit JSIC (as above)
\(X_a\) = categorical variable for firm affiliation, where \(a\) can take the values:
0 = independent or 1 = zaibatsu (as above)
\(X_v\) = linear combination of firm affiliation, ownership, industry contestability, industry code, and major prefecture\(^1\) within a given class; ie, the right hand side of the equation for the OLS regression (with the variables as defined above)

<table>
<thead>
<tr>
<th>JSIC1</th>
<th>JSIC2</th>
<th>JSIC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zaibatsu (X_a)</td>
<td>-0.917</td>
<td>-0.204</td>
</tr>
<tr>
<td></td>
<td>(0.677)(^2)</td>
<td>(1.607)</td>
</tr>
<tr>
<td>Private Ownership</td>
<td>-0.833</td>
<td>-0.129</td>
</tr>
<tr>
<td></td>
<td>(0.764)</td>
<td>(1.008)</td>
</tr>
<tr>
<td>Moderately Contestable</td>
<td>4.038</td>
<td>1.486</td>
</tr>
<tr>
<td></td>
<td>(0.891)(^**)</td>
<td>(1.167)</td>
</tr>
<tr>
<td>Minimally Contestable</td>
<td>4.719</td>
<td>5.580</td>
</tr>
<tr>
<td></td>
<td>(2.315)(^**)</td>
<td>(0.857)(^***)</td>
</tr>
<tr>
<td>Uncontested</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zaibatsu*Moderately Contestable</td>
<td>-</td>
<td>-0.241</td>
</tr>
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<tr>
<td>Zaibatsu*Minimally Contestable</td>
<td>--</td>
<td>-0.635</td>
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<tr>
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<tr>
<td>Zaibatsu*Uncontested</td>
<td>--</td>
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<tr>
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<tr>
<td>Private*Moderately Contestable</td>
<td>-</td>
<td>1.294</td>
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<tr>
<td>Private*Minimally Contestable</td>
<td>-</td>
<td>0.905</td>
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<td>Private*Uncontested</td>
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<tr>
<td>N</td>
<td>661</td>
<td>457</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.399</td>
<td>0.483</td>
</tr>
<tr>
<td>Specification Link Test (P &gt; z)</td>
<td>0.349</td>
<td>0.708</td>
</tr>
</tbody>
</table>

\(^-\): variable dropped due to non-variation in sample
\(--\): variable dropped due to collinearity

Baseline comparison is to independent firms in highly contestable industries (ie, omitted reference groups). Results for JSIC codes and prefectures are omitted for clarity.

\(^1\) Major prefecture includes: Tokyo, Osaka, Yokohama, and Nagasaki.
\(^2\) Eicker-White standard errors are in parentheses, which take into account variable hetereoskedasticity.
\(^*(**))\): significant to the 1(5(10)) percent level
Figure 1: All Firms

Figure 2: First Entrant Firms*

*First Entry for JSIC1, JSIC2, and JSIC3 classes
Figure 3a: Industry Contestability Breakdown

- **Highly Contestable**
- **Moderately Contestable**
- **Minimally Contestable**
- **Uncontested**

Graphs by JSIC1 Contestability
Figure 3b: Industry Contestability Breakdown

Highly contestable

Moderately contestable

Minimally contestable

Uncontested

Density

Establishment Date

Graphs by JSIC2 Contestability
Figure 3c: Industry Contestability Breakdown

Highly Contestable

Moderately Contestable

Minimally Contestable

Uncontested

Graphs by JSIC3 Contestability
Figure 4a: Contestability by Affiliation

Independent

Zaibatsu

Highly Contestable

Moderately Contestable

Minimally Contestable

Uncontested

Graphs by JSIC1 Contestability

Graphs by JSIC1 Contestability
Figure 4b: Contestability by Affiliation

Independent

Zaibatsu

Highly Contestable

Highly Contestable

Moderately Contestable

Moderately Contestable

Minimally Contestable

Minimally Contestable

Uncontested

Uncontested

1860 1880 1900 1920

1870 1880 1890 1900 1910

Density

Density

Graphs by JSIC2 Contestability

Graphs by JSIC2 Contestability
Figure 4c: Contestability by Affiliation

Independent

Highly Contestable

Moderately Contestable

Minimally Contestable

Uncontested

Zaibatsu

Highly Contestable

Minimally Contestable

Uncontested

Graphs by JSIC3 Contestability
Figure 5: Development of Selected Industries

Graphs by Major Groups

Mining
Textiles
Chemicals
Metal Processing
Utilities