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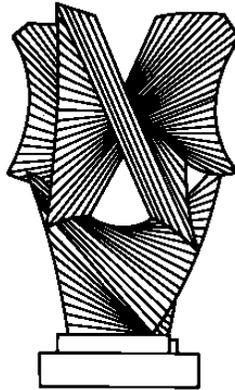
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CREDIBLY COMMITTING TO EFFICIENCY WAGES: COTTON SPINNING CARTELS IN IMPERIAL JAPAN

J. Mark Ramsmeier

Credibly Committing to Efficiency Wages:
Cotton Spinning Cartels in Imperial Japan

*By J. Mark Ramseyer**

* Professor of Law, University of Chicago. I received generous financial support from the Lynde and Harry Bradley Foundation and the John M. Olin Foundation, and helpful comments and suggestions from Douglas Baird, Gail Lee Bernstein, Taimie Bryant,

I. Introduction

Most antitrust scholars still hold dear their ban on cartels. Some have turned agnostic on resale-price maintenance. Others grant critics their exclusionary agreements. Most still insist, though, that horizontal agreements to fix prices or quantities are necessarily bad. So it was that few agreed when Lester Telser suggested that some such agreements might sometimes be efficient. Even as other scholars began to find empirical evidence for Telser's game-theoretic model, few listened.¹

In the article that follows, I trace the logic behind one massive but potentially efficient series of agreements to cut production. The logic differs from Telser's "empty-core cycling" game, but similarly suggests that the agreement may have generated social gains. At issue is a half-century's worth of production-limitation agreements among the giant Japanese cotton spinning firms. Although these firms structured the agreements as a classic cartel, the logic to the agreements lay not in monopoly pricing. Instead, it lay in the economics of "efficiency wages" and corporate governance. If the data is specific to Japan, this logic is not. Absent an antitrust ban, it suggests similar arrangements might appear in many industries everywhere.

By tradition, Japan specialists accuse the cotton spinning firms of much the same sins of which observers accused the Lancashire mills: that they exploited their workers by paying them a pittance and exploited consumers by fixing prices. The claims probably were not true of

Richard Epstein, Eric Feldman, Harry First, David Galenson, Michael Huberman, William Klein, Geoffrey Miller, Yoshiro Miwa, Clark Nardinelli, Tetsuji Okazaki, Randal Picker, Richard Posner, Frances Rosenbluth, Arthur Rosett, Richard Sander, Paul Sheard, Richard Smethurst, Haruhito Takeda, David Weinstein, Stephen Yeazell, and participants in a workshop at the University of Tokyo Department of Economics.

¹ *E.g.*, Lester G. Telser, *Cooperation, Competition, and Efficiency*, 28 *J. Law & Econ.* 271 (1985); see George Bittlingmayer, *Decreasing Average Cost and Competition: A New Look at the Addyston Pipe Case*, 25 *J. Law & Econ.* 201 (1982) (applying Telser); Stephen Craig Pirrong, *An Application of Core Theory to the Analysis of Ocean Shipping Markets*, 35 *J. Law & Econ.* 89 (1992) (same); Andrew R. Dick, *The Competitive Consequences of Japan's Export Cartel Associations*, 6 *J. Japanese & Int'l Eco.* 275 (1992) (same); see also Joseph Farrell & Carl Shapiro, *Horizontal Mergers: An Equilibrium Analysis*, 80 *Am. Econ. Rev.* 107 (1990) (efficiencies to horizontal mergers). The best critique of Telser's model appears in John Shepard Wiley Jr., *Antitrust and Core Theory*, 54 *Univ. Chic. L. Rev.* 556 (1987). These models do not apply to the spinning cartel described below for the same reason that the monopoly-rent-extracting model does not apply: the firms did not restrict capital investments and therefore did not effectively limit production.

Lancashire. Neither were they true of Japan. The Japanese mills paid their workers double or triple their reservation wage and charged consumers market-clearing prices. They did agree to cut production, but not for the reasons usually claimed. Instead, they did so to solve a two-pronged principal-agent problem: (a) to pay wages high enough to induce their workers to “shirk” less, and (b) to prevent their managers from cheating on those high wages.

Like the owners of the large Lancashire mills, the Japanese mill owners paid their workers “efficiency wages”—supra-market wages that reduced employee shirking by more than the wage increase itself. They apparently paid these high wages because of the unfamiliar technology they used. At the turn of the century, they used foreign machines in a foreign factory system. They knew neither how much to expect from their workers, nor—given the team character to the production involved—how best to monitor those workers. Rather than hire many managers to supervise their workers closely, they tried to induce their employees to work hard without much monitoring. They did so by raising the penalty workers incurred if they lost their job, and they raised that penalty by paying double or triple the market-clearing wage.

These efficiency wages potentially compounded the agency slack between the mill owners and their managers. Although the managers left some control over major decisions (like large capital investments) with the owners, they themselves supervised the daily operations at the firm. Necessarily, however, they could give the owners only noisy information about the details of factory operations and only incomplete information about the industry’s demand curve. In turn, these informational problems created an environment where a manager sometimes jeopardized his tenure if he reduced his plant’s production. When they did, short-term managers had an incentive to operate the plant at full capacity even when the reduced demand would have led the owners themselves to idle some machines.

This situation sometimes gave managers an incentive to respond to demand shocks by cutting wages. Because the firm intentionally paid workers a steady premium over the workers’ shadow wage, it needed managers who would respond to demand shocks primarily by cutting production. If they instead merely cut wages, workers would eventually shirk, productivity would eventually fall, and the firm’s total wage bill would eventually rise.

Managers and investors solved this principal-agent problem through a cartel. Through it, the firm’s managers credibly committed themselves to

responding to demand shocks by cutting production rather than wages. By delegating decisions about production cuts to the cartel's officers, they tied their hands—and protected their firm's efficiency wage regime from themselves.

At the outset, I summarize the history of cotton spinning in Japan (Section II). In Section III, I outline why the cartel that the spinning firms established could not have earned them monopoly rents. I conclude by using their efficiency wage labor contracts (Section IV.A.) to explain why they formed the cartel that they did (Section IV.B.).

II. The Industry

A. Cotton History

Cotton had already been in Japan a millenium when entrepreneurs began to import modern spinning machines in the mid-19th Century.² Not that it matters. Japanese farmers never did raise much raw cotton. In the middle of the 19th Century they grew 49 million pounds, and by 1887 they increased that amount to 67 million. They never grew more. Japanese farmers had no comparative advantage in cotton production, and by 1887 spinners were already importing 10 million pounds. By the end of the century they imported almost their entire supply, and the farmers had switched to other crops.³

Even if Japanese farmers could not grow raw cotton competitively, in the first decades of this century Japanese spinners and weavers came to dominate their sectors of the industry. Half a century earlier, English firms had led the industry. For decades, the Crown had punished anyone who exported textile machines; by some rumors, it had even hanged them.⁴ Perhaps because such threats sometimes work, perhaps for more mundane reasons, mid-19th century English firms still had some of the best machines, and still dominated the field.

Things changed. At the turn of the century, Japanese firms adopted this British technology. By the 1920s and 30s, they consumed more raw

² Some of this introductory material draws on Frances McCall Rosenbluth & J. Mark Ramseyer, *The Politics of Oligarchy: Endogenizing Institutions in Imperial Japan* (unpublished MS, 1993).

³ Takeshi Abe, *Men kogyo [The Cotton Industry]*, in Takeshi Abe and Shunsaku Nishikawa (eds.) *Sangyoka no jidai [The Age of Industrialization]* 163, 170 (Tokyo: Iwanami shoten, 1990); Keizo Seki, *Nihon mengyo ron [A Theory of the Japanese Cotton Industry]* 13, 164, 436 (Tokyo: Tokyo daigaku shuppan kai, 1954).

⁴ E.J. Donnell, *History of Cotton* 12-13 (London: James Sutton & Co, 1872); Seki, *supra* note 3, at 20.

cotton than their British competitors and spun more yarn. Domestically, they created enormous wealth. By 1930, textile firms produced over a quarter of all Japanese manufactured goods and employed over 40 percent of all factory workers.⁵

B. Cotton Crises:

During the half-century before World War II, firms in the Japanese cotton textile industry weathered three major crises: one at the turn of the century, one in the early 1920s, and one in the mid-1930s. Toward the end of the 1890s, Japanese economic performance dipped badly. Where from 1886 to 1898 manufacturing volume had doubled, during the four years from 1898 to 1902 it fell. When the Boxer Rebellion broke out and Japanese firms could no longer sell to China, bad matters simply turned worse. In the textile industry, output fell 11 percent from 1898 to 1900, and another 8 percent from 1900 to 1904.⁶

A second crisis hit the cotton firms in 1920. As it had been to many firms in many countries, World War I was good to Japanese spinners. During the War, many Allied competitors joined the war effort, and even those that did not found the sea lanes precarious and the Suez Canal closed. In East Asia, all of this dramatically raised cotton prices. From 1916 to 1919, the price of raw cotton rose 2.7 times, and that of cotton yarn 4.5 times. Given that raw cotton costs were four-fifths of the price of cotton yarn, this price differential gave entrepreneurial spinners a nice profit.⁷

For exploiting these high international prices, Japanese spinners found themselves well placed—and badly placed for the bust that followed. From 1915 to 1919, they watched real profits per spindle more than double. When the war ended and prices fell, they watched these profits plummet. Granted, they did not do as badly as observers claimed. Cotton

⁵ Sanji Muto, *Bosekigyo [The Spinning Industry]*, in *Shakai keizai taikei [Overview of Social Economics]* 5 (no pub. infor.; cat'd in the Univ. of Tokyo Dept. Econ. lib. at 12/120P, 1927) (cotton consumption in 1927); Seki, *supra* note 3, at 60 (yarn production in 1935); *id.* at 435 (of all manufacturing workers, 42.5% were in one of the textile industries in 1934-36).

⁶ Shozaburo Fujino, Shino Fujino & Akira Ono, *Choki keizai tokei: Sen'i kogyo [Long-Term Economic Statistics: The Textile Industry]* 244-45 (Tokyo: Toyo keizai shimpo sha, 1979); Seisan chosa kai (ed.), *Shuyo kogyo gairan [Survey of Major Industries]* 1 (Tokyo: Seisan chosa kai, 1912).

⁷ Kusuhei Mihashi (ed.), *Toyo boseki kabushiki gaisha yoran [A Survey of the Toyo Spinning Corporation]* 37-38 (Osaka: Toyo boseki K.K., 1934) (price changes); Nippon kangyo ginko chosaka (ed.) *Menshi boseki gyo ni kansuru chosa [An Investigation into the Cotton Threat Spinning Industry]* 43-49 (Tokyo: Nihon kangyo ginko chosaka, 1928) (raw cotton cost fraction; as of the late 1920s).

yarn prices did fall, but so did raw cotton prices. Nonetheless, as with the firms elsewhere that had tried to ride the war-time boom, the spectacular wartime profits disappeared. From 1920 to 1926, real profits per spindle fell two-thirds (Table 1).⁸

The problems arose from two facts. First, not all firms had hedged themselves against price changes. Those that had agreed to buy raw cotton at the earlier high prices without agreeing to sell at fixed prices now lost badly. Second, even firms that had hedged sometimes found the protection worthless—for their partners could renege. Although those that had contracted to sell high should have done well, they did well only if their buyers did not default. Many buyers did. Where the price changes had eliminated the buyer’s assets, even courts could not help.⁹

A third crisis hit the industry some ten years later. After the general financial collapse of 1929-31, many governments began to adopt protectionist policies. Some of these policies they designed explicitly against Japanese products. Japanese firms, for example, particularly threatened British competitors. From 1928 to 1935, Japanese cotton fabric exports rose from 1.4 to 2.7 billion square yards, while British exports fell from 3.9 to 1.9 billion square yards.¹⁰ To slow this competitive shift, Commonwealth countries adopted stringent tariffs, and many added quantity restraints to boot. By mid-1936, Japanese cotton weavers faced trade barriers in a majority of their markets: 56 countries had adopted barriers and over half were quotas. By one estimate, the barriers affected 67 percent of Japanese cotton fabric exports.¹¹

Table 1: Profitability in the Cotton Spinning Industry

Profits/ Firm (¥1000)	Profits/ Spindle	Profits/ ¥1000 Capital
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⁸ William Lazonick & William Mass, *The Performance of the British Cotton Industry, 1870-1913*, 9 *Res. Econ. Hist.* 1 (1984) (performance of spinning firms in other countries); Mihashi, *supra* note 7, at 37-38 (price data).

⁹ Seki, *supra* note 3, at 43-46 (buyer defaults).

¹⁰ Hiroshi Nishikawa, *Nippon teikoku shugi to mengyo [Japanese Imperialism and the Cotton Industry]* 190 (Kyoto: Minerubwa shobo 1987); Seki, *supra* note, at 436-41. For the debate over the cause of the British decline in cotton spinning, see Lazonick & Mass, *supra* note 8

¹¹ Fujino, Fujino & Ono, *supra* note 6, at 244-45; Nishikawa, *supra* note 10, at 192; R. Robson, *The cotton Industry in Britain* 268 (London: Macmillan & Co., 1957); Seki, *supra* note 3, at 55.

1907	629	17.14	354.3
1908	307	6.17	136.7
1909	515	8.18	181.8
1910	203	3.49	79.7
1911	368	5.77	139.6
1912	547	10.29	232.9
1913	646	11.77	243.7
1914	545	8.61	193.9
1915	741	10.81	249.2
1916	1431	19.91	415.4
1917	2201	30.93	543.2
1918	2225	27.43	443.7
1919	1730	26.78	330.1
1920	1756	25.78	228.5
1921	1154	16.92	150.2
1922	1213	17.18	152.5
1923	780	11.15	88.8
1924	956	10.99	97.2
1925	895	9.31	85.1
1926	862	8.44	78.5

Notes: Total capital is the sum of paid-in capital and accumulated profits.
Profits are in constant 1934–36 yen.

Table 1 cont.:

Sources: Calculated from data found in Ryokichi Watanabe, *Nihon mengyōron [The Theory of the Japanese Cotton Industry]* 340-41 (Tokyo: Nippon hyoron sha, 1931); Kazushi Ohkawa, Tsutomu Noda, Nobuyuki Takamatsu, Saburo Yamada, Minoru Kumazaki, Yoichi Shinoya & Ryoshin Minami, *Choki keizai tokei: Bukka [Long-Term Economic Statistics: Prices]* 135-36 (Tokyo: Toyo keizai shimpo sha, 1967).

III. The Cotton Cartel

A. Organization:

These crises were not lean years the cotton spinning firms stoically endured for the sake of the years of plenty to come. Instead, the firms sought safety in numbers. Already in 1882, they had organized themselves into the “Great Japan Spinning Federation” (Dai-Nippon *Boseki Rengo Kai*, abbreviated “Boren”). By all accounts, they were the first in the textile industry to cartelize. By many accounts, they were among the first in *any* modern Japanese industry to cartelize.¹² To them, the Boren now became the focus for their efforts to respond to these crises.

The conventional story is simple enough. Initially, the spinning firms used the Boren to gain monopsonistic power in the labor market: to lower wages by not bidding for each others’ workers.¹³ Soon, they used it to gain monopolistic power in the product market: to raise profits by enforcing quantity restraints. By 1890 they were coordinating reduced operating hours, days, and machines (Table 2). Workers and consumers suffered, so the story goes, but with no antitrust statute it was all legal.

Superficially, it was also plausible business strategy. *If* there had been large scale economies, perhaps new firms would have found it hard to enter the industry without access to substantial capital.¹⁴ *If* capital markets were under-developed, perhaps the new firms could not have obtained

¹² Toshiyuki Shinomiya, *Karuteru to sono tokucho [Cartels and Their Characteristics]*, in Keiichiro Nakagawa, Hidemasa Morikawa & Tsunehiko Yui (eds.), *Kindai Nihon keiei shi no kiso chishiki [Basic Information Regarding Early Modern Japanese Management History]* 193-94 (Tokyo: Yuhikaku, 1990).

¹³ Takahiko Hashimoto, *Nippon menshiseki gyo shi nempo [A Time Line for the Japanese Cotton Yarn Spinning Industry]* 26 (Tokyo: Bunka shi nempyo seisaku kenkyu kai, 1935).

¹⁴ In fact, there were some scale economies. See Table 9, *infra*.

that access except from one of the large conglomerates (the *zaibatsu*).¹⁵ Given the size of the globe, they arguably could not have entered the industry quickly even with the best financial connections. Domestic firms did not make competitive spinning machines, after all, until the late 1920s.¹⁶ Before then, a firm intent on undercutting the cartel would have had to import its machines from Great Britain or the U.S.

During the five decades before the War, the spinning firms coordinated capacity cuts eleven times (Table 2). They launched the first in 1890, but disbanded it within a month. They launched the last in 1930, and continued it eight years.¹⁷ All told, they maintained capacity restraints for twenty years. According to Table 3, moreover, production per unit of capital equipment did decline. On average, they mandated production cuts of about 20 percent. On average, production per spindle fell about 10 percent.

Table 2: Quantity Restraints in the Cotton Spinning Industry, 1890-1930

Beginning		
<u>Date</u>	<u>Duration</u>	<u>Restraints</u>
1. 1890 Jun.	1 mo.	No work for 8 days & nights per mo.
2. 1899 Jan.	1 mo.	No work for 4 days & nights per mo.
3. 1900 May	2 mo.	Same
1900 Jul.	3 mo.	Either no night work or a 40% reduction in machines used
1900 Oct.	3 mo.	Same
1901 Jan.	3 mo.	Same
4. 1902 Jul.	6 mo.	No work for 4 days & nights per mo.
5. 1908 Jan.	4 mo.	No work for 5 days & nights per mo.
1908 May	6 mo.	Either no night work for 3 months or a 27.5% reduction in machines used for 6 months
1908 Nov.	18 mo.	20% reduction in machines used

¹⁵ In fact, capital markets *were* well-developed. See Rosenbluth & Ramseyer, *supra* note 2.

¹⁶ Toshiaki Chokki, *Boshoku gyo to koo shita boshokki no hatten [The Development of Spinning and Weaving Machines in Response to the Spinning and Weaving Industry]*, in Nakagawa, *et al.*, *supra* note 12, at 258.

¹⁷ Seki, *supra* note 3, at 110.

Table 2 cont.:

6.	1910 Oct.	6 mo.	Either (i) a 27.5% reduction in machines used or (ii) no night work for 4 days & nights per mo. plus 2 hour reduction per day plus a 12.5% reduction in machines used
	1911 Apr.	6 mo.	Same
	1911 Oct.	6 mo.	Either (i) a 10% reduction in machines used or (ii) no work for 5 days & nights per mo.
	1912 Apr.	6 mo.	No work for 4 days & nights per mo.
7.	1914 Aug.	4 mo.	No work for 4 days & nights per mo. and a 10% reduction in machines used
	1914 Dec.	8 mo.	No work for 4 days & nights per mo. and a 20% reduction in machines used
	1915 Aug.	6 mo.	No work for 4 days & nights per mo. and a 10% reduction in machines used
8.	1918 Jan.	6 mo.	A 10% reduction either in the machines used or in the days worked
	1918 Jul.	6 mo.	Same
9.	1920 May	1 mo.	No work for 6 days & nights per mo.
	1920 Jun.	2 mo.	No work for 4 days & nights per mo., a 10% reduction in the machines used, and a reduction of 4 hrs/day
	1920 Aug.	13 mo.	Same, but with a 20% machine cut
	1921 Sept.	3 mo.	Same, but 10% machine cut
10.	1927 May	6 mo.	No work for 4 days & nights per mo., and a reduction of 4 hrs/day, a 15% reduction in machines used,
	1927 Nov.	20 mo.	No work for 4 days & nights per mo., a 23% reduction in machines used, and a reduction of 4 hrs/day
11.	1930 Feb.	5 mo.	No work for 2 days & nights per mo., and a 10% reduction in machines used
	1930 June	5 mo.	No work for 2 days & nights per mo., and a 20% reduction in machines used
	1930 Nov.	2 mo.	Same

Sources: Otokichi Shoji, *Boseki sogyo tanshuku shi [A History of the Spinning Operation Reductions]* (Osaka: Nippon mengyo kurabu, 1930); Seisan chosa kai (ed.), *Shuyo kogyo gairan [Survey of Major Industries]* (Tokyo: Seisan chosa kai, 1912); Shotaro Kojima, *Waga kuni shuyo sangyo ni okeru karuteru*

teki tosei [Cartel-Controls in the Major Industries in Our Country] 407-18
(Tokyo: Yufukan shobo, 1932).

Table 3: Quantity Restraints and Spindle Productivity

	Mandated Reductions	Bales/ Spindle		Mandated Reductions	Bales/ Spindle
1899	0%	578	1916	1.9%	684
1900	9.9	475	1917	0	654
1901	3.8	499	1918	0	578
1902	7.2	570	1919	0	576
1903	0	581	1920	31.5	492
1904	0	515	1921	47.0	454
1905	0	657	1922	0	508
1906	0	699	1923	0	465
1907	0	663	1924	0	453
1908	16.8	545	1925	0	485
1909	20.0	556	1926	0	490
1910	12.4	566	1927	28.9	453
1911	19.7	521	1928	47.2	401
1912	9.7	626	1929	23.6	440
1913	0	664	1930	21.8	374
1914	7.6	646	1931	25.3	358
1915	27.9	620			

Mean bales/spindle, when restrictions in place: 506.

Mean bales/spindle, when no restrictions in place: 559.

Mean mandated reduction when restrictions in place: 21.2%.

Mean actual reduction: 9.5%.

Notes: Mandated reductions are calculated on the basis of 20 hour work days (2 shifts), 28 work-day months, 7 hour nights. 1916 is treated as an unrestricted year. Bales/spindle gives the number of cotton bales produced, divided by the number of spindles in place.

Table 3 cont.:

Sources: Calculated from data found in Table 2; Keizo Seki, *Nihon mengyōron [A Theory of the Japanese Cotton Industry]* 446 (Tokyo: Tokyo daigaku shuppan kai, 1954).

B. Leaks:

Nevertheless, as a long-term monopoly-pricing strategy this cartel never had a chance. First, the Japanese cotton spinning firms faced constant pressure from *potential* entrants. This simply was not an industry with large entry barriers. The most spectacularly successful late entrant was Nisshin bōseki. Cotton merchant Hirazaemon Hibiya had launched the firm in 1907. By 1910 it was in the second quintile of firms; by 1930 it ranked sixth in a field of over sixty.¹⁸ Smaller firms, however, continued to enter the industry throughout the pre-war period.

Second, the cartel never (a) incorporated all members (much less all potential members) of the industry, or (b) limited investments in new productive capacity.¹⁹ Consider each of these issues in turn.

1. *Incomplete membership.* The Boren never included all members of the industry. Most obviously, it excluded foreign competitors, this at a time when producers often joined cartels across national boundaries.²⁰ The Boren began as an organization of Japanese spinning firms, and forever remained that. Nonetheless, those firms sold in what was always a global market. Despite variations in thread quality, many firms in many countries produced interchangeable thread. Granted, foreign spinners could not necessarily compete in the domestic Japanese market. Tariffs on imported cotton products helped ensure that. Notwithstanding, Japanese firms did compete abroad with spinners from several countries—most prominently, Great Britain, U.S., France, Germany, and India.

¹⁸ Nisshin bōseki K.K. (ed.), *Nisshin bōseki 60 nen shi [A Sixty-Year History of Nisshin bōseki]* (Tokyo: Nisshin bōseki, K.K., 1969); Dai-Nippon bōseki rengo kai (ed.), *Dai-Nippon bōseki rengo kai geppo [Great Japan Spinning Federation Monthly Newsletter]* (Osaka: Dai-Nippon bōseki rengo kai, various issues) (relative size of firms by number of spindles).

¹⁹ In addition, note that the cartel did not take several obvious steps open to it. The firms could have tried to restrict output through their coordinated import scheme involving the N.Y.K. (described below), but did not. Indeed, they could have set prices, but did not.

²⁰ Terushi Hara & Akira Kudo, *International Cartels in Business History*, in Akira Kudo & Terushi Hara (eds.) *International Cartels in Business History* 1, 2 (Tokyo: University of Tokyo Press, 1992).

The spinners sold much of their product in this competitive international market. Even when they sold to domestic weavers, those weavers often exported the finished fabric.²¹ Given these international *fabric* markets, Japanese spinners generally could not have charged monopoly *yarn* prices to domestic weavers: as long as a downstream product faces a competitive market, upstream cartels with fewer than all producers (*e.g.*, a spinning cartel that excludes foreign competitors) will seldom be able to raise prices. Indeed, because many of the largest Japanese spinners (like the large American spinners) ran integrated spinning and weaving operations, many Boren members sold fabric on the international market directly (Table 4).²²

Until 1936, the Boren could not even convince all Japanese spinners to join.²³ To be sure, it tried to make membership worthwhile. It never made it indispensable. In 1893 it negotiated a favorable shipping contract with the N.Y.K., the Mitsubishi shipping firm.²⁴ Under this agreement, the N.Y.K. agreed to pay large rebates to association members who used it for their raw cotton. More specifically, the N.Y.K. charged shippers full price, but at the end of the accounting season rebated to Boren members a large portion of that price.

Unfortunately for the Boren, the bulk shipping market was a competitive market. As one scholar recently put it, “collusion among shippers has never survived” in this industry.²⁵ The Japanese shipping firms launched periodic price wars with the western firms, and were not always the low bidder. Yet the Boren could have made membership

²¹ Mihashi, *supra* note 7, at 7 (foreign competitors); Okura sho zeikanbu (ed.), *Kanzeiritsu enkaku [A History of Tariff Rates]* Tokyo: Okura sho, 1968) (tariffs).

²² Although these integrated firms operated fewer than 20 percent of all looms, they operated the most efficient ones. In 1936, they ran nearly three-fourths of the 46,000 automatic looms in use. With a fifth of the looms, they wove a third of the fabric. See Table 4; Shoko daijin kanbo tokei ka (ed.), *Kojo tokei hyo [Census of Manufactures]* 413 (Tokyo: Tokyo tokei kyokai, 1936) (automatic loom use). On integrated spinning and weaving operations in the West, see John S. Lyons, *Vertical Integration in the British Cotton Industry, 1825-1850: A Revision*, 45 *J. Econ. Hist.* 419 (1985); Peter Temin, *Product Quality and Vertical Integration in the Early Cotton Textile Industry*, 48 *J. Econ. Hist.* 891 (1988).

²³ As of September 1927, for instance, 11 spinning companies representing 6 percent of all cotton spindles were outside the Boren. Nippon kangyo, *supra* note 7, at 55-58. The remaining 11 firms joined the Boren in May 1936. Zaisei keizai jiho sha (ed.), *Nippon sen'i kogyo soran okutsuki [An Overview of the Japanese Textile Industry, with Appendix]* 210 (Tokyo: Zaisei keizai jiho sha, 1936).

²⁴ Reprinted in Seisan chosa kai (ed.), *Shuyo kogyo gairan [Survey of Major Industries]* 26-29 (Tokyo: Seisan chosa kai, 1912). Other shipping firms later joined the N.Y.K.

²⁵ Pirrong, *supra* note 1, at 128.

advantageous only (i) if the N.Y.K. charged prices below international competitive prices, and (ii) if no other international shipping firm were willing to match those prices.²⁶

Renegade spinners simply did not need the N.Y.K. Although the Boren firms could together obtain bulk discounts, so could most other spinners. Major spinning firms would have qualified for equivalent discounts elsewhere. Whatever clout the Boren had, as the shipping arm of the Mitsubishi empire the N.Y.K. was not the sort of firm on which it likely could have imposed monopsonistic prices. Unless it was indeed extracting monopsonistic rents, though, renegade firms could have competed without joining it.²⁷

2. *Investment limits.* As Table 3 details, the Boren never tried to limit the *total number* of spindles. Instead, it mandated cuts only in either operating hours or the percentage of spindles used. This made for a bizarre cartel, for to earn its members monopoly rents the Boren had to cut the quantity produced. To do that, it could not just cut hours or furlough existing spindles. It needed also to limit the purchase of new spindles. That it

²⁶ Shotaro Kojima, *Waga kuni shuyo sangyo ni okeru karuteru teki tosei [Cartel-Controls in the Major Industries in Our Country]* 478-511 (Tokyo: Yufukan shobo, 1932) (shipping cartels); Nihon keiei shi kenkyu sho (ed.), *Nippon yusen kabushiki kaisha 100-nen shi [A 100-Year History of the N.Y.K.]* 7-74, 123-29 (Tokyo: Nippon yusen kabushiki kaisha, 1988) (competition between N.Y.K. and the western firms); William D. Wray, *Mitsubishi and the N.Y.K., 1870-1914: Business Strategy in the Japanese Shipping Industry* 289-308, 400-08 (Cambridge: Harv. Council E. Asian Stud. Pub., 1984) (same); William D. Wray, *Kagami Kenkichi and the N.Y.K., 1929-1935: Vertical Control, Horizontal Strategy, and Company Autonomy*, in William D. Wray (ed.), *Managing Industrial Enterprise: Cases from the Prewar Experience* 182, 187 (Cambridge: Harv. Council E. Asian Stud. Pub.) (existence of irregular “tramp shipping”).

Indeed, *if* the Boren had been a pricefixing scheme and *if* the N.Y.K. had had a lock on cotton imports, one would expect the Boren to have enforced its quantity restraints through its control over raw cotton imports. Given that the spinners depended critically on cotton imports, that bottleneck offered the perfect monitoring device. The Boren did not do so—both because it was *not* a pricefixing scheme (discussed *infra*), and because the N.Y.K. did *not* have a lock on the import trade.

²⁷ In addition, note two points. First, the Boren convinced the domestic raw cotton producers not to sell to non-Boren firms. Because domestic producers raised a small fraction of the cotton consumed, this was not a major barrier. Second, in 1930 the Boren convinced the cotton yarn sellers’ association not to buy yarn from non-Boren firms. In return, Boren members agreed to sell only to members of the sellers’ association. See Kojima, *supra* note 26, at 413; Nippon kangyo, *supra* note 7, at 54-55; Seki, *supra* note 3, at 114-16. At this point, the only firms safely able to remain outside the Boren would have been those that *both* spun and wove. As Table 4 shows, however, the biggest Japanese firms operated integrated spinning and weaving factories.

never did. In letting firms buy new spindles but not letting them use them fully, it apparently ensured only that its members invested inefficiently.

Even as the Boren mandated production cuts, spinning firms continued to buy new equipment (Table 5). Despite the capacity restraints, they aggressively built new factories and installed new spindles. Indeed, they built more factories and installed more spindles while the restraints were in place than while they were not. Were this a production-restriction cartel, it was one that failed.

Table 4: Spinning Firms in the Weaving Industry

	A	B	C=	D	E	F=	G
	Total	Spinning	B/A	Total	Spinning	E/D	E/Firm
	Looms	Looms	%	Fabric	Fabric		Rev.
1905		6,077	%	715	154	21.5%	11.9%
1910		17,002		1222	332	27.2	18.5
1915		27,931		1824	710	38.9	27.3
1920		43,725		6936	2950	42.5	27.0
1925	365,369	61,918	16.9	7719	2732	35.4	22.5
1930	348,903	69,147	19.8	4933	1631	33.1	25.5
1935	385,980	83,308	21.6	8104	2466	30.4	21.7

Notes:

- (A) Total number of cotton weaving looms in use.
- (B) Total number of cotton weaving looms used by spinning firms.
- (C) Percentage of cotton weaving looms used by spinning firms.
- (D) Value in current prices (x ¥100,000) of total cotton fabric produced.
- (E) Value in current prices (x ¥100,000) of cotton fabric produced by spinning firms.
- (F) Percentage of total cotton fabric produced by spinning firms.
- (G) Percentage of spinning firm revenues attributable to weaving operations.

Sources: Calculated from data found in Shozaburo Fujino, Shino Fujino & Akira Ono, *Choki keizai tokei: Sen'i kogyo [Long-Term Economic Statistics: Textile Industry]* 74-83, 242-43 (Tokyo: Toyo keizai shimpo sha, 1979); Miyohai Shinohara, *Choki keizai tokei: kokogyo [Long-term Economic Statistics: Mining and Manufacturing]* 194-95 (Tokyo: Toyo keizai shimpo sha, 1972); Shoko daijin kanbo tokei ka (ed.), *Shoko sho tokei hyo [Statistical Tables for*

the Ministry of Commerce and Industry] (Tokyo: Tokyo tokei kyokai, various years).

Table 5: Spinning Cartel Cheating

	A. Mandated Reductions	B. Spinning Factories	C. Spindles (x 1000)
1920	31.5%	(40)	355
1921	47.0	89	299
1922	0	(159)	394
1923	0	(1)	284
1924	0	20	(91)
1925	0	(8)	451
1926	0	37	293
1927	28.9	(22)	263
1928	47.2	6	531
1929	23.6	38	233
1930	21.8	18	595
1931	25.3	15	221

Mean new spindles while restrictions in place: 328,000.

Mean new spindles while no restrictions in place: 266,000.

Mean new spinning fact's while restrictions in place: 14.8.

Mean new spinning fact's while no restrictions in place: -22.2.

Notes:

(A) Cartel-mandated reductions.

(B) Net increase (or decrease) in number of spinning factories with five or more employees.

(C) Net increase (or decrease) in number of operating spindles.

Sources: Calculated from data found in Table 2; Shoko daijin kanbo tokei ka (ed.), *Kojo tokei hyo [Census of Manufactures]* (Tokyo: Tokyo tokei kyokai, various years); Tsusho sangyo daijin kanbo chosa tokei kyoku (ed.), *Kogyo tokei 50 nenshi [A Fifty Year History of the Manufactures Census]* (Tokyo: Okura sho insatsu kyoku, 1961); Keizo Seki, *Nihon mengyo ron [A Theory of*

the Japanese Cotton Industry] 446 (Tokyo: Tokyo daigaku shuppan kai, 1954).

C. Temporary Local Gains?

Even if the Boren firms could not have earned monopoly rents long-term, perhaps they hoped to exploit a temporary local monopoly.²⁸ Expansion in the industry did take time. Because most firms already operated 25 to 28 days a month, 20 to 22 hours a day, non-Boren firms could not have dramatically expanded production without buying new machines. Yet until the 1920s, almost all machines came from either Great Britain or the United States. Even with a telegraphed order, expansion would have taken quite a while. Meanwhile, perhaps the Boren firms could have earned monopoly returns.²⁹

²⁸ Many Japanese historians (e.g., Nishikawa, *supra* note 10, at 154; 2 Naosuke Takamura, *Nihon boseki gyo shi josetsu [An Introduction to the History of the Japanese Spinning Industry]* 178-91 (Tokyo: Hanawa shobo, 1971)) suggest a very different explanation for the cartel: that the largest spinning firms used the restrictions to gain a competitive advantage over the smaller firms. Recall, however, that membership in the cartel was voluntary, that spinning firms imported raw cotton in a competitive international market, and that they sold yarn and fabric on a competitive international market. As a result, this explanation necessarily fails. The large spinning firms could have induced the small firms to join the Boren (or to remain in the Boren) and suffer the exploitative consequences only if the small firms earned a net gain by doing so. Hence the large firms would have had to compensate the smaller firms for any exploitation the small firms summered. Because of the competitive market constraints, however, the large Boren firms had no way of using the Boren to generate sufficient monopoly rents to pay that compensation and still earn a profit.

Tetsuji Okazaki, *1930-nen dai no Nihon ni okeru keiki junkan [Japanese Business Cycles and Capital Accumulation in the 1930s]*, 39-2 *Shakai kagaku kenkyu* 1 (1987), suggests a ingenious alternative: Small spinners were heavily invested in low-count thread, and large spinners were invested in high-count thread. Small spinners wanted to move into high-count thread and used the cartel to give them breathing space to do that. Aside from whether the cartel would have given any breathing space without international market power, and aside from whether large firms would ever have agreed to such a plan, Okazaki's theory does not explain why small firms would find advantageous a scheme that disabled themselves as much as it disabled their competitors.

²⁹ On the hours and days worked, see the tables at the end of any issue of *Dai-Nippon*, *supra* note 18; on the source of spinning machines, see Mariko Tatsuki, *Mitsui Bussan no setsuritsu to hatten [The Establishment and Development of Mitsui Bussan]*, in Nakagawa, *et al.*, *supra* note 12, at 36, 40.

As an explanation for the Boren, none of this could have worked—short-term monopoly returns cannot explain the measures the Boren took. Most basically, the measures were not short-term. Rather, they lasted for months and years. Nor did the Boren ignore the measures once competition eroded any monopoly price. Instead, month after month, Boren firms regrouped to change the percentage of spindles furloughed, the number of days closed, or the number of hours per day worked. To the firms themselves, the cuts meant more than any short-term advantage.

Second, (as noted earlier) the Boren firms never tried to limit total production. Absent such an agreement, they could not have raised prices. As Tables 2 and 3 show, although they required each other to reduce the percentage of their equipment that they operated, they let each other freely expand that equipment. Had they wanted to affect prices, they would not have agreed just to cut the stock used. They would also have agreed to idle any new equipment they bought. Because they did not do so, the Boren firms could not have successfully raised prices, even temporarily. According to Gary Saxonhouse, the American economist who has spent the most time on the industry, they did not: Boren firms did not “restrict industry output, even on a cyclical basis.”³⁰

IV. Cotton Logic

The basic puzzle thus remains: if the Boren firms were not trying to earn monopoly rents, what did they think they were doing? The answer, I suggest, is that they were trying to solve two principal-agent problems at once: to pay workers enough to reduce their “shirking,” and to enable their managers to commit credibly to keeping wages at levels that would mitigate that shirking.³¹ Turn first to the wages in the industry (Section IV.A.), then to the managerial problems (Section IV.B.).

³⁰ Gary Saxonhouse, *Country Girls and Communication among Competitors in the Japanese Cotton-Spinning Industry*, in Hugh Patrick and Larry Meisner (eds.), *Japanese Industrialization and its Social Consequences* 97, 122 (Berkeley: University of California Press, 1976); Gary Saxonhouse, *Mechanisms for Technology Transfer in Japanese Economic History*, *12 Managerial & Dec. Econ.* ___ (1991). Note that this is consistent with the 9.5% fall in productivity during the cartel (Table 3). The cartels were in place during slack demand. Even if they had been completely ineffective, production would have fallen somewhat during their tenure—if only because consumers were less willing to buy the yarn.

³¹ Readers may also ask why the Boren (like many trade associations) did not try to manipulate the political process to form a legally enforceable cartel. The reason, elaborated on in Rosenbluth & Ramseyer, *supra* note 2, is that the *zaibatsu* firms had the greatest political influence in pre-war Japan, and the *zaibatsu* firms had interests contrary

A. Efficiency Wages:

1. *Monitoring and shirking.* Picture the problem that the owners of the new mills faced. In a society where almost all manufacturing occurred in small shops, they built massive factories. In a world where machines ran on muscle or water, they introduced steam and later electricity. In the new factories, they installed large, complicated, and expensive British-made machines.

To run these powerful new factories and machines, the owners needed managers and workers they did not have. They needed managers who could organize individual workers into teams suited to factory production. They needed managers who could structure incentives so that the workers individually would not free-ride on each other. They needed managers who could teach people to run the new machines and to avoid breaking them. As of 1891, however, they had only one formally trained engineer for every six factories.³²

The owners also needed workers who would work obediently, regularly, and carefully. As the new ring spindles were relatively easy to operate, they did not need workers who understood much physics or chemistry, or workers with much physical strength. They did need workers who would not ignore instructions, who would not skip work on a whim, and who would not take breaks that disrupted production at the entire plant. They needed, in short, workers with what we now call “basic work habits.” Before the industrial revolution, few people considered such habits basic, for few people needed them in either agrarian or handicraft production. Eventually, school teachers did bring these habits to Japanese peasant children. As of 1891, though, only a quarter of the workers at the spinning plants had attended primary school.³³

Somehow, the mill owners had to teach their workers to use the new machines safely and effectively, to convince them to work together as a team, and to induce them not to free-ride on each other. Fundamentally,

to the Boren. The *zaibatsu* were not heavily invested in cotton spinning (Table 10). Yet the Mitsubishi (through the N.Y.K.) shipped the bulk of the raw cotton to the spinners, while the Mitsui marketed the finished product abroad. Any contraction in the raw cotton consumed or the cotton yarn sold (even if international competitive market forces would have allowed this) would thus have directly harmed the politically powerful Mitsubishi and Mitsui.

³² Saxonhouse, *Country*, *supra* note 30, at 109; see Noshomu sho somukyoku tokeika (ed.) *Noshomu tokei hyo [Agricultural and Commercial Statistics]* 63 (Tokyo: Noshomu sho somukyoku tokeika, 1903) (many factory supervisors did not understand the machines under their jurisdiction).

³³ Saxonhouse, *Country*, *supra* note 30, at 109.

this was largely a matter of incentives. Unfortunately, to use the optimal incentives the owners had to be able to monitor workers individually and to dispense appropriate penalties and rewards. Yet precisely because it involves joint production, team work is hard to meter. Precisely because cotton spinning involved team work, the owners found it hard to meter their workers—and hard, therefore, to reward and discipline them appropriately.

This is complicated enough where the technology is familiar; it is harder still where everything about the factory is strange.³⁴ With new machines, an owner often will have no idea how much he (the owners and managers of these factories were generally men) can expect of a recruit. Not knowing what to expect, he cannot set the proper piece rate. Predictably, many of the earliest Japanese factory owners produced nothing so much as chaos. Their workers did not know how to use the machines, their managers did not know how to structure incentives to motivate workers, and absent appropriate incentives the workers had little reason to learn to use the machines.

Contemporary observers chronicled the chaos. “If a supervisor can see the employees (particularly day laborers), they work attentively,” reported one otherwise sympathetic man in 1899. “But as soon as he disappears, they gossip in groups of two or three.”³⁵ “The day after payday,” another observer wrote, “employees regularly skip work.”³⁶ According to the oral histories of the workers themselves, they even slept on the job.³⁷

2. *Market-clearing wages.* Workers shirked in these early factories for a simple reason: they preferred leisure to work and had no reason not to indulge that preference. Through their work, they earned the going rate—a wage that cleared the labor market. But when labor markets clear,

³⁴ Given (a) the asymmetric distribution of information between workers and management regarding worker abilities, and (b) the inability of management to commit credibly to a given wage structure, piece rate contracts never entirely solve the incentive problem. See Gary J. Miller, *Managerial Dilemmas: The Political Economy of Hierarchy* ch. 5 (Cambridge: Cambridge Univ. Press, 1992); Bengt Holmstrom, *Moral Hazard in Teams*, 13 *Bell J. Econ.* 324 (1982).

³⁵ Gennosuke Yokoyama, *Nihon no kaso shakai [Japanese Lower-Class Society]* 179 (Tokyo: Kyobunkan, 1899) (cotton spinning workers).

³⁶ Noshomu sho, *Shokko jijo [Circumstances of Factory Workers]* 235 (1903; reprinted, Tokyo: Koseikan, 1981) (steel workers).

³⁷ Shigemi Yamamoto, *Aa nomugi toge: aru seishi koje aishi [Ah, the Nomugi Pass: A Tragic History of the Factory Women in the Silk Thread Industry]* 180 (Tokyo: Kadogawa shoten, 1977).

workers who quit a job can easily find another. And if all firms pay the market-clearing wage, a worker will earn the same wage in her (most textile workers were women) new job as she earned in the old. Workers can safely work when they want, rest when they want. In agricultural and handicraft industries, such work habits seldom disrupt. In a modern factory, they wreak havoc.

If the spinning mills could have monitored their workers cheaply, they could have mitigated this problem. If their managers might have noticed and fired them when they shirked, workers would have shirked less profligately. Yet monitoring is not free, of course, and hence the problem. The more monitoring costs, the more cheaply workers can indulge their preference for leisure over work. If losing their job costs them little (if they earn market-clearing wages) and if monitoring is often ineffective (if they can often shirk unnoticed), rational workers may choose to shirk as they please.

3. *Efficiency wages.* All this generates the well-known paradox of “efficiency wages”: the more monitoring costs, the more likely employers can lower labor costs by *raising* wages.³⁸ If workers shirk because they can easily earn equivalent wages elsewhere, a firm can sometimes save money by paying them more. For when it does so, workers who lose their job lose income. Rather than lose their well-paying job (a risk they retain if the firm maintains even moderate levels of monitoring), they may now decide to reduce their shirking. Even if all equivalent firms pay the same high wages, workers who lose their job still lose—for wages above market-clearing levels necessarily generate unemployment. Given the higher unemployment levels, fired workers now spend longer finding their next job.

The classic example is Ford. In 1914, Henry Ford paid his workers \$2.34 per day. The wage was the going rate and cleared the market. Because everyone else paid it as well, jobs were easy to find. Workers, observers recalled, could quit Ford in the morning and find another job by noon. As a result, Ford found himself with an annual turnover rate of 370 percent, and chaos in his assembly line. To solve this problem, he doubled wages. At \$5 a day, workers now stood in line for a Ford job. At \$5 a day,

³⁸ See Eric Rasmusen, *Games and Information* 166-67 (London: Basil Blackwell, 1989); Carl Shapiro & Joseph E. Stiglitz, *Equilibrium Unemployment as a Worker Discipline Device* 74 *Am. Econ. Rev.* 433 (1984); Joseph E. Stiglitz, *The Causes and Consequences of the Dependence of Quality on Price*, 25 *J. Econ. Lit.* 1 (1987); see also Eric Rasmusen, “An Income-Satiation Model of Efficiency Wages,” 80 *Econ. Inquiry* 467, 475 (1992) (model applicable to low-wage workers).

Ford himself boasted, “I have a thousand men who if I say ‘Be at the northeast corner of the building at four a.m.,’ will be there at four a.m.”³⁹

The large Lancashire cotton spinning mills in the 19th century similarly paid efficiency wages.⁴⁰ Because they regularly experimented with new technology, they regularly found it hard to monitor their employees. “In the heyday of industrialization, managerial methods of supervising workers and monitoring how much they could produce were unsophisticated,” explains economic historian Michael Huberman. Even though the larger Lancashire firms tried to mitigate these problems with piece-rate wages, they still “had difficulty in linking effort to output and setting piece rates.” Accordingly, they chose not to rely exclusively on monitoring. Instead, they “paid efficiency wages to reduce the loss of productivity associated with shirking.”⁴¹

4. *The Japanese mills.* Turn-of-the-century Japanese cotton-spinning firms too paid efficiency wages. The giant Kanebo firm did so most extravagantly, advertising not just its wages but also the various other amenities it offered. Modern scholars often doubt whether it improved employee welfare as much as it claimed, but in doubting they miss the point. Kanebo did not adopt its scheme out of charity. Instead, it adopted it as a simple profit-maximizing efficiency wage strategy. Its wage premium was stark. Table 6 details (i) the mean daily wage paid by all Boren firms to their female workers as of the middle of each year, (ii) the comparable figure for Kanebo, and (iii) the resulting premium attributable to Kanebo employment. In the late 19th century, Kanebo paid close to a third more than its competitors. Although Kanebo’s wage dominance faded, it faded only because other firms soon hiked their wages as well. As Table 7 shows, the larger firms did adopt efficiency wages before the smaller firms did; but as Table 8 shows, by 1910 the industry *as a whole* paid textile workers double what they could earn on the farm.

The Japanese story does not parallel early-19th century Lancashire completely. Where only the larger Lancashire firms paid high wages, by

³⁹ Miller, *supra* note 34, 65-71.

⁴⁰ Michael Huberman, *Invisible Handshakes in Lancashire: Cotton Spinning in the First Half of the Nineteenth Century*, 46 *J. Econ. Hist.* 987 (1986); Michael Huberman, *How Did Labor Markets Work in Lancashire? More Evidence on Prices and Quantities in Cotton Spinning, 1822-1852*, 28 *Explorations Econ. Hist.* 87 (1991); Michael Huberman, *Industrial Relations and the Industrial Revolution: Evidence from M’Connel and Kennedy, 1810-1840*, 65 *Bus. Hist. Rev.* 345 (1991).

⁴¹ Huberman, *How*, *supra* note 40, at 88.

1915 large and small Japanese firms alike paid similar rates (Table 7).⁴² Because large and small firms used the same technology in Japan, similar wages and hours are exactly what one would expect. By the turn of the century, almost all Japanese mills used standard steam-powered Platt Brothers machines.⁴³ Whatever monitoring problems large firms experienced, small firms faced them too. After large firms found it advantageous to pay high wages, small firms soon followed suit.

Table 6: The Kanebo Wage Premium

	Boren mean	Kanebo mean	Kanebo premium
1898	¥14.99	¥19.60	30.8%
1908	24.89	29.00	16.5
1919	80.51	84.10	4.5

Source: Calculated from data found in Dai-Nippon boseki rengo kai (ed.), *Dai-Nippon boseki rengo kai geppo [Great Japan Spinning Federation Monthly Newsletter]* (Osaka: Dai-Nippon boseki rengo kai, various years) (1918 data unavailable).

Table 7: Mean Hours and Wages in the Spinning Industry, by Firm Size

A. Daily Hours

Quintile	1900	1905	1910	1915	1921	1925
First	19.4	22.7	22.9	22.3	19.8	19.7
Second	19.0	21.7	22.3	21.9	19.0	21.1
Third	18.8	23.3	20.6	23.0	20.1	19.6
Fourth	16.9	22.8	22.6	23.1	20.1	19.9
Fifth	18.1	22.4	21.4	22.8	19.5	20.2

⁴² A point confirmed by separate calculations in Konosuke Odaka, *Niju kozo [Dual Structure]* in Takafusa Nakamura and Konosuke Odaka (eds.), *Niju kozo [Dual Structure]* 133, 161 (Tokyo: Iwanami shoten, 1989).

⁴³ Tatsuki, *supra* note 29, at 37; Saxonhouse, *Mechanisms*, *supra* note 30.

Table 7 cont.:
B. Daily Wages

Quintile	1900	1905	1910	1915	1921	1925
First	¥0.193	¥0.239	¥0.298	¥0.319	¥1.109	¥1.323
Second	0.195	0.224	0.268	0.302	1.073	1.096
Third	0.175	0.217	0.284	0.310	1.201	1.222
Fourth	0.164	0.190	0.246	0.344	1.079	1.225
Fifth	0.153	0.192	0.236	0.305	1.060	1.260
<u>Mandated cuts:</u>	9.9%	0.0	12.4	27.9	31.5	0.0

Notes: The firms are divided into quintiles on the basis of the number of spindles in each firm. Wages are daily wages for female workers in current yen. The data are for the months of July for each year except when July was unavailable (when nearest available month was used instead). Mandated production cuts are taken from Table 3. Hours are number of hours of operation of factories operated by firm. 1921 is substituted for 1920 because of the unavailability of 1920 data.

Sources: Calculated from data found in Dai-Nippon boseki rengo kai (ed.), *Dai-Nippon boseki rengo kai geppo [Great Japan Spinning Federation Monthly Newsletter]* (Osaka: Dai-Nippon boseki rengo kai, various years).

5. *The quantity of labor.* Given their efficiency wage strategy, Japanese spinners could not respond to demand shocks by cutting wages. Instead, they had to cut the *quantity* of labor they hired. Recall that they paid a premium in order to induce employees not to shirk. If they now cut that premium, they increased shirking. In the long run, they thereby raised their total labor costs.

Because most textile workers came from (and returned to) rural villages, the shadow wage that determined whether they found shirking advantageous depended on the difference between their spinning wage and their agricultural wage. During much of the pre-war period, about 80 percent of the cotton-spinning workers were women, and about 60 percent of these women came from the farm.⁴⁴ In terms of efficiency wage, the

⁴⁴ Chuo shokugyo shokai jimukyoku (ed.), *Boseki rodo fujin chosa [An Investigation into Women Working in the Spinning Industry]* 5 (Tokyo: Chuo shokugyo shokai jimukyoku,

crucial premium for them was the premium they received over the *agricultural* wage. If the demand for cotton yarn fell, spinning firms paying efficiency wages could safely cut wages only if agricultural wages also fell. In fact, they often did not. Hence, if a spinning firm sought to pay double or triple the agricultural wage, it could *not* respond to demand shocks by lowering wages. It could only lower production.⁴⁵ Japanese firms did just that—when demand fell, they cut the quantity of labor they hired (Table 8).

Note a complication: if spinning firms cut output by firing workers, they potentially vitiated their efficiency wage scheme, for workers would discount their higher wages by their higher probability of being fired. Rather than lay off existing workers, therefore, Japanese spinning firms cut production by delaying new hires. In most years, 1/4 to 1/3 of their workers quit voluntarily anyway. They quit because they had never planned to work a long time. They had come to the factory to work a few years and save. Having done exactly as they planned, they returned to their farm to marry. Because so many women quit each year, the spinning firms could adjust to demand shocks simply by deferring new hires.⁴⁶

6. *The price of labor.* Few facts about the spinning firms are more prominent than the high wages they paid their workers (Table 8). Most of these workers were young women off the farm with few marketable abilities other than agricultural skills. By 1910, the cotton spinning firms paid them double the agricultural wage. They continued to pay at least double for most of the next three decades.⁴⁷

1929); Takejiro Shindo, *Mengyo rodo sanko tokei [Reference Statistics Regarding Labor in the Cotton Industry]* 365 (Tokyo: Tokyo daigaku shuppan kai, 1958).

⁴⁵ That cutting production would generally lower per-unit production costs is straightforward: on a short-term basis, cutting production quantity lowers marginal (and short-term average variable) production costs because the marginal cost curve cuts average cost curves from below, and because the short-term average variable cost curve lies below the average total cost curve. In a long-term equilibrium, of course, firms will sell at a price equal to long-term total average costs.

⁴⁶ Hosei daigaku keizai gaku bu (ed.), *Keihin kogyo chitai o chushin to suru chingin chosa hokoku [Survey Report on Wages Paid Primarily in the Keihin Industrial Area]* 187-91 (Tokyo: Hosei daigaku keizai gaku bu, 1936); Riyuemon Uno, *Shokko kinzoku nen su cho (jo) [A Survey of Work Tenure Among Factory Workers (I)]* 14 (Osaka: Kogyo kyoiku kai, 1915) (Shokko mondai shiryō, No. A163); Riyuemon Uno, *Shokko kinzoku nen su cho (ge) [A Survey of Work Tenure Among Factory Workers (II)]* 12 (Osaka: Kogyo kyoiku kai, 1915) (Shokko mondai shiryō, No. A164).

⁴⁷ Shindo, *supra* note 44, at 396, finds similar ratios for the early post-War years. I use mean *annual* wage rates for female agricultural workers rather than mean *daily* wage rates (as, e.g., 1 Takamura, *supra* note 28, at 302, does) for two reasons. First, agricultural work

Other data indirectly confirm these high wages. Take one 1927 survey of 3,966 workers at 12 cotton spinning factories. These women sent home each month mean amounts ranging from 5.2 percent of their wages at one factory to 60.5 percent at another. Unfortunately, the report does not give the number of respondents within each plant. Averaging the 12 factory means, however, gives a mean of 36.0 percent. *In addition*, these women every month saved another 7.0 to 52.1 percent of their pay. Averaging the factory means gives 24.3 percent. All told, the women saved or sent home an average of 59.9 percent of their wages: amounts ranging from a mean of 43.2 percent at the lowest factory to 67.5 percent at the highest.⁴⁸

7. *Historians and textile workers.* Despite this evidence, sophisticated social historians continue vociferously to lament the plight of the spinning mill workers. Gail Lee Bernstein, for example, describes the lives that the silk-reeling workers (a job with some technical differences from cotton spinning) lived as “deplorable.” Workers sang, she adds, songs with titles like the “Song of the Living Corpses.”⁴⁹ Patricia Tsurumi describes the spinning mill dormitories as “prisons,” the wash rooms as “appalling,”

was highly seasonal where textile work was steadier. Thus, daily textile and agricultural rates do not give an accurate picture of the relative expected earnings of women in the two sectors. Second, spinning firms generally provided room (or at least provided heavily subsidized room) in addition to wages; yearly agricultural contracts probably did as well, though daily work did not. Note that most spinning firms did charge for board. According to one 1927 survey of 12 cotton spinning factories, the women paid the factory a mean food charge ranging from 10.8 percent of salary at one factory to 22.8 percent at another. The mean of the 12 factory means was 16.9 percent. Chuo, *supra* note 44, at 69-70; see Hosei, *supra* note 46, at 168. According to Riyuemon Uno, *Shoku hi teigaku no chosa [A Survey of Food Charges]* (Osaka: Kogyo kyoiku kai, 1917) (Shokko mondai shiryō, No. B79), factories charged an average of 9.31 sen/day for board, and subsidized these meals with another 4.57 sen/day.

⁴⁸ Chuo, *supra* note 44, at 69-70; Hosoi, *supra* note 46, at 140, 184 (corroborating data). Firms sometimes offered the woman (or her family) a sign-on loan of part of her future earnings. Unlike the cash advances in the sex industry (see J. Mark Ramseyer, *Indentured Prostitution in Imperial Japan: Credible Commitments in the Commercial Sex Industry*, 7 *J. Law, Econ. & Org.* 89 (1991)) these loans were relatively small. Of a sample of 8,926 workers hired by large Tokyo-area spinning factories in 1926, workers (or their families) received a mean sign-on loan of only ¥22.23—about 16 days’ wages. See Chuo, *supra* note 44, at 33; corroborated by data in Hosoi, *supra* note 46, at 99, 140.

⁴⁹ Gail Lee Bernstein, *Women in the Silk-reeling Industry in Nineteenth-century Japan*, in Gail Lee Bernstein & Haruhiro Fukui (eds.), *Japan and the World: Essays on Japanese History and Politics in Honour of Ishida Takeshi* 63 (London: Macmillan Press, 1988). She rightly notes that the women “may have been better off” than they had been at home. *Id.*, at 67. An English translation of the song appears at E. Patricia Tsurumi, *Factory Girls: Women in the Thread Mills of Meiji Japan* 157-59 (Princeton: Princeton University Press, 1990).

and the food as “shoddy” and inadequate. Winter days in the factories were cold, and “the hot humid days of summer were hell.”⁵⁰ Andrew Gordon assigns textile workers “the worst objective situation of any group of workers.”⁵¹ And Mikiso Hane concludes that “what frequently came to prevail was unrestrained exploitation.”⁵²

Perhaps the historians rely too heavily on the the documents bourgeois journalists and social reformers left, for the women themselves told a radically different story.⁵³ Consider oral historian Shigemi Yamamoto’s experience. Yamamoto interviewed 580 former textile workers for what he planned as their “tragic history.” To his surprise, none of the women regretted having taken her factory job, none complained of the food she ate in the factory dormitories, none thought she had been underpaid, and only three percent of the women thought their work had been harsh. By contrast, 90 percent thought the food had been good, 70 percent thought their pay had been high, and most found the work “more fun than the work at home.”⁵⁴

“At least I got to eat rice,” one former textile worker told Yamamoto. “It was better than staying home.” And whether many sang Bernstein’s “Song of the Living Corpses,” Yamamoto’s interviewees remembered some very different songs:⁵⁵

Shall I fall in love with the boss,
or shall I ignore the boss?
Think about it,
and before you know it you’ve finished the thread.
Rather than fall for the boss and be hated,

⁵⁰Tsurumi, *supra* note 49, at 132-35, 141. Elsewhere, she properly notes that the wages were higher than other employment opportunities for women, and that the “poorly prepared and spoiled food” that the women supposedly received “would have seemed a splendid feast” to starving peasants. *Id.*, at 132-35, 141, 148-49, 162.

⁵¹ Andrew Gordon, *Labor and Imperial Democracy in Prewar Japan* 75 (Berkeley: University of California Press, 1991).

⁵² Mikiso Hane, *Modern Japan: A Historical Survey* 144 (Boulder: Westview Press, 1986). See also Barbara Malony, *Activism Among Women in the Taisho Coitton Textile Industry*, in Gail Lee Bernstein (ed.), *Recreating Japanese Women, 1600-1945* 217, at 232 (Berkeley: University of California Press, 1991) (“Girls’ salaries were extremely low.”).

⁵³ A mistake scholars of Japanese history have made elsewhere as well, whether when they write about women specifically, see Ramseyer, *supra* note 48, or when they write about peasants generally, see Richard J. Smethurst, *Agricultural Development and Tenancy Disputes in Japan, 1870-1940* (Princeton: Princeton University Press, 1986).

⁵⁴ Yamamoto, *supra* note 37, at 332.

⁵⁵ Yamamoto, *supra* note 37, at 50, 72 (translation by M. Ramseyer).

I think I'll head for the sunshine,
I think I'll head for the young ones.
I may have left home saying I'd reel thread,
but now I'm reeling in guys instead.

8. *Other evidence of efficiency wages.* Even if workers earned high wages, they need not have earned “efficiency wages.” Instead, perhaps they just earned wages that compensated them for unusual disamenities. Several aspects of the record, however, suggest that the cotton spinning workers did earn efficiency rather than market-clearing wages. First, the workers recalled their jobs fondly. Had they earned market-clearing wages for harsh work, few would have remembered their factory years with the affection that Yamamoto found.

Second, the workers earned a premium over their shadow agricultural wage that held relatively steady (Table 8). Because the demands for agricultural and textile products moved independently, market-clearing wages in the two industries would not have moved in tandem. Notwithstanding, in Japan the ratio of textile to agricultural wages did hold fairly constant: textile workers earned double or triple the agricultural wage. Even when their employers' profits fell, their wage tended to hold firm. It moved independently of textile firm profits but in tandem with agricultural wages, and it did so precisely because it was an efficiency wage⁵⁶—because the employers found it important to give their workers a large incentive not to shirk.

Third, the textile firms offered labor contracts that in other ways corroborated how hard they tried to create incentives for their employees not to shirk. Most dramatically, many firms withheld part of their workers' wages as performance bonds. As it had been for many indentured servants in the Americas,⁵⁷ part of a textile worker's pay was contingent on her satisfactorily completing her contract.⁵⁸ If she shirked, the firm fired her and kept the bond; if she worked well and completed her contract, it paid her the bond when she quit. As one might expect,

⁵⁶ Fujino, Fujino & Ono, *supra* note 6, at 22.

⁵⁷ Stanley L. Engerman, *Servants to Slaves to Servants: Contract Labour and European Expansion*, in P.C. Emer (ed.), *Colonialism and Migration: Indentured Labour Before and After Slavery* 263, 268-69 (Dordrecht: Martinus Nijhoff Publishers, 1986)

⁵⁸ See Chuo, *supra* note 44, at 67-68 (1929); Nobuhiko Murakami, *Meiji josei shi [A History of Meiji Women]* 135 (Tokyo: Riron sha, 1971).

workers hated these contractual provisions.⁵⁹ Only firms that found it usually hard to monitor their workers would have demanded contracts that placed them in as disadvantageous a position as did these.

**Table 8: The Price and Quantity of Labor
in Cotton Spinning**

	A. Daily (current ¥)	B. Hourly (constant sen)	C. Spin/ agri.	D. Quantity person-days)
1890	.08	2.22		2,762
1892	.09	2.71	1.37	4,984
1894	.10	2.95	1.43	7,842
1896	.12	2.85	1.47	9,405
1898	.16	3.27	1.17	15,413
1900.	.19	3.96	1.61	15,236
1902	.22	4.10	1.71	16,933
1904	.22	4.07	1.75	13,952
1906	.25	4.02	1.84	20,153
1908	.27	4.13	1.90	17,999
1910	.29	4.68	2.14	23,263
1912	.32	4.38	1.65	25,200
1914	.33	4.79	2.21	29,271
1916	.33	4.74	2.08	32,616
1918	.47	4.10	1.57	29,415

⁵⁹ See Noshomu sho (ed.), *Menshi boseki shokko jijo [Conditions of Factory Workers in Cotton Spinning]* 99 (Tokyo: Noshomu sho, 1903).

Table 8 cont.:

1920	1.31	8.95	2.74	34,103
1922	1.30	9.49	2.38	41,885
1924	1.29	10.26	2.38	35,627
1926	1.30	10.70	2.38	45,118
1928	1.35	11.76	2.83	38,720
1930	1.16	13.97	2.56	33,710
1932	.85	11.16	2.79	33,197
1934	.77	9.62	2.43	38,830
1936	.73	8.76	2.01	40,158

Notes:

(A) Mean daily wage in yen for female workers in cotton spinning sector, current prices.

(B) Mean hourly wage in sen (¥/100) for female workers in cotton spinning sector, constant 1934-36 prices.

(C) Mean annual wage for female workers in cotton spinning sector, divided by mean annual wage for female workers in agricultural industry.

(D) 1000 person-days worked by female laborers in spinning sector.

Sources: Calculated on the basis of data from Shozaburo Fujino, Shino Fujino & Akira Ono, *Choki keizai tokei: Sen'i kogyo [Long-Term Economic Statistics: The Textile Industry]* 27, 256-77 (Tokyo: Toyo keizai shimpo sha, 1979); Takahiko Hashimoto, *Nippon menshiseki gyo shi nempo [A Time Line for the Japanese Cotton Yarn Spinning Industry]* (Tokyo: Bunka shi nempyo seisaku kenkyu kai, 1935); Noshomu sho somukyoku tokeika (ed.), *Noshomu tokei hyo [Agricultural and Commercial Statistics]* (Tokyo: Noshomu sho somukyoku tokeika, various years); Kazushi Ohkawa, Tsutomu Noda, Nobuyuki Takamatsu, Saburo Yamada, Minoru Kumazaki, Yoichi Shinoya & Ryoshin Minami, *Choki keizai tokei: Bukka [Long-Term Economic Statistics: Prices]* 134-36 (Tokyo: Toyo keizai shimpo sha, 1967); Takejiro Shindo, *Mengyo rodo sanko tokei [Reference Statistics Regarding Labor in the Cotton Industry]* 500-03 (Tokyo: Tokyo daigaku shuppan kai, 1958); Matsuji Umemura, Saburo Yamada, Yujiro Hayami, Nobuyuki Takamatsu, & Minoru Kumazaki, *Choki keizai tokei: Norin gyo [Long-term Economic Statistics: Agriculture and Forestry]* 220-21 (Tokyo: Toyo keizai shimpo sha, 1966).

B. Cartels as a Corporate Governance Mechanism:

1. *Introduction.* Return, then, to the basic question: if the Boren firms could not earn monopoly rents, why did they coordinate production cuts? The answer, I suggest, derives from the principal-agent slack in corporate governance: absent a cartel, managers would have found it difficult credibly to commit to keeping the firm's efficiency wage regime. In turn, that difficulty derived from four constraints to the contractual structure of the pre-war cotton spinning firms:

1. The firm's managers often needed to raise funds from a broad range of investors.
2. The firm needed to respond to demand shocks primarily by cutting production rather than wages.
3. Investors could obtain only noisy information (a) about the wages that their managers paid laborers, and (b) about the demand curve that the industry faced.
4. Managers hesitated to run the plant at less than full capacity.

Take each of these constraints in turn.

2. *Dispersed ownership.* Because cotton spinning firms faced significant economies of scale (Table 9), many could raise the large amounts they needed only by issuing stock to a wide spectrum of investors. Together, these firms accounted for a major part of the trades on the Tokyo and the Osaka stock exchanges.⁶⁰ Had they been able to attract money from the large conglomerates (the *zaibatsu*), perhaps they could have avoided widely dispersed stock holdings. Whatever the reason, however, those conglomerates chose not to invest heavily in cotton spinning (Table 10). The firms thus often had little choice but to build publicly held firms.

3. *Demand shock responses.* For reasons explained above (Section IV.A.5.), spinning firms could minimize their long-term labor costs only if they responded to demand shocks by cutting production rather than wages. Because of the monitoring and metering problems in the industry, they minimized their wage bill by paying efficiency wages; because most workers came from the farm, they paid efficiency wages only by paying a steady premium above the agricultural wage; because the demand for

⁶⁰ See generally Osaka kabushiki torihiki sho (ed.), *Okabu 50-nenshi [50-Year History of the OSE]* (Osaka: Osaka kabushiki torihiki sho, 1928); Tokyo kabushiki torihiki sho (ed.) *Tokyo kabushiki torihiki sho [The Tokyo Stock Exchange]* (Tokyo: Keizai shimbun sha, 1916).

agricultural and textile labor moved independently, they could not cut wages without cutting their efficiency wage premium.

4. *Noisy information.* (a) *Wages.* Public investors in the spinning firms had only noisy information about their firm's wage scales. Had the firm paid its workers a straight daily wage, a straight seniority based wage, or a straight piece-rate contract, the investors would have had clean information. Their managers could have reported the scale they paid, and they could then have hired an independent auditor to verify the report.

Most cotton spinning firms, however, blended seniority wages *with* piece-rate wages.⁶¹ A pure fixed or seniority-based contract created incentive problems: workers had less reason to work hard, and more reason to shirk. A pure piece-rate contract created metering and quality problems: (i) cotton spinning involved too much team production to permit a manager to meter individual output cleanly and readily, and (ii) piece-rate contracts induced workers to lower the quality of the output they produced. To mitigate these problems, most cotton-spinning firms blended the two contractual forms: they paid a worker by her team's output, but on an individualized per-unit scale that depended on how the manager generally appraised the pace and quality of her work. As a result, a manager rated each worker's skill and diligence. He gauged the quality and quantity of each worker's output, and adjusted it from time to time as warranted. In turn, she could increase her pay both by inducing her team to increase its production (thereby increasing her own units of output), and by impressing her supervisor (thereby increasing her per-unit wage).

Investors received only noisy information about all this for two reasons: the factory hired new workers regularly, and the investors could not readily gauge whether a manager promoted his workers on the per-unit scale at the optimal pace. To create the right incentives for their workers, the investors had to delegate discretion to their manager; in the process, however, they necessarily left themselves vulnerable. If a manager wanted to cheat on the firm's efficiency wages, he could promote his workers too slowly; if he wanted to waste firm resources, he could promote them too generously. Should he promote workers either too quickly or too slowly, investors would learn that fact only much later, if they learned it all. Eventually, they might discover that they were paying

⁶¹ Riyuemon Uno, *Shokko chingin shiharai no shin hoho* [A New Means of Paying Factory Workers] (Osaka: Kogyo kyoiku kai, 1913); Hosei, *supra* note 46, at 160-89. Tsurumi, *supra* note 49, at 148, claims that firms generally used pure piece-rate contracts for women, but this claim is belied by her own account of the many discretionary adjustments made.

higher wages than they needed to pay, or that they were incurring higher monitoring costs because their spartan wages had raised employee shirking. Alternatively, though, they might never know. Firms fail for a myriad of reasons, and many investors never learn why; ex post, investors often have trouble disentangling why a firm did so poorly. The managers responsible may have long since left anyway.

(b) *Demand curve.* If investors lacked clean information about their own wage scales, they also lacked clean information about the industry's demand curve. They knew their own firm's sales, granted. Yet with only that information they could not distinguish between (i) a fall in industry-wide demand and (ii) a fall in demand specific to their firm. These two problems, however, dictated radically different responses: the former dictated production cuts, while the latter required a product change to meet consumer tastes. Absent industry-wide information, investors could not distinguish the two.⁶²

5. *Managerial reluctance to cut production.* Even where investors would have wanted their manager to cut production, a manager sometimes had an incentive not to do so. To see why, suppose first that he had short-term horizons. Many probably did, for the shortage in well-trained managers enabled people who wanted to switch jobs to switch easily. For them, pre-war Japan was not the Japan of "lifetime employment." Suppose too that a manager discovered that industry-wide demand had fallen. If he either operated the plant at a loss or idled part of it, investors would notice. If he kept the plant at full capacity and kept it in the black by cutting wages, investors would not notice—at least for some time. To cut the short-term wage bill, he needed only to slow the rate at which he promoted his workers. In the long run, by lowering the efficiency wage premium the firm paid, he would increase shirking and raise the firm's wage bill. In the short run, he could avoid an investigation of his managerial activities—and the short run can often last a long time.

This problem stemmed from the noisy information and collective action problems the firm's investors faced. Assume—counter-factually—that a single investor with perfect information owned each cotton spinning firm. If industry-wide demand fell, the investor could order his manager to cut capacity. If the manager instead cut wages, he could fire

⁶² Price information on yarns would not yield this information because of the broad fluctuations in prices during these years. See Kazushi Ohkawa, Tsutomu Noda, Nobuyuki Takamatsu, Saburo Yamada, Minoru Kumazaki, Yoichi Shinoya & Ryoshin Minami, *Choki keizai tokei: Bukka [Long-Term Economic Statistics: Prices]* 134-36 (Tokyo: Toyo keizai shimpo sha, 1967).

him. Now assume—more realistically—that investors had noisy and incomplete information, and that each owned only a small share of the firm. Two problems ensued. First, because of their coarse information sets, investors could not distinguish industry-wide slumps from firm-specific declines. Second, because of their collective-action problems, they had little incentive to intervene in their firm unless they received strong signals that their managers might have misbehaved.⁶³

To protect his tenure at a firm, a manager had somehow to insure that investors received no strong signals that he may have mismanaged it. Should he either run the plant in the red or idle part of it, he sent just such a signal. Investors would sometimes then have found it cost-effective to intervene and investigate. If he had idled the plant, he could have done so either (a) because of an industry-wide slump, or (b) because of his own poor performance. If the investors could obtain perfect information, he would not worry. The investors would have absolved him and left. If investors could obtain only noisy and incomplete information, however, then even an honest and able manager faced a nontrivial risk of discharge or demotion. In such a world, he often did better if he could send no strong signals that investors might interpret unfavorably.

6. *The solution.* Firms in the Japanese cotton spinning industry solved these problems through the Boren. They did so in two steps. First, they pooled information about industry-wide demand. By contributing information about their own firms, they together generated the data that let them gauge the extent they suffered from industry-wide demand shocks. They could then have forwarded that information to their investors, and—if their investors faced no collective-action problems—those investors could have determined whether the firm should cut capacity. Absent collective-action problems, the firms needed the Boren for information pooling, and for nothing more.

Yet the investors in many cotton spinning firms did face collective action problems, and it was to mitigate those problems that the Boren not only pooled information but also ordered capacity cuts. If privately held firms could trust their owner to decide whether to cut production, publicly traded firms could replicate that result by delegating the decision to a third party, the Boren. In giving Boren officers that authority, managers committed themselves to enforcing their firm's efficiency wage

⁶³ True, because the stock was listed on the national exchanges, they could easily sell their interests even if they received only weak signals that their managers had misbehaved. Given that their sale price would have incorporated those signals, though, they would have found the sale small consolation.

strategy, and investors reduced the cost of verifying that their manager had acted appropriately. In effect, managers and owners assigned the Boren the task not just of pooling information, but of interpreting it and enforcing that interpretation as well. In a world without antitrust, no one incurred legal risks in fixing quantity; in an internationally competitive industry with many spinners from many countries, neither did anyone incur many technological risks by sharing information.

The Boren membership patterns loosely corroborate this hypothesis. During the early decades of the century, not all cotton-spinning firms joined the Boren. Of those that listed their shares on either the Tokyo or Osaka stock exchange, though, nearly all did. All such firms faced the principal-agent and collective-action problems described above, and most mitigated them through the Boren. Only privately held firms faced less of a problem, and primarily only they avoided the Boren.⁶⁴

That managers needed to tie their hands also explains some of the more bizarre aspects of the agreements. Recall the details: the Boren often required firms to idle specified percentages of their capacity, but never banned them from augmenting that capacity (Table 2). If Boren members hoped to raise prices, this made no sense. Without a way to limit new capacity, they could not have cut production and could not have raised prices.

In contrast, suppose that the Boren firms negotiated their agreement to mitigate the agency slack between investors and their managers. More specifically, suppose that they wanted to induce managers to idle machines whenever the investors would have wanted them idled. The Boren agreements addressed the problem precisely. The firms did not use the Boren to ban investments in new capacity because most of the firms had already assigned that decision to the investors directly. They did so

⁶⁴ Of the 11 non-Boren cotton spinning firms listed in *Zaisei*, *supra* note 23, at 210, none had listed stock. Although *Nippon kangyo*, *supra* note 7, 58, lists two muslin firms outside the Boren and both had publicly traded stock, Shigeru Kano (ed.), *Tokyo kabushiki torihiki jo [Tokyo Stock Exchange]* 125 (Tokyo: Hideshi Kano, 1933), lists these firms as not being cotton spinning firms. It is difficult to differentiate cotton spinning firms on the basis of name alone. If we eliminate firms that seem to have specialized in flax and wool, however, as of 1925 the only non-Boren cotton spinning firm on either the Tokyo Stock Exchange or the Osaka Stock Exchange was one Naniwa boshoku. On Boren membership, see *Dai-Nippon* *supra* note 18; on the stock listings, see *Osaka*, *supra* note 60; *Tokyo*, *supra* note 60; Kano, *supra* note 64.

by regularly draining the firm of cash.⁶⁵ Through high dividend policies, they insured that they often could build new plants only by raising new capital. In the process, the managers credibly committed themselves to the discipline of the capital market on questions of new investment⁶⁶

Table 9: Scale Economies in Cotton Spinning

A. Relative Costs:

<u>Spindles/ Factory</u>	<u>Materials</u>	<u>Wages (labor)</u>	<u>Amenities (labor)</u>	<u>Operating Costs</u>	<u>Total</u>
5,000	21.77	104.14	16.92	22.37	165.20
10,000	21.77	73.59	11.95	19.34	126.65
20,000	21.77	57.66	9.35	18.84	107.64
30,000	21.77	51.53	8.37	18.33	100.00
40,000	21.77	49.25	8.00	18.09	97.11
50,000	21.77	47.97	7.79	17.93	95.46
60,000	21.77	47.14	7.66	17.83	94.40

B. Firm Size:

<u>Number of Spindles</u>	<u>No. of Firms</u>	<u>(%)</u>	<u>Total Spindles</u>	<u>(%)</u>
Under 10,000	10	(12.5)	51,268	(0.4)
10,000- 49,999	25	(31.3)	614,820	(5.0)
50,000- 99,999	14	(17.5)	932,828	(7.5)
100,000-299,999	20	(25.0)	3,040,996	(24.6)
300,000-499,999	3	(3.7)	1,050,604	(8.5)
500,000 and over	8	(10.0)	6,668,248	(54.0)

Note: In A, costs are indexed by expenses for 30,000-spindle factories, and are for No. 20 yarn. In B, firm size is as of 1937.

⁶⁵ For evidence of high dividend rates in the spinning industry, see Dai-Nippon boseki rengo kai, *Menshi boseki jijo sanko sho [Reference Regarding Cotton Yarn Spinning Matters]* (Osaka: Dai-Nippon boseki rengo kai, various years).

⁶⁶ See Frank H. Easterbrook, *Two Agency-Cost Explanations of Dividends*, 74 *Am. Econ. Rev.* 650 (1984).

Table 9 cont.:

Source: Keizo Seki, *Nihon mengyo ron [A Theory of the Japanese Cotton Industry]* 204, 473 (Tokyo: Tokyo daigaku shuppan kai, 1954).

Table 10: Zaibatsu Investments in Cotton Spinning

A. Zaibatsu Holdings in Spinning Firms

The Mitsui Zaibatsu

Textile firm	Mitsui shareholdings	Firm spindles	Mitsui share of spindles
Kanebo	6.71%	615,192	41,279
Kinka boseki	41.36	144,624	59,816
Toyoda boshoku	5.97	79,824	4,765
Tenma boshoku	48.58	65,792	31,962
Utsumi boshoku	48.97	72,500	35,503
Tokyo mosurin	48.52	79,128	38,393
Kikui boshoku	1.43	62,428	768

The Mitsubishi Zaibatsu

	Mitsubishi s/g	Mitsubishi share
Nagasaki boshoku	2.79	98,656 2,753
Fuji gasu boseki	1.43	502,104 7,180

The Sumitomo Zaibatsu

	Sumitomo s/g	Sumitomo share
Osaka godo boseki	0.67	427,524 2,864

The Yasuda Zaibatsu

	Yasuda s/g	Yasuda share
Osaka godo boseki	0.86	427,524 3,677

Table 10 cont.:

B. Zaibatsu Share of Total Industry Spindles (6,529,394)

	Spindles	Percent
Mitsui	212,486	3.25
Mitsubishi	9,933	0.15
Sumitomo	2,864	0.04
Yasuda	3,677	0.06
TOTAL	228,960	3.50

Notes: Figures are from Takahashi (cited below) where available, and from stockholder lists in company semi-annual reports where not. Mitsui ownership in Kinka and Tokyo mosurin are Takahashi's estimates. Stock classes are combined on an equal basis. Figures are as of approximately 1928.

Sources: Kamekichi Takahashi, *Nippon zaibatsu no kaibo [An Analysis of the Japanese Zaibatsu]* (Tokyo: Chuo koron sha, 1930); semi-annual company reports for Kikui boshoku, Tenma boshoku, and Osaka bodo.

V. Conclusion

Just once, you should come see a farming or fishing village. You won't find a single girl. All you'll see are shivelled old grannies. The girls are all gone, left the village for work. ... We guys are left, but we're lonely. Real lonely. Even suppose I can take the loneliness. How am I going to find a wife? I want a wife so bad I'm going crazy. But no girl'll marry a poor farmer anymore. Even when they come back to the village from the factories, they've turned completely high-class. With their hair done up and perfumed and all, they won't even look at us.

It was a letter to the editor of a Tokyo daily newspaper.⁶⁷ And it captured at least some of the economic impact of the textile industry. Having made a minor fortune in the mills, the women had raised their

⁶⁷ Quoted in Yamamoto, *supra* note 37, at 121. Of course, there may have other reasons factory women would not give this man the time of day—there usually are. Of the 1,536 women in spinning factories surveyed in 1927, 801 said they hoped to marry a farmer. See Chuo, *supra* note 44, at 22-23.

sights. It is not what one reads in the tirades against the mills so popular in the fashionable histories. But the fashionable histories miss the industry's effect on female incomes. "It was harder work at first than I had done before," recalled one old woman. As a young girl, she had left her hometown for a silk reeling factory. "But since there were lots of us and we all worked together, it was kind of fun. And besides, it paid better."⁶⁸

Peasants may be poor, Donald McCloskey reminds us, but they are not fools. They respond to market incentives, and they respond rationally. To induce them to work in the new spinning factories, the owners had to make it worth their while; to induce them to work *hard* in the new mills, they had to make it lucrative. The firms did so by paying peasant women double or triple their market-clearing wage. Largely, their scheme worked. Rather than lose such a well-paying job, the young women worked hard.

Within the firm, that which promoted the welfare of its managers did not always promote the welfare of its investors. In particular, given the noisy information and the diversified ownership patterns in the industry, managers sometimes had an incentive to respond to demand shocks suboptimally—to cheat on the firm's high wage strategy rather than to cut plant capacity. To commit credibly to cutting capacity rather than wages, the managers placed the firm in the Boren. In the process, they tied their hands—they assigned the decision about wage and production cuts to a third party.

Although the Boren adopted the appearance of a cartel, it accomplished something radically different. Although the spinning firms used it to coordinate production cutbacks, they did not use it to earn monopoly rents. Instead, they used it to lower operating costs. Whether of Japan or elsewhere, scholars too readily conclude that if it looks like a monopoly rent and quacks like a monopoly rent, it must be a monopoly rent. Like ducks, like rents: the Japanese spinning firms illustrate again how wrong that approach can be.

⁶⁸ Quoted in Yamamoto, *supra* note 37, at 336.

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