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〔Article〕

The Inter-firm Relationship in Steel Industry of Prewar Japan: How Were the Market and Organizational Principle Intertwined?

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Contents

Introduction

The purpose of this paper is to analyze the transaction of steel for ships in the prewar Japan.

Because many Japanese assembly industries such as automobile industry and electronical machinery industry had strong competitiveness since the 1970s, the inter-firm relationship between Japanese assembly firms and intermediate goods firms in postwar, has attracted much attention. Hence, there are only few empirical studies on transaction of Japanese intermediate goods of the pre-WWII period.

Furthermore, in terms of firm size, most parts and materials firms are small whereas representative assembly firms are large. Therefore, studies on Japanese “supplier system” concentrated on inter-firm relationships between large and small companies.

Many scholars insist that inter-firm relationships of postwar Japan are characterized by the long-term obligational contract. The contract illustrates that the organizational principle strongly works. Nevertheless, all the transactions in Japan are not characterized by the long-term obligational contracts. In other words, it is highly probable that the market principle and the organizational principle intermingled in inter-firm relationships. Based on this way of thinking, in this paper, I analyze transaction of steel in prewar Japan, especially in the 1930s, focusing on the intermingling of the market principle and the organizational principle.

Steel was indispensible for a lot of industries as fundamental materials. In that sense, we can say that steel industry is a representative materials industry in Japan. In particular, Japanese steel industry became the key industry to supply the fundamental materials for Japan's major industries in the 1930s.[1] This is the reason why I focus on the 1930s.

Indeed, although there are plenty of splendid studies on Japanese steel industry of prewar[2], they don't focus on transaction of steel.

At the same time, through the 1930s, the shipbuilding industry's demand for steel had been growing most rapidly in Japan. As such, this paper analyzes transaction of steel for ships.

1. Market Condition of Steel in the Prewar Japan

Market conditions, namely the balance of supply and demand, have a great influence on the transaction. Therefore, before the historical analysis of the inter-firm relationship in the steel industry, let me start with a discussion about market conditions in the prewar period.

(1) In World War I

In Japan, it is not until the World War I that the demand for steel increased in earnest. The war increased trade and created the "marine transportation boom". Owing to the ship shortage, shipbuilding industry was booming. The demand of other machines also increased. Accordingly, the demand of steel for the industries exploded. For example, the demand for steel in Japan increased from 650,000 tons in 1914 to 1,122,000 tons in 1918, an increase of approximately 1.7 times.[3]

In response to this explosion in demand, Japanese steel companies actively constructed and expanded their rolling equipment for steel.[4] As a result, the production of steel increased from 283,000 tons in 1914 to 537,000 tons in 1918.[5]

Nonetheless, supplies of steel in Japan couldn't keep up with the demand.[6] Above all, after Germany and Belgium prohibited export to Japan, so did Great Britain and the US in April 1916 and in August 1917 respectively.[7]

In addition, the production capacity of Japanese steel companies was inadequate. For instance, although orders for steel that shipbuilding companies received and accepted amounted to 110,000 tons during this war, Yawata Steel Works, which was the biggest producers of steel in Japan, was only able to accept order of 27,000 tons in total.[8]

According to *Seitetsu Sankō Siryo*,[9] from 1914 to 1918, self-sufficiency ratio of steel for ships was very low in spite of the difficulties regarding imports. For example, imports of steel for ships during the WWI comprised more than three-fourth of demand for the steel. Meanwhile, as machine manufacturing companies and metal processing companies demanded strongly a further more amount of steel to the Yawata, the steel market continued to be a seller's market.

So-called "iron and steel famine" problem then occurred and steel price soared. Even the agreement for the "exchange between Japanese ships and U.S. steel" in 1918 was not able to solve the severe steel shortage. In particular, because the "exchange" concentrated on steel for shipbuilding companies, other customers of steel apart from sufferred more from the shortage of steel.

(2) After World War I and the 1920s

Nevertheless, the market condition for steel in Japan changed dramatically after the war. Above all, the steel demand decreased sharply. Specifically, the end of "shipbuilding boom" and the sharp decrease of demand for steel for ships was followed by marine transportation recession after WWI. The conclusion of the Washington Treaty in 1922 critically influenced the naval disarmament, which, in turn, decreased substantially the demand for steel for military use and for warships.[10]

With regard to supply of steel,steel factories that had begun to be built towards the end of WWI had not been yet completed during the war and were then finished one after another after the war ended. Hence, production capacity expanded rapidly soon after the war. Besides, even though two Japanese shipbuilding companies, Kawasaki Shipbuilding Co. and Asano Shipbuilding Co. started in-house production of steel during the war, it was not until 1919 that they were able to produce substantial amount of steel.[11]

Furthermore, as European countries and the US produced an excess of steel supply after the war, those countries increased steel exports to Japan in order to mitigate the oversupply problem.[12]

(3) In the 1930s

In the era of the Great Depression from the end of 1929, the oversupply of steel increased drastically because of sharp decline in demand of steel in Japan. The buyer's market continued.

However, along with the recovery from the Depression, the demand for steel began to increase. Furthermore, the increase in demand accelerated in the late 1930s. Eventually, the short supply of steel became more serious, resulting in another "iron and steel famine" as in the period of WWI. The steel market then became a seller's market again and steel producers had the upper hand over the steel customers. In that sense, steel market in the 1930s shared common points with that of that of WWI. That is, as in the WWI period, excessive supply and sellers' market continued through the 1930s.

On the other hand, compared with WWI, there were significant differences in the period. First, as seen in Table 1, in the 1930s, Japan had become self-sufficient in steel. In other words, whereas most of steel demand was met by imports

Table 1 Domestic steel production, imports, and exports (1932-40, thousand tons, %)

Year	Domestic production	Imports	Exports	Self-sufficiency ratio
1932	2,123	235	300	103
1933	2,792	410	435	101
1934	3,323	427	596	105
1935	3,978	357	823	113
1936	4,548	345	990	117
1937	5,080	815	773	99
1938	5,489	339	799	109
1939	5,381	197	931	107
1940	5,261	312	793	110

Source: Iida, Ohashi, and Kuroiwa,eds.(1969),320;Yonekura(1994),159.

Table 2 Production, import and self-sufficiency ratio of steel for ships(1912-19, thousand tons, %)

Year	Production	Import	Total supply	Self-sufficiency ratio
1912	5	21	26	22
1913	6	21	27	25
1914	10	34	44	23
1915	10	33	43	23
1916	15	60	75	20
1917	20	129	149	13
1918	20	234	254	12
1919	30	241	271	11

Source: Nagura,1984.302; *Seitetsugyô Sankô Siryô* [Reference Materials of Steel and Iron Industry].

during WWI(Table 2), all the steel demand could be met by domestic production in the 1930s. Moreover, the export ratio of domestic steel production was low throughout the 1930s. In the seller's market, Japanese steel producers derived much more benefit due to expansion in demand.

The high self-sufficiency ratio and the low export ratio of domestic steel production meant that the transaction between Japanese steel companies and customers had become more important in the 1930s than in WWI. As such, in 2, we focus on steel transaction in the 1930s.

2. The Steel Transaction in the 1930s

(1) The Market Principle and the Organizational Principle in the Sales Methods and Distribution Routes

As described above, the Japanese steel market changed drastically to the sellers' one since the mid-1930s. In the market condition, Nippon Steel Corporation[13](hereinafter will be referred to as Nippon Steel) employed three sales methods of steel; the regular futures contract, the futures contract, and the spot trades. Whereas the former two methods suggest primary kinds of organizational transaction, the spot trade was included in market transaction. In brief, the big steel company in this period practiced market transaction as well as organizational transaction.

However, with regard to the distribution channel of big steel companies, the organizational principle was dominant. For example, Nippon Steel sold most steel through three distribution channels in 1936 and 1937; direct sales to customers, the sales through designated big wholesalers and the sales to merchants via the designated wholesalers.[14] All of the channels had characteristics of organizational transaction.

(2) Cartel Activity and Its Limits

From 1930 to1932, cartels by producers were formed one after another in a lot of steel market segments except for a few monopoly steel segments. For example, cooperative sales associations were organized for black plates, wire rods, plates, medium plates, small angles, and medium angles and so on from 1930 to1931.

Moreover, in December 1932, the steel industry became subject to the Strategic Industries Control Act, which was enacted to strengthen the control of primary industries by the government. As the law was applied to the steel industry, cartels in this industry were supported by the government.[15]

These cartels did play important roles in reducing steel imports and in establishing a segmented division of labor between Yawata and the private steel companies. One of the reasons why the cartels were rather successful lay in the competitive structure of the industry,[16] which represents the functioning of the market principle. In sum, in the case of steel cartels in this period, we can observe the organization principle and the market principle were complementary each other.

Nonetheless, in the some cases, there was conflict between the aim of cartels and interests of individual firms. Specifically, even though the cartels aimed to stabilize prices, there was always the strong temptation to violate the cartel price among the cartel members. From time to time, the cartels failed to stabilize prices and, outsiders even appeared, especially in a thin steel sheet cartel.[17] In fact, it was reported that "disintegration" in some cartels began to happen in 1934.[18] Hence, we can remark that there was a substitutive relationship as well as complementary one, as illustrated above, between the organization principle and the market principle.

(3)Inter-firm Relationship between Steel Producers and Wholesalers

In the Great depression, steel demand decreased rapidly. The steel market changed into a buyer's market, which meant that Yawata's power to control big merchants became weak. Furthermore, the "designated merchant system" of Yawata didn't function well. The same situation continued until the establishment of Nippon Steel in 1934.

However, on establishing Nippon Steel, it engaged in controlling steel merchants more strongly. In May 1934, the Sales Manager of Nippon Steel declared to control the commission of designated wholesalers and speculative competition among them.[19] Indeed, Nippon Steel strengthened the "designated merchant system" after August 1935. Under the system, the company selected and adopted not only designated wholesalers but designated merchants that were smaller and further downstream than big designated wholesalers.[20] It means that the scope of the control by the large steel company expanded significantly. The organizational relationship between steel producers and merchants was enhanced from the mid-1930s. It demonstrates that the organizational principle strongly worked in the relationship.

At the same time, along with seller's market, the market principle worked in the relationship and the behavior of merchants. For instance, many behaviors of steel merchants were speculative in the autumn of 1936 because of supply short of steel, so that even the authoritarian intervention of the Sales Department of Nippon Steel did not work.[21] Furthermore, the individual designated merchants competed quite fiercely against each other. For example, each designated merchants competed intensively to buy further amount of steel from Nippon Steel while giving credits to small merchants. Both the organizational principle and the market principle worked simultaneouly in inter-firm relationship between the big steel company and the merchants.

3. The Case of Steel Transaction for Ships in the 1930s

Although the consumption of steel for ships in the early 1910s was only three or four per cent of total demand for steel[22], it increased dramatically during WWI, owing to the "shipbuilding boom", as described earlier. In particular, in 1918, near the end of WWI, the consumption of steel for ships comprised approximately 30% of all the domestic steel demand.[23] Moreover, according to government report, shipbuilding works consumed over 50 % steel of steel from machine factories that employed more than 30 employees in 1918.[24]

While the steel demand for the use of ships decreased substantially during the 1920s as a result of the Washington Treaty and following a Depression, the demand for steel for the use of machines, such as ships and electric equipments was increasing quite rapidly after the recovery from the Great Depression.[25]

Specifically, business in the shipbuilding industry was booming. The value of production in shipbuilding industry increased from 38 million Yen in 1931 to 111 million Yen in 1936.[26] Not only warship construction but also building of private merchant ships increased sharply. Accordingly, freighters occupied about two-thirds of private merchant ships in the same period.[27]As a result, through the 1930s, the steel demand of shipbuilding industry increased rapidly in Japan.

Moreover, Japan achieved the complete self-sufficiency of thick steel sheet that was mainly used for building ships in the 1930s. It suggests that transaction between Japanese companies became important in the market segment of the 1930s.

The market for steel for ships in this period had the characteristics of the organizational principle. First of all, to promote the marine and shipbuilding industries, the Japanese government actively intervened in the transaction of steel for ships. In addition, as with other kinds of steel products, a cartel was established in this market segment. Because both the market of shipbuilding and the market of steel for ships were oligopolistic, it was highly likely that organizational transaction such as obligational contractual relationships were practiced extensively in this steel market segment.

At the same time, in the seller's market that was a result of explosive increase of demand, the interests of the steel suppliers and the steel demanders frequently conflicted and they were even at each other's throats as well as cooperative. In addition, they competed fiercely to expand their market shares. Accordingly, the steel market segment also had the characteristics of the market principle. In brief, it is highly probable that the steel market segment had the characteristics that indicate the market principle and the market principle and the organizational principle intermingled. These are the reasons why I will examine the transactions of steel for ships in the 1930s.

(1) Inter-firm Relationship between Cartels

The Organizational Principle in Transactions between Cartels

In the early 1930s, both Japanese shipbuilding companies and thick steel sheet producers, that is, suppliers and customers of steel for ships, formed cartels respectively. The shipbuilding companies organized the "Japanese Shipbuilders' Association" (*Zosen Rengokai*) as a cartel in January 1932. The association mainly aimed joint purchasing of materials for ships and building the standard form of shipbuilding contract. In addition, the association assigned steel among ten member companies.[28]

The producers of thick steel sheet, more than 6mm, also formed a cartel which consisted of Yawata Steel Works, Kawasaki Shipbuilding Corporation, Asano Shipbuilding Corportation, and Tokai Kogyo in February 1931. The main members of the cartel were first three companies except because Tokai Kogyo was virtually a subcontractor of Yawata Steel Works.

Both cartels carried out substantial transaction for steel for ships in the 1930s. A representative example is the steel transaction for the "subsidy for ship improvement". The "subsidy", which was carried out three times from October 1932 to 1937, was the government policy to promote breaking up old ships and, on the other hand, to promote the building of excellent ships.[29] In this policy, both cartels repeatedly negotiated with each other for steel transaction, which was accompanied by the intervention of the government. For example, in November 1932, the Japanese Shipbuilders' Association held the meeting of the board of directors in order to take measures against soaring steel price. Based on the conclusion of the meeting, the cartel of shipbuilders continued to negotiate with the thick steel sheet cartel. As a result, agreements on the price and the quantity were made several times between both the cartels.[30] This implies that a kind of organization principle worked in this transaction.

With regard to steel prices, they had risen sharply in the seller's market in the 1930s. However, the price of steel sheets "subsidy" for ships was very stable. Specifically, the agreement price of the steel for the "subsidy" ships between cartels was kept in relatively low compared with the market price (see the Table 3).[31] This means that the price was stabilized by the agreement between the cartels. Furthermore, not limited to the

Table 3 The price of thick steel sheet (Yen per ton)

Period	The price of thick steel sheet for ship improvement	The price of thick steel sheet	Price quotation of cartel of thick steel sheet
The Second Half of 1933	130	131	122
The First Half of 1934	120	136	124
The Second Half of 1934	116	153	125
The First Half of 1935	121	112	108
1936	120	116	106

Source: *Senpaku Kaizen Kyōkai Jigyoshi* [The History of Activity of Ship Improvement Corporated Association] (1943),218-233;Hashimoto(2004),213; *Nittetsu Shasi Henshū Siryō* [The Eding Documents of Nihon Steel Corpratation](1955), No.196, Tokyo.

transaction of steel for "subsidy" ships, in the later 1930s when steel prices rose sharply, the prices agreed by the cartels considerably stabilized.[32] This illustrates that the organizational principle worked in the formation of steel prices.

The Market Principle in Transaction between Cartels

As the same time, the organizational principle didn't work fully. For example, the shortage of supply became more serious in the late 1930s so that steel supply was insufficient even to satisfy the demand for steel for "ship improvement". This fact suggests that even cooperation between the cartels could not solve the problem of short supply of steel.

The conflicts between the cartels over steel prices occasionally took place as well. For example, when the shipbuilders' association negotiated with the thick steel sheet cartel for contract of steel for new ships in March 1936, the former requested the deferment of price quotes of the steel to the latter. Still, the negotiation ran into difficulties.[33] Even though the agreement price of steel between the cartels should be decided by the end of 1936, it was not yet determined even in February 1937. The thick steel sheet cartel in March 1937 also requested the new price quote that was 50 Yen per ton higher than the old price quote. The shipbuilders thought that their business would be unprofitable at the new price quoted and that their operation could get into trouble. Therefore, the representative of the shipbuilders' association visited Nippon Steel and petitioned to lower the price quote.[34] This conflict of interests between both the cartels demonstrates that the market principle as well as the organizational principle was working strongly.

In addition, a severe conflict of interest among member companies of the shipbuilding cartel, *Zosen Rengokai*, frequently occurred. For instance, early in 1933, before the negotiation with the steel cartel, regarding steel purchasing, there was an internal complication in the shipbuilding cartel owing to the variance in price that member companies hoped to buy at. As a result, some shipbuilding companies individually engaged in buying steel because it became almost impossible for them to agree on the specific price amongst themselves.[35] In 1937, during the steel shortage, members of *Zosen Rengokai* fiercely scrambled to purchase steel for ships, so that the government recommended the joint purchase of steel.[36]

Those conflicts of interest between cartels and within the cartels also illustrate that the market principle as well as the organizational principle worked in transaction of steel for ships.

(2) The Steel Transaction between Individual Companies

Reasons

It is highly probable that suppliers and demanders of steel for ships in the period had reasons why they transacted individually as well as through negotiating between the cartels that they belonged to.

With respect to the market condition, as the market for steel for ships in the 1930s was a seller's market, steel producers should have been able to sell in favorable terms in this time. Nonetheless, as described above, the agreement price between the cartels was controlled by the negotiation between the cartels and the government to prevent it from rising sharply. However, although the same agreement price was advantageous to customers, steel producers never had the strong motive to keep the price low.[37]

In addition, the purpose of the thick steel sheet cartel was to stop sharp fall of steel price in establishing the cartel. Nevertheless, as the economy recovered and a boom came to the steel market, the chief purpose of the cartel changed to the control of the rapid rise of the steel price. Therefore, as for steel companies, the motivation for continuing to be a member of the thick steel sheet cartel was decreasing. As a result, some shipbuilding companies individually engaged in buying steel.

Furthermore, the steel for warships occupied considerably high proportion in the thick steel sheet market. For example, on average from 1933 to 1935, a military demand comprised about 40 per cent of shipment of Yawata and Nippon Steel.[38] In the late 1930s, the company's business relating to military demand was unprofitable. In particular, despite of the "steel famine", the severe short supply of steel, Nippon Steel's profit per ton of thick steel sheet decreased after the latter half of 1937.[39] This highlights that big steel producers such as Nippon Steel had strong motives to sell the steel for merchant ships, including a motive to transact with individual shipbuilding companies as the transaction was not controlled by negotiation between cartels.

Moreover, shipbuilding companies as customers of steel have also strong motives to transact with the individual steel producers. Above all, the demand for steel for ships increased so rapidly that the quantity of thick steel sheet to be transacted between cartels was not sufficient to meet the growing demand.

As for the shipbuilding companies, warships construction business was not profitable in this period because of skyrocketing steel prices.[40] For example, because Mitsubishi Shipbuilding Co. accepted the order for warships based on the low steel price in 1931 and 1932, it eventually suffered losses due to the rapid increase of steel price.[41] As a result, most shipbuilders tried to actively expand the business of merchant shipbuilding in order to increase the purchasing of steel for the ships.

According to the data in *Hanbai Jumpō* in the mid-1930s, the number of application for steel by merchants to the thick steel sheet cartel continued to be greater than those that were accepted by the cartel. This implies that the cartel controlled the supply of thick steel sheet in the seller's market and, in turn, the thick steel sheet market was suffering a serious supply shortage.

Moreover, the military demand had had the top priority in the allocation of steel so that the shortage of steel for merchant ships became more serious.[42] Delivery of steel to shipbuilders for merchant vessels was frequently delayed. In response to the problem, as soon as the top shipbuilding companies accepted an order for merchant ships, they made contracts to purchase the steel in order to prevent the critical loss in shipbuilding business due to steel supply shortage.[43]

Accordingly, it is very likely that shipbuilding companies tried to purchase steel for merchant ships from individual steel companies.

The Organizational Principle and the Market Principle in Steel Transaction between Individual Companies

In the steel transaction among individual companies, both the market principle and the organizational principle worked simultaneously in the transaction.

Above all, a continuous and obligational contractual relationship among a few specific companies illustrates the principle of organization. Although it is very difficult to prove the existence of the transactions, we can guess that it is highly possible that a continuous and obligational contractual relationship existed in the thick steel sheet market in the 1930s.

The clue is in the industrial organization in both the thick steel sheet and shipbuilding market. Namely, both the industries of suppliers and customers of the thick steel sheet had an oligopolistic structure. Needless to say, industrial organization in both supply and demand industry is just one factor that determines the type of transaction. However, it is undeniable that the industrial organization greatly affects the type of transaction.

Take a close look at the industrial organization of the shipbuilding industry and the thick steel sheet industry. Although there were plenty of small companies in Japanese shipbuilding industry, the production tended to be concentrated in a few large companies. The tendency became more marked as the economy recovered from the Great Depression.

Table 4 The market share of shipbuilders and the concentration ratio of top 3 and top 6 companies (1930–37, launching base, ton, percentage)

ranking	name of company	gross tonnage	market share
1	Mitubishi Shipbuilding	433,312	38.3
2	Mitsui Tama	199,658	17.6
3	Kawasaki Shipbuilding	182,387	16.1
4	Harima Shipbuilding	76,831	6.8
5	Osaka Iron Work	74,000	6.5
6	Urgaga Dock	66,443	5.9
top 3	—	815,357	72.0
top 6	—	1,032,631	91.2

Source : Hashimoto (2004) 205.

Table 5 Market Share by Companies in Thick Steel Sheet Market and Concentration Ratio of Top 3 Companies(ton, percentage)

1931			1934			1937		
Name of Companies	Production	Market share	Name of Companies	Production	Market Share	Name of Companies	Production	Market Share
Yawata	121,970	43.5	Nippon Steel	303,615	48.6	Nippon Steel	500,092	45.0
Asano	69,709	24.9	Asano	116,223	18.6	Asano	216,577	19.5
Kawasaki	60,558	21.6	Kawasaki	98,653	15.8	Kawasaki	159,387	14.4
(3 largest firms)	252,237	89.9	(3 largest firms)	518,491	83.0	(3 largest firms)	876,056	78.9
Tokai	13,385	4.8	Tokai	36,328	5.8	Nakayama	59,473	5.4
Tokuyama	10,225	3.6	Osaka	24,463	3.9	Osaka	37,222	3.4
Others	4,595	1.6	Tokuyama	20,952	3.4	Tokai	34,734	3.1
—	—	—	Others	24,249	3.9	Azumamachi	32,443	2.9
—	—	—	—	—	—	Tokuyama	28,314	2.6
—	—	—	—	—	—	Others	41,890	3.8
(total)	280,442	100.0	(total)	624,483	100.0	(total)	1,110,132	100.0

Source: Seitetsugyō Sankō Siryō [Reference Materials of Steel and Iron Industry].

For example, in the 1930s, the top six shipbuilding companies in Japan constituted more than 90 per cent in the shipbuilding market. Particularly, the top three companies constituted more than 70 per cent and had a decisive lead over other shipbuilding companies (Table 4).

The thick steel sheet industry was oligopolistic as well. For instance, Yawata, Kawasaki and Asano had most of the market share during the 1930s along with the sharp increase in production of thick steel sheet. In particular, since its establishment in 1934, Nippon Steel had maintained the top share in the market while the market share of Kawasaki and Asano had fallen since then (Table 5).

Only a few transaction parties participated in the transaction of thick steel sheet, which implies that obligational contractual transaction of steel, a kind of organizational transaction, were frequently practiced in this steel market segment.

Indeed, according to Table 6, it was not until 1936 that Osaka Iron Works, whose total revenues comprised a high proportion of merchant shipbuilding, rapidly increased its inventory. Therefore, considering that greatest part of the inventory would be made up of steel, steel inventory of the company didn't increase so much until 1935 although it could have increased them much as possible in response to the steel shortage. As such, it is highly probable that it could have bought a stable volume of steel from specific steel companies as a result of an obligational contractual relationship before 1935. This implies the working of the organizational principle in the transaction of steel for merchant ships.

Table 6 Inventory of Osaka Iron Works(Yen)

Accounting term	Inventory of Osaka Iron Works	Accounting term	Inventory of Osaka Iron Works
The first half of 1929	4,529,097	The second half of 1933	1,583,118
The second half of 1929	7,143,462	The first half of 1934	1,697,744
The first half of 1930	7,077,570	The second half of 1934	1,755,106
The second half of 1930	1,065,799	The first half of 1935	1,783,260
The first half of 1931	1,115,416	The second half of 1935	1,621,019
The second half of 1931	1,332,016	The first half of 1936	1,906,305
The first half of 1932	1,203,209	The second half of 1936	3,093,607
The second half of 1932	1,396,295	The first half of 1937	4,977,948
The first half of 1933	1,593,540	The second half of 1937	5,610,780

Source: Osaka Iron Works. *Annual Report*.

At the same time, the market principle also worked in transactions between individual companies. First, conflict of interest regarding the transaction volume between steel companies and shipbuilding companies happened frequently. For example, according to a diary of Hirao Hachisaburo, the president of Kawasaki Shipbuilding in 1934, he heard from a bureaucrat that *Zosen Rengōkai* complained that steel producers did not supply steel sufficent for ships to meet the demand, when he visited the Bureau of Mine at the Ministry of Commerce and Industry. Besides, he added in the same diary that shipbuilding companies suspected and complained that the steel factory of Kawasaki Shipbuilding was shifting some of its production capacity of steel for ships to production of other products that were more profitable.[44]

Second, due to the seller's market in steel, shipbuilding companies fiercely competed with each other for purchase of steel for ships along with the intense competition in shipbuilding market. For example, in the "subsidy for ship improvement" that was mentioned earlier, shipbuilding companies competed for application of the policy.[45]

Third, the steel merchants were not good at adjusting the transaction volume of steel between the thick steel cartel and individual shipbuilders, especially at adjusting the quantity of steel supply in relation to demand. For example, according to *Hanbai Jumpō*, each merchant's share of total volume of application to the cartel had been fluctuated wildly since the second half of 1933.

Finally, the thick steel sheet cartel occasionally made spot transaction with individual shipbuilding companies, which primarily represents the functioning of the market principle.

Conclusion

Along with economic recovery from the Great Depression, the shipbuilding industry became booming. As the supply ran short of demand, the market became the seller's market in the 1930s.

In this period, suppliers and customers of steel for ships established the cartels and government occasionally intervened into the transaction between the cartels of suppliers and customers. The representative example was the transaction of steel for ships of "subsidy for ship improvement". At the same time, the agreement price of the steel between cartels was relatively lower than market price. they illustrate that the organization principle was strongly working.

On the other hand, the market principle worked in transaction of steel for ships. For example, despite of the cooperation between cartels, problem of short supply of steel after the mid-1930s was not improved at all. It demonstrates that there was a limit in working of the organizational principle. To put it another way, the market principle worked in forming the price of steel for ships.

The market principle appeared in other ways as well. For example, even thick steel sheet cartel made partly market transactions of steel. In addition, the difference between the prices to be requested by suppliers and by customers was so large that the agreement price between both cartels could not have satisfied both of them. Indeed, this was a reason why individual customers of the steel for ships transacted substantially with individual suppliers. It also illustrates that the market principle worked in this period.

Moreover, in the steel transactions between individual companies, both the organizational and market principle worked. For example, it is highly probable that the obligational contractual transaction of steel between a few specific companies was practiced. It demonstrates that the organizational principle worked.

On the other hand, the market principle worked in steel transaction between individual companies, too. Above all, there was conflict of interest between individual shipbuilders and steel producers. Furthermore, the steel merchants were not good at connecting between thick steel cartel and individual shipbuilders. In addition, thick steel sheet companies fiercely competed each other and so did shipbuilders.

We can observe how the market principle intermingled with the organizational principle in inter-firm relationship of Japan's steel industry during the prewar period. First, the market principle and the organizational principle were related complementarily as well as alternatively, depending on circumstance. In some cases, both alternative and complementary relations also worked simultaneously.

Second, influenced by the economic fluctuation, seller's and buyer's market appeared one after the other. In response to this cyclic change of market condition and sharp change of steel price that represent the market principle, steel companies tried to stabilize the market with some measures such as the obligational contractual transaction and cartels and so on, which represent the organizational principle. In brief, the same player could take actions to be interpreted both as the market principle and as the organizational principle.

Third, market transaction and organizational transaction such as obligational contractual transaction coexisted and these two kinds of transactions influenced each other.

Fourth, there were both conflict of interest and cooperation between steel companies and shipbuilding companies simultaneously. The former mainly represents the market principle whereas the latter mainly represents the organizational principle respectively. Moreover, conflict could be transformed to cooperation and vice versa.

Finally, Japanese uniqueness in the inter-firm relationships of steel industry was not found during the prewar period. It illustrates that Japanese "specialty" argument on inter-firm relationship of intermediate goods industry may overemphasize the differences between Japan and the other countries.

Author note

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1 Hashimoto(1984),300; Hashimoto(2004),136.

2 For example, the representative studies on the Japanese steel and iron industry of prewar period are Okazaki(1993); Nagura(1984); Nagashima(1987); Nagashima(2012).

3 Iida,Ohashi,andKuroiwa,eds.(1969),192;Hashimoto(1984),39.

4 Since the initial investment was relatively low and demand was increasing, many companies entered production in order to survive (Yonekura(1994),90).

5 Iida, Ohashi, and Kuroiwa, eds.(1969), 194.

6 Iida, Ohashi, and Kuroiwa, eds.(1969), 192.

7 MITI(1970),168; *Nichibei Sentetsu Kōkan Dōmeishi* [The Alliance of Exchange between Japanese Ships and U.S. steel] (1920). 225. In 1917,when the United States, declaring war on Germany, banned steel exports, the Japanese shipbuliders, who had already ordered 450,000 tons of steel from the United States, were threatened with being unable to fulfill their contracts(Yonekura(1994),79).

8 *Zōsen Kyōkai Kaihō* No.17,37;Shiba(1978),99.

9 *Seitetsugyō Sankō Siryō* ; Nagura(1984),302.

10 *Nihon Tekkōshi:Taishō Koki-hen*(1984),30-31,173;Nagura(1984),303;Iida, Ohashi and Kuroiwa,eds.(1969), 204,206;Nagashima(1987),65. Yawata's third expansion plan was mainly based on the planned fleet expansion of the Navy. The Yawata Works had anticipated 765,000 tons in orders from the Navy between 1922 and 1925, but it got only 60,800 tons or 8 per cent of what it expected (Yonekura(1994),89).

11 Kawasaki Shipbuilding Corporation(1936),51,144;Kawasaki Steel Corporation (1976),262,269;Kawasaki Heavy Industries Ltd.(1959),81,91;Nagura(1984),333, 375; *Nihon Tekkōshi Hensankai : Taishō Kōki-hen*(1984),220, 224-225.

12 Zenkoku Tekkō Tonya Kumiai (1958),43;Kawasaki Steel Corporation(1976),262; Nihon Tekkōshi Hensankai, *Taishō Zenki-hen* (1984), 82,158; Nagura(1981),7,9. In addition, due to the Great Kanto Earthquake of 1923, speculative import of steel in Japan temporarily increased.

13 Nippon Steel was established in May 1934 by merging Yawata and some private steel and iron companies.

14 Nihon Tekkōshi Hensankai ed.(1984),*Nihon Tekkōshi:Shōwa Daiikki-hen*,231-5.

15 Nippon Seitetsu Kabushiki Kaisha Henshu Iinkai(1959),38.

16 Yonekura(1994),130-31.

17 *Hanbai Jumpō*, Issue 239;Iida, Ohashi and Kuroiwa, eds.(1969), 295-6.

18 Zenkoku Tekkō Tonya Kumiai(1958),78;Iida, Ohashi and Kuroiwa, eds.(1969),286.

19 Nihon Tekkōshi Hensankai ed.(1984). *Nihon Tekkōshi:Shōwa Daiikki-hen,*189-90.

20 Designated wholesalers of Nippon Steel Co. put designated merchants under themselves and fortified likewise self-protection scheme. Yet, as designated wholesalers increased thereafter, control power of distribution channel shifted gradually from the designated merchants to the designated wholsalers (Nihon Tekkōshi Hensankai ed.(1984). *Nihon Tekkōshi:Shōwa Daiikki-hen*,191).

21 Nihon Tekkōshi Hensankai ed.(1984). *Nihon Tekkōshi:Shōwa Daiikki-hen*,244.

22 Nagura(1984),300-6.

23 *Nihon Tekkōshi:Taishō Koki-hen*(1984),51;Iida, Ohashi, and Kuroiwa eds.(1969),192; Hashimoto(1984),39.

24 Yoshida(1928),59-60.

25 *Seitetsugyō Sankō Siryō;Nihon Tekkōshi: Shōwa Daiikki-hen*(1984),57,272-3;Hashimoto(2004),214.

26 Hashimoto(2004),140.

27 In addition, the ratio of big ships such as ocean-liners and tankers increased(*Osaka Manichi Shimbun*, February 5 1937;*Jiji Shimpō*,February 24 1936: *Tokyo Asahi Shimbun*, November 8 1936).

28 Hashimoto(2004),201-02;*Tokyo Asahi Shimbun*, May 18 1933;*Yomiuri Shimbun*, November 17 1932.

29 Kimura(1991),18;Uraga Senkyo(1957), 269; *Chūgai Shōgyō Shimpō*, May 31 1937.

[30] Senpaku Kaizen Kyokai(1943),218-223;Hashimoto(2004), 212; *Tokyo Asahi Shimbun*, November 8 1932; *Yomiuri Shimbun*, December 25 1932;*Nikkan Kōgyō Shimbun*,January 22 1933.

[31] Kimura(1991),18;*Yomiuri Shimbun*,December 25 1932.

[32] *Yomiuri Shimbun*, March 4 1937 and March 20 1937;*Tokyo Asahi Shimbun,* April 27 1937.

[33] *Hōchi Shimbun*, March 4 1937.

[34] *Yomiuri Shimbun*, March 4 1937; *Tokyo Asahi Shimbun*, March 4 1937.

[35] *Nikkan Kōgyō Shimbun*, Feburary 5 and February 9 1933.

[36] *Chūgai Shōgyō Shimbun*, February 12 1937.

[37] Hashimoto(2004),212-3.

[38] After the outbreak of the Second Jino-Japanese War, the demand of steel for marine vessels increased rapidly. For instance, Nippon Steel manufactured the thick steel sheets for military and official demand 71.3 per cent in 1939 and 74 per cent in 1940 of total production of thick settle sheets respectively(Nagashima(1983a),25;Nagashima(1983b),29,31). Indeed, most thick steel products of Yawata were consumed for marine vessels until the 1920s but it began to commit to the steel production for merchant ships in the early 1930s(*Nittetsu Shasi Eigyō -hen:Hanbai Kankei Kaiko Zadankai*(1955),24).

[39] Nagashima(1983a),27,29,44;Nagashima(1981),540.

[40] *Hirao Hachisaburō Nikki* [The Diary of Hirao Hachisarubo], October 6, November 21 and November 27 1933.

[41] *Jiji Shimpō*, September 28 1933.

[42] *Yomiuri Shimbun*, December 11 1936; Nihon Zōsen Gakkai(1977),71.

[43] *Yomiuri Shimbun*, December 11 1936;*Osaka Asahi Shimbun*, January 27 1937.

[44] *Hirao Hachisaburō Nikki*, June 6 1934. According to this diary record, there were interest conflicts between Kawaski and integrated steelmakers.

[45] Nihon Zōsen Gakkai ed. (1977), 312-3.