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FORWARDS AND FUTURES IN TOKUGAWA-PERIOD JAPAN

A New Perspective on the Dōjima Rice Market

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The first thoroughly organized futures exchange that fulfilled all the technical criteria specified by modern research in finance can be traced back to 18th century Japan. The Dōjima rice market in Ōsaka developed as a trading center for rice in the 17th century, and the futures market materialized according to the traders' needs; differences to modern futures exchanges can be observed in early mark-to-market procedures and margin requirements. If the role of rice in the pre-modern Japanese economy is acknowledged to be monetary, rice bill futures can also be regarded as financial futures.

1. Introduction

According to the most widely accepted view, the first thoroughly organized futures exchanges were those established at the end of the 19th century in Frankfurt (1867) and London (1877). To be sure, the Chicago Board of Trade was founded in 1848, but because of the Great Fire there are no records that show the exact nature of futures transactions in Chicago prior to 1871. In 1872, the New York Cotton Exchange was incorporated; it did not, however, provide for clearing facilities before 1892 [Seki (1985, p. 10), Kaufmann (1984, p. 11), Kolb (1985, p. 3)].

In Japan, an organized exchange with a standardized futures clearing system was officially permitted in Dōjima, a section of the city of Ōsaka, as early as in 1730. Various authors have suggested that this was a fully-fledged futures market [e.g., Sansom (1964, p. 126)]; some have even claimed that it was a financial futures market [Shimamoto (1969), Sakudō (1961, p. 345)]. However, it is not clear to what extent the Ōsaka market can be characterized as a futures market in the technical sense used in the modern literature of finance.

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This paper will examine the exact operations of the Dōjima rice market during the Tokugawa-period (1603–1867) and evaluate how closely the Ōsaka market corresponded to what we now understand a futures market to be. It will show that, while Dōjima indeed can be evaluated as a futures market, it had a few characteristics that slightly differentiated it from its modern theoretical counterpart. Likewise, it requires some qualifications to characterize the Dōjima market as a financial futures market.

There are two fundamental questions to be raised. First, what would be the economic implications of the difference in practice, if any, between the Dōjima market and its modern counterpart? Dōjima developed without any guidance from financial authorities. Thus, this was a market that materialized solely in response to the needs of market participants, who made up their own rules in a way that best suited their needs. This contrasts sharply with today's markets. Differences between contemporary trading practices and those in the 18th century might either imply that the Dōjima market was imperfect or that contemporary rules do not meet the economic needs of market participants.

Secondly, what was the reason for futures trading practices to develop at all? As Telser and Higinbotham (1977) pointed out, it may be that the major motive for the introduction of an organized futures exchange is that of minimizing transaction costs. This issue will be dealt with briefly.

For an evaluation of Edo-period trading practices, the following criteria, necessary components of a futures market today, are used as a standard:

(1) only exchange members can participate in the market;
(2) contracts traded are standardized;
(3) for each position, a 'good-faith' money (margin) has to be deposited at the clearinghouse;
(4) trading is not bilateral, but the clearinghouse enters each transaction as a third party and guarantees the fulfillment of all contracts;
(5) the contract runs for a certain trading period and open positions are reassessed daily in accordance with price fluctuations (mark-to-market); and
(6) positions dissolved before the end of the trading period are cleared by cash settlement.

The paper will show that the Dōjima market practices generally satisfied these criteria except that it had different margin rules, different mark-to market mechanism, and several clearinghouses. The margin rules and the mark-to-market mechanism, modified when a new system was introduced in the 1860s, are probably of little substantive importance.

The analysis relies on primary materials [as reprinted in Shimamoto (1969, 1970)] as well as on early Japanese research [Suzuki (1940), Shimamoto (1953), Tanaka (1910)] that is based on such primary sources as merchants'

notebooks. The paper builds on the pioneering work of Miyamato (1972, 1977a, b, 1982, 1986), by analyzing in greater detail the crucial role of rice bills as forwards or futures contracts as well as the clearing procedure in the whole trading system. The lack of reliable data, however, did not allow for a more quantitative examination of these issues.

The paper is organized as follows. Section 2 describes the evolution of Ōsaka as the so-called 'kitchen of the country' [Dohi (1981, p. 69)]. Section 3 presents the organization of the Dōjima market. Sections 4 and 5 describe the trading systems in forwards and futures respectively. Section 6 deals with the question of market efficiency and categorizes trading practices in Dōjima according to whether they were commodities or financial, traded as forwards or futures; it will argue that, if rice is considered to have had the function of money in the broadest sense during the Tokugawa period, futures traded on the rice market can be characterized as financial futures. Section 7 will give some final concluding remarks.

2. The emergence of Ōsaka as a trading center

In the 250 years of the Tokugawa period, Japan's population is estimated to have been remarkably stable at roughly 30 million people. Of this total, 87% were farmers, 5% were 'warriors' (*bushi*), who actually were the public servants of feudal domains (*han*), and 8% were merchants and artisans living in the cities [Sekiyama (1957, p. 247)]. The population of the city of Ōsaka was an estimated 200 000 in 1609; it doubled to 400 000 by the 1750s [Dohi (1983, p. 18)].[1]

The city became the 'kitchen of Japan' during the reign of Toyotomi Hideyoshi, the second of the three great unifiers of the country, who placed his castle in Ōsaka. In his attempt to unify the then divided country, Hideyoshi faced strong opposition from the nearby city of Sakai which had been a free town and the dominant trading city since the 14th century. Hideyoshi made an effort to make his castle town, Ōsaka, into the principal commercial base of the country in order to lure merchants away from independently-minded Sakai. He improved the infrastructure of the city by building a closely-knit channel system and requested the merchants to gather on a single spot right in the center, called Senba. An active market soon evolved in Senba and attracted Sakai merchants, thus eventually contributing to the fall of the former trading center.

Ōsaka became the most important rice market not only because of its already existing merchant community and distribution systems, but also because of its physical characteristics. Although Ōsaka was located on the

[1]Throughout the paper, dates are given in accordance with the primary sources, some of which are based on the old Japanese calendar. However, this differed only slightly from the Western calendar.

arterial roads connecting the east and the west of the country, it was even more important as a port. As losses were high when transporting rice on horseback through the mountainous and untraversed country, territorial (feudal) lords (*daimyō*) built their own ships, which they could easily unload in Ōsaka because of its many rivers and channels; warehouses were built along the waterfront.

Hideyoshi also began to unify Japan's currency system. In the 17th century Japan used gold coins, quantities of silver, and copper or iron coins [on the monetary system of Tokugawa-period Japan, see Crawcour (1961), Crawcour and Yamamura (1970), and BOJ (1974)]. Silver money was not coined, but had to be weighed for each transaction. As weighing was a great bother, silver went out of circulation in the 18th century. It remained as an accounting unit, however, because the silver system used decimal division.

Of equal importance with money was rice. Because rice was the most important product of an agrarian economy and largely homogeneous, it was the basic unit for taxation by the bakufu[2] and the feudal domains, i.e., the basis of national income. The size of a parcel land was measured in *koku* of rice producable on it, taxes were levied in rice, and emoluments to the *bushi* were disbursed in rice. However, it was only in the very beginning of the Tokugawa-period that rice was used as a means of payment.

Farmers had to pay a certain percentage of their annual harvest as tax to their feudal lords. What was left after the farmers' own consumption they sold to rice merchants on local markets. The local rice merchants in turn brought the rice to Ōsaka where all the large merchants were located. Similarly, the feudal lords used the rice they levied as tax to pay their retainers and for their own consumption, and sent the surplus to Ōsaka. The rice sent to Ōsaka was stored in warehouses (*kurayashiki*) until the sellers' trading agents in the city could bring it to the market.

In addition to the Ōsaka merchants, Ōsaka already had money changers (*ryōgae-ya*). Because the feudal lords needed to smooth out expenditures throughout the whole year out of annual shipments of rice, they developed a special relation with the money changers, who became the financial agents of the feudal lords and supplied credit against future rice transport.[3]

All important feudal lords had their own warehouse in Ōsaka in the 1670s. They sold rice by issuing a certificate of title to a certain amount of rice in the warehouse in exchange for money. The certificates were called rice bills and initially were traded in an occasional fashion in front of the house

[2]The bakufu or shogunate was the military government in Edo (present-day Tōkyō) as distinct from the court in Kyōto which had no political power.

[3]The city of Edo, which had become the seat of the bakufu in 1603, only started to develop when Ōsaka was already a fully-fledged trading center. In the 18th century, Edo began to catch up with Ōsaka in its size and role as an important rice market, because rice harvests of bakufu-owned domains and from some of the nothern domains were sent there. However, advanced trading practices as known in Ōsaka were never officially permitted in Edo.

of Yodoya, the outstanding trading house at the time. Because Yodoya was situated on the main road to Kitahama in the northern part of the city and the crowd of merchants who would gather there daily disturbed the traffic, in 1688 the authorities asked the merchants to gather in Dōjima, a small island at the delta of the three main rivers in the northern part of the city. In 1697, Yodoya himself moved to Dōjima, establishing the island as the central trading place, In 1730, the authorities officially acknowledged the market place as an exchange. It was at the same site that a modern commodities exchange was established in 1871[4].

3. Organization of the market

3.1 Warehouses

Ōsaka had 91 warehouses in 1673, and 124 in 1730 [Suzuki (1940, p. 6)]. The functions of a warehouse belonging to a particular domain were:

(1) to sell goods on hand (most importantly rice);
(2) to buy goods not available in the domain; and
(3) to arrange credit to the domain.

Management was in the hands of the warehouse superintendent (*kuramoto*). Initially, the warehouse superintendent was a *bushi* sent from the domain. As early as the 1660s, however, Ōsaka merchants took over the tasks of the superintendent (*chōnin-kuramoto*, merchant superintendents). The superintendent was responsible for organizing auctions in order to sell the rice and for selecting those merchants permitted to take part in his auction.

In addition, the warehouses had a special financial agent (*kakeya*, lit. 'money raiser') whose business very closely resembled that of a modern bank. The financial agent kept the books on all transactions, by recording such items as assets obtained from selling rice, credits granted to the feudal lord, and money transfers to the government in Edo on behalf of the domain. These were standing orders, i.e., they were automatic credit extensions to the domain. Furthermore, raising fees and delivering certificates became the task of the financial agents who expeditiously took over all of the auction proceedings [Suzuki (1940, p. 7–8), Miyamoto (1982, p. 53)].

3.2 Rice bills

While in most of Japan, including Edo, rice dealings were exclusively done

[4]Ōsaka also functioned as a trading place for numerous other goods at the time. An investigation of trading practices on such other markets is left for future research.

on a spot basis in the cash commodity, the dealing in Ōsaka was made through rice bills. In the 17th century, these bills were paid for immediately after the auction and changed into rice within a few days.

Rice bills (*kome-tegata* or *kome-gitte*) were introduced as a means to minimize the transaction costs of trading large volumes of rice that arrived in Ōsaka during a short period of time. Without the securitization of rice trading, it would have been more difficult to smoothe out rice consumption over the year and over Japan, and large temporal price fluctuations could have resulted. When brokers began to deal in bills until their maturity, maturities were soon extended up to 18 months – in spite of repeated bakufu reprimands (see section 3.3). The warehouses did not mind in the least, but began to issue unbacked bills and did not charge storage fees [Suzuki (1940, p. 86)]. Eventually, rice bills took the form of futures contracts as futures trading in rice emerged in the latter half of the 17th century.

In the beginning, the rice bill was a warehouse receipt. The issuer of a warehouse receipt in general cedes right of ownership to the purchaser and remains in charge of storage only. The receipt also defines the commodity in detail; along with the ownership, the bearer of the receipt takes the risk of damages and losses of the goods in storage. In Dōjima, however, the question of who bore the responsibility for safe storage was not generally settled until the beginning of the 18th century, when a fire burnt down the warehouses of the domains Kaga and Murakami (Echigo), two of the leading domains. While Murakami tried to maintain its reputation by declaring all bills written on its warehouses eligible, the Kaga domain insisted that no guarantee was given in case of losses due to fire or flood. Holders of Kaga bills protested sharply, putting the domain's political prestige at stake. In the event, the Kaga domain replaced the non-guarantee clause on its bills by a full guarantee [Miyamoto (1982, p. 54)].

As time went by, the rice bill came to acquire a new dimension that was independent of the underlying commodity. Whereas rice bills originally transferred the entitlement to a certain amount of rice at a certain warehouse from the issuer to the purchaser, they changed into more of a promissory note. The rice bills, however, differed from what we normally associate with contemporary promissory notes in that the bill carried a promise of delivery of physical commodities rather than a repayment of debt. In order to facilitate trading, these bills were standardized in terms of 10 *koku*[5] of rice counted in number of rice bales at around 1700. Moreover, some of the warehouses began to issue interest-bearing bills, i.e., the initial payment for the bill was one third of the face value plus interest on the remaining two thirds [Suzuki (1940, p. 10)].

With the issuance of unbacked rice bills and the further development of the market, bills with different rights and features appeared. One way to

[5] 1 *koku* = 10 *to* = 180 litres.

categorize bills is a division into two types according to inscription. Bills that were issued after the arrival and immediate sale of rice, i.e., the backed and wholly paid-for bills, were called 'delivering bill' (*dashi-kitte*). They gave the running number of the bill, name of the buyer, number of bales, name of the auctioneer (financial agent), date of the auction and name of the warehouse. Bills that were issued without rice being on stock, i.e., unsecured bills, were called 'monk bills' (*bōzu-kitte*). The monk bill derived its name from the Buddhist practice of tonsure that resembled the practice of not inscribing the name of the purchaser, nor the date on the unsecured bills. Thus, monk bills are analogous to bearer bonds.

In general, securities can be divided into debt securities (such as bonds and mortgages) and ownership securities (such as stock certificates and titles to marketable assets). Depending on the manner in which they were issued, the rice bills traded in Tokugawa-period Dōjima took the shape of either a debt security or an ownership security.

'Delivering bills' and 'monk bills', together referred to as auction bills (*rakusatsu-kitte*), were sold by way of auction and were in effect ownership securities. Auction bills were delivered upon paying a 'good-faith' deposit, the amount of which varied according to the respective warehouse's rules and to the kind of bill issued. Such a bill represented evidence of a property right in a certain amount of rice which was stored in the warehouse.

On the other hand, 'prepayment bills' (*sennō-kitte*), issued without auction on payment, were closer to debt securities. These bills were also called 'empty (rice) bills' (*kūmai-kitte*), overdraft bills (*kamai-kitte*), or financial bills (*chōtatsu-kitte*, lit. '(money) raising bills'), each implying that they were issued without connection to the issuing warehouse's inventory. Neither the issuer (the warehouse) nor the purchaser regarded them as titles to physical rice. Instead, these bills were more like a note evidencing a credit extended by a merchant to a warehouse. In case the warehouse was not able to pay the credit back after one year the bill was converted into an auction bill, with the interest being payed either independently or added to the total sum [Miyamoto (1982, p. 54), Suzuki (1940, p. 200), Shimamoto (1953, p. 15)].

According to the Hachiboku-chō, a notebook on rice prices, bills in circulation represented more than 110,000 bales of rice in 1749, whereas the inventory at that time only amounted to approximately 30,000 bales [Hachiboku-chō, April 17th 1749, in: Shimamoto (1970)]. That is to say, the oustanding balance of rice bills represented almost four times the actual quantity of rice available for physical delivery.

These differences in the type of rice bills mean differences in the way the bills were traded. If the buyer had to furnish the whole amount of money on the day he bought a bill that was unbacked, he actually bought a bond. On the other hand, if the rice merchant bought a backed rice bill, he entered a forward contract. If this rice bill was standardized and being traded on the futures market, he effectively entered into a futures contract.

3.3 Government rice policy

As rice played the paramount role in the economy of the Tokugawa period, it is understandable that the bakufu in Edo pursued an active rice policy by issuing official decrees (*o-fure*) from time to time. The earliest of the recorded decrees were issued in the 1650s, discouraging the extensive issue of unbacked rice bills. Because the bakufu – rightly or wrongly – considered the expansion of unbacked rice bills to be the main cause of inflation, it prohibited unbacked rice bills in 1652[6]. In 1660, the bakufu altogether prohibited trading in rice bills and limited the maximum term of a bill to 30 days. In 1663, it further shortened the term to 10 days. The decrees, however, did not have the desired effect: the merchants now paid the total amount of the bill within 10 days, while the rice continued to remain in the warehouses and bills were traded as actively as before [Sakudō (1961, p. 348), Miyamoto (1972, p. 207)]. The bakufu seems to have abandoned the 10-day restriction a few years later.

Since decrees were of no effect, the bakufu looked for other ways to influence the rice market. The new scapegoat for rising prices was soon to be found in futures trading, the market in 'book transactions' (*chōaimai-akinai*), i.e., the trading in front of Yodoya's house that was said to be nothing but gambling[7]. In 1705, Yodoya's house was closed, his credits to feudal lords were declared void, and his impressive wealth was confiscated. The official reason for these actions was Yodoya's violation of sumptuary restrictions. However, the actual reason was the hope that dissolving the 'fictitious' gambling would stop the increase in rice prices [Sugie (1984, p. 17)]. In spite of these restrictive bakufu measures, book trading kept flourishing under cover in front of Yodoya's closed house.

The Kyōho era (1716–1735) under Tokugawa Yoshimune, who was also called the 'rice shōgun', saw a 180 degree reversal in government rice policy. The so-called Kyōho-reforms consisted, among others, of attempts to increase tax revenue by undertaking or encouraging additional rice land cultivation, a revision of the tax system and sumptuary regulations. Furthermore, the bakufu revalued the currency so that one *koku* of rice which sold for 200 *monme*[8] in 1714 sold for about 30 *monme* in 1718 [Sugie (1984, p. 24)]. Rice prices fell not only in nominal terms, but also in real terms because of a series of good harvest years. What the bakufu aimed at now was to reduce the general price level and to raise rice prices at the same time. Because the bakufu regarded the trading practices of the Dōjima rice

[6]One of the most important decrees at that time was issued in 1654, when the word bill (*tegata*) was mentioned by the officials for the first time. According to the decree, these bills were issued on payment of only a part of the total sum and 'passed through more than ten hands a day' [Ōsaka-shi Shiyakusho (1972, vol. 3, p. 47)].

[7]Coincidentally, midwestern American farmers tried for years to close down the Chicago Board of Trade on the argument that futures trading violated antigambling statutes.

[8]1 *monme* of silver was 17,36 grains.

merchants to be 'fictitious' and 'price-hiking', it officially authorized prolonged transactions in 1728; in 1730, the Dōjima rice market became the only officially acknowledged and organized futures exchange in Japan.

In recognizing the futures market, the decree of 1730 specifically stated [Shimamoto (1953, p. 9–10), emphasis added]:

(1) the aim of officially allowing the market was to increase rice prices;
(2) 'book transactions' must be conducted only *according to conventional practices* [to be explained later];
(3) clearing business was restricted to the 50 clearinghouses that *had been active in this business before* [1730];
(4) exchange members had to follow market rules; and
(5) only Dōjima, and no other market, could deal in book transactions.

As these suggest, book transactions had already been in existence as an established system with well-defined trading patterns by this time. Also, the authorization of an organized 'rice futures' market was meant to be temporary, because the bakufu initially intended to prohibit trading on the book as soon as rice prices rose again. However, once the market was formally established, the bakufu could not close it.

In the 1770s, the bakufu gave up its futile attempts to regulate the size of the rice bill market and decided to use qualitative measures. In 1773, it introduced 'suing-days' that made it possible for the merchants to bring suits in connection with fraud or default in rice bill trading to the governor of Ōsaka (*Ōsaka machi-bugyō*). If the suit was justified, the government paid out the claims. The bills were also safe even if the government confiscated the possession of a merchant or financial agent[9], because the merchant's rice bill holdings were transferred to his wife or children [Shimamoto (1953, p. 19, 22)]. The bakufu probably gave this guaranty in order not to topple the entire credit system. Because of these guaranties, rice bills were in effect equivalent to local bonds or bakufu-backed bonds, except that the rice bills were denominated in rice, whether or not physically defined. This distinguishing feature of rice bills has some crucial implications for the final evaluation of the trading practices.

3.4. Rice merchants

There were two types of rice merchants: so-called rice traders or rice wholesalers (*kome-donya*), and rice brokers (*kome-nakagai*). Whereas brokers (or retailers) in Edo typically bought their goods from the wholesalers and sold them on the market, brokers in Ōsaka followed totally different

[9]This happened quite often for several reasons, one being that a feudal lord or the bakufu itself was heavily indebted to a merchant.

practices. When Dōjima was officially acknowledged as a rice exchange in 1730, rice merchants were registered. In order to keep the number of rice merchants within controllable limits, the bakufu sold licenses (*kabu*): 500 in 1731, another 500 in April 1732, and 300 in November 1732. The first 500 licensed merchants obtained the most privileged position of rice traders (*tonya*), the remaining 800 became brokers [Shimamoto (1953, p. 57), Honjo (1954, p. 591)].

Tonya had the legal right to deal on the spot market as well as on the futures market. Some of the *tonya* were also active in warehouse rice delivery or rice transportation, even though most of them specialized in one field or another. Although we do not know how traders were divided into dealers and brokers on the exchange, it is clear that those traders permitted by the warehouses to participate in their auctions were elected among those 500 *tonya*. In this function, they were called *kura-namae*, lit. 'warehouse names'.

The so-called brokers, who bought the exchange license in 1732, were confined to only one of the activities in the market. On the exchange in Dōjima, they dealt in the rice bills previously bought at auction by the *tonya*.

Both types of merchants were required to pay an annual fee for the license, called *myōgakin* (lit. 'thanks-money'). This fee was in effect a trading license tax. The bakufu in return granted controlled market access in rice trading and especially in futures transactions. Issuing these licenses also enabled the bakufu to exercise close surveillance over the Ōsaka rice market.

More important than bakufu legislation, however, was the rice merchants' self-regulation. In the 1730s, the rice merchants formed groups or guilds (*kumiai*, *nakama*) based on the ward they lived in. The merchants of the same area and business who would not join the group were required to close their shops. The guilds were divided into those made up of licensed rice merchants (*kabu-nakama* 'licensed guild') and those not officially acknowledged (*nakama*) [Matsuyoshi (1932, p. 157)].

3.5. The exchange

The development and formalization of trading practices was not a government-led process but emanated from the market's own dynamics. The exchange was an autonomous, voluntary, non-profit association of its members, and its main function was supervising everyday trading, so it regulated brokers and auctions, settled disputes, registered official daily closing prices, and collected fees for its operations. Originally, exchange members were supposed to bear these expenses collectively, but payment was soon taken over by particular warehouses [see section 5.2, Tanaka (1910, p. 29)].

The staff of the exchange consisted of five so called 'annual directors' (*nengyōji*), five 'monthly directors' (*tsukigyōji*), 14 'watermen' (*mizukata*,

whose function will be explained in section 5.3) and other officials with such special responsibilities as superivising rice transportation and daily trading practices. The board of directors was elected annually by the exchange members. During their honorary term of office, directors were not allowed to trade by themselves and had to leave business to their secretaries. Before the exchange building was completed in 1783, the house of the head of the board served as the office building. However, even though the annual directors enjoyed several benefits (e.g., tax exemption), the cost of being a director probably outweighed the benefits; it was a rather unpopular job. Directors often reported sick, or else engaged themselves in active trading precisely because this would result in suspension from the board. In 1774, the system was revised by making re-election possible and by abandoning the voting system; the directors in office began nominating their successors [Suzuki (1940), p. 57, Shimamoto (1953, p. 52)].

The exchange members of every ward (i.e., the members of the licensed guild) elected a head each month. Out of approximately 35 such heads, the five representing the largest groups made up the board of 'monthly directors'. These directors were intermediaries between the rice merchants and the board of 'annual directors'.

The clearing center (*keshiai-ba*, lit. 'settlement place') was near the market place. There were several clearinghouses which registered the open futures positions of their customers and settled them on liquidation days (see section 5.4). The cost of maintaining the central clearing place was paid for by the clearinghouses. Thus, the clearing center was an association of individual clearinghouses, and clerks at the clearing center were actually employees of the clearinghouses.

3.6. Clearinghouses

The original function of clearinghouses (*komegata-ryōgae* or *yarikuri-ryōgae*, lit. 'rice-merchants' money changer' or 'matchmaking agents') was to change rice into money and keep the deposits of rice merchants. The more actively rice bills were traded, the more difficult it was for a merchant to keep an eye on all his open interests in the futures market and settle all his transactions with a huge number of different trading partners. Therefore, he entrusted his daily market operations to his special money changer.

In 1731, 50 special licenses (*kabu*) were issued for these specialized money changers and another 10 in 1746. These houses were not permitted to trade in their own interest, but they could only fulfil orders. Their clientele was restricted to the licensed exchange members for whom they settled open trading positions. Moreover, on receiving margin payment, they took responsibility for the fulfillment of the contract [Suzuki (1940, p. 79)]. Thus, the merchants paid a margin and fees on their open positions and could in turn settle their positions at the clearinghouse without regard to the

creditworthiness of the ultimate counterparty. In this interpretation, the clearinghouse provided intermediation services for futures market participants. This intermediation service is one of the key features of a modern futures exchange.

We can only guess what the exact margin requirements were. They seem to have fluctuated around 30% of the value traded, depending on the credit standing of the client as well as on prevailing market conditions[10]. Commissions were regulated by the exchange. The clearinghouses were not allowed to charge for clearing of daily trading positions. Probably because daily clearing constituted a highly labor-intensive business, the houses suffered a loss in daily clearing; of the original sixty houses that were established in the first half of the 18th century, only four survived into the 19th century. However, it is still remarkable that Ōsaka had four clearing institutions towards the end of the Tokugawa-period, while a modern exchange has only one clearinghouse.

4. The forward market

The eastern part of the Dōjima market place was designated for two kinds of transactions: *shōmai-akinai*, lit. 'dealings in real rice', and *nobemai-akinai*, lit. 'prolonged transactions'. Although the name 'dealings in real rice' is suggestive of spot transactions, the transactions so designated were in fact forwards.

4.1. 'Prolonged transactions'

Forward transactions, called prolonged trading (*nobeuri-nobegai*, lit. 'prolonged selling – prolonged buying'), developed as early as in the 1620s. Two parties contracted to exchange a certain amount of rice while extending delivery as well as payment to a specified future time. In other words, such a transaction was an agreement to complete trade at a future time and price specified when the agreement was made. The bills used for this kind of transaction were called 'prolongation bills' (*nobe-tegata*). They were drafts drawn on the buyer by the seller, but were not presented for payment before the contract matured [Honjo (1954, p. 1293)].

Prolonged transactions were 'empty' dealings, that is, the seller did not necessarily have the rice on hand at the time of the forward sale. This kind of transaction is said to have originated in an incident that happened during the years 1616–1621. A rice merchant from Nagoya frequently met a

[10]An entry in *'ina no ho'* ('On rice') evidences that margin requirements were lowered to one to two *monme* of silver per *koku* of rice in 1770 (Ōsaka-shi Shiyakusho 1927/V). This means 200 to 300 *monme* per trading contract of 100 *koku*, hence a minimal margin requirement of only 5%. This suggests that margin practices were not standardized, at least not over the entire Tokugawa-period.

colleague from Sendai on his business trips to Edo and exchanged information on harvest, weather conditions etc., in their hometowns. One day the Nagoya merchant learned of an impending bad harvest in the northern parts of Japan which would reduce rice shipments to Edo by about 50%. At the same time he knew that the Nagoya area would have a good harvest. Recognizing the potential profit opportunity, the Nagoya merchant bought the future harvest of his region by paying approximately 10% to the farmers and writing drafts for the rest of the negotiated amount. These drafts were not to be presented for payment before the rice was actually sold. When the harvest came in, he stored it and after three or four months sold it with a profit of 30–40%, as prices had climbed in the meantime [Sugie (1984, p. 5)]. The benefit for the seller (i.e., the farmer) was the advance payment of 10% and the guarantee he had about the future revenue he would receive from the known buyer. In other words, he could hedge his future income against rice price fluctuations. Soon other merchants copied the system, which became the prevailing trading practice and remained so until the 1650s.

This practice of buying in advance, i.e., taking a long position on unharvested rice without the money to pay for it, is the earliest form of forward transactions in Japan. Although it was a widespread trading method in the 17th century, prolonged transactions gradually lost much of their importance with the development of rice bills. It is improbable that prolongation bills were traded independent of the actual transaction.

4.2. The trading system

When rice bills came to be traded in the early 17th century, they were a receipt on the delivery of a certain amount of rice to be made within 30 days. The receipt was delivered upon payment of a fraction of total value as a good-faith deposit, which varied according to the rules of the various warehouses and to the kind of bills issued. An initial payment of 30% seems to have been the usual practice from the 1650s onward. In time, the scope of rice bills expanded to cover any bill written on any rice, and the bills' period of validity was extended from 30 days to more than a year.

In the first half of the 17th century, the basic pattern of rice trading appears to have been as follows:

For instance, a rice broker (*tonya*) would buy a bill on seven *koku* rice from a warehouse by paying about 30% (i.e., the margin) of the market price of the auction day. If the maturity of the bill (promise of delivery) was, for example, 25 days, the balance of the price would be due in 25 days from the day he purchased the bill at the latest. Thus, the bill represented a contract between two trading partners on the delivery of seven *koku* rice in 25 days at the price of the day on which the contract was made with an advance payment of 30%. This type of rice trading was thus a forward transaction. Such trading was already a forward transaction even during the

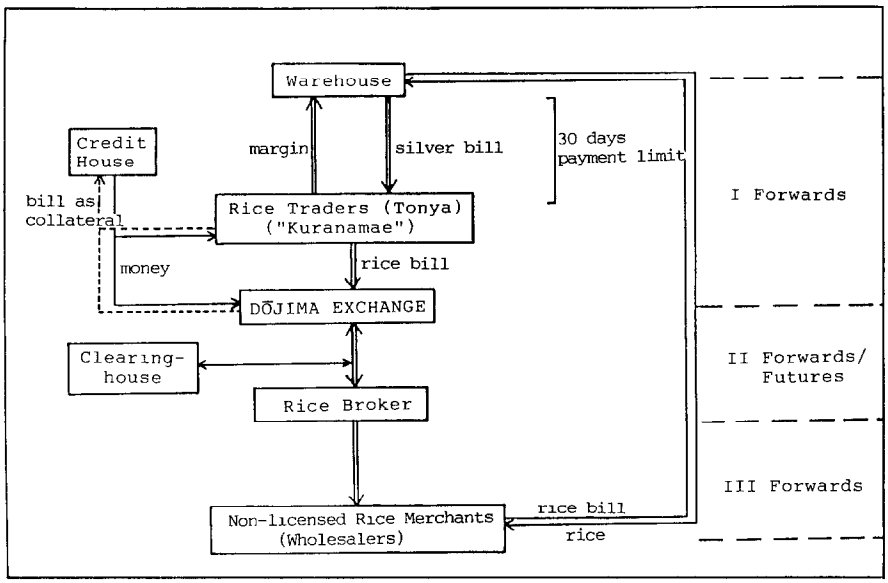

Fig. 1: Forward and futures market transactions.

first third of the 17th century, when the margin requirement was customarily 100%, i.e., when the full amount had to be paid on the day the agreement was made. The so-called 'dealings in real rice' probably derived their name from the fact that the underlying price of the contract was the current rice price of the day the contract was made, even if 'real rice' was not necessarily traded.

In the second half of the 17th century, the trading system became more intricate. With the standardization of rice bills, trading in futures became common. Fig. 1 will help to clarify the system.

As mentioned in section 3.4, there were two types of merchants: the *tonya* who were admitted to warehouse auctions, and the *nakagai* who did not have this right. The *tonya* deposited 30% of the total sum as 'good-faith' and for this received a receipt called silverbill (*gin-gitte*), which quoted the total price of the transaction in silver units. The *tonya* had to pay the 70% balance due within the next 30 days and received the rice bill (phase 1 in fig. 1), which he could then sell on the futures market in Dōjima (phase 2 in fig. 1)[11]. At some point, an exchange member might buy the rice for resale to

[11]Another kind of receipt issued at the auction against a margin payment was the 'defining receipt' (*sashi-gami*), which quoted the actual amount paid to the warehouse and was probably not traded.

a wholesale rice merchant who, in contrast to the exchange members, would buy the bill with the intention of taking possession of the underlying rice (phase 3). As the maturity of the rice bill was extended to more than one year, the bill could remain on the market for some time.

The *tonya* could, of course, trade their silverbills (margin receipts) before maturity and thus speculate on daily price fluctuations. A fully-fledged trading system emerged out of such practice, with so-called credit houses developing into financing institutions.

4.3. Credit houses and margin transactions

Credit houses (*irikae-ryōgae*, lit, 'pay and convert'-money changers) resemble today's securities financing firms (*shōken-kinyū-gaisha*) which finance margin transactions. The credit houses were wealthy money changers who extended credit against rice bills, silverbills or commodities as collateral. There were 20 houses of this kind, although only the largest six took part in volume business where credit sums exceeded 100 *koku* rice. In addition to charging interest, the credit houses earned profits by trading the bills which they had accepted as collateral. For this reason, the credit houses only accepted bearer bills (monk bills) as collateral [Shimamoto (1953, p. 35, 25–26); Honjo (1954, p. 69)].

The credit houses financed and traded with participants in the futures markets as well as the *tonya* depicted in phase 1 of fig. 1. The *tonya* would deposit his silverbills at the credit house and in turn receive a credit. The credit house would either give the bill back on repayment of the credit sum or pay the outstanding balance to the financial agent and receive the rice bill itself. Thus, the credit house would lend either the face amount of the bill minus interest or just the margin. The actual amount of lending could also have been smaller than 70% of the face value of the silverbill (the margin certificate) by the amount of interest to be paid to the credit house.

The advantage of this type of credit financing for the *tonya* was as follows. Suppose that the *tonya* was convinced that rice prices would climb within the maturity of his silverbill. He would then ask a credit house for money, giving his first long (=buying) position to the house as collateral and opening up a second long position in the forward or futures market. If prices were indeed higher in a few days, the *tonya* could make a profit by selling his second long position. He would subsequently run to his credit house, buy back his silverbill and make a second capital gain by selling this one as well. Alternatively, if he had just borrowed the margin, he could sell the bill, repay the loan for the margin, and take the profit. In contrast to the contemporary practice of margin transactions, however, there is no evidence that credit houses in the Tokugawa period furnished securities; credits were given in money only.

5. The futures market

The further development of the original spot and forward market into a rice bill futures market was accomplished by

(1) the emergence of a fully-fledged secondary market for rice bills,
(2) the increased issues of standardized bearer bills, and
(3) the centralization of a clearinghouse in the trading process (phase 2 in fig. 1).

Trading futures was called '(rice) book transactions' (*chōaimai-akinai*). It can be reasonably assumed that trading on the book (i.e. settling positions without delivering contracts or goods) emerged in order to reduce transaction costs: having an organized exchange where all transactions in standardized contracts were settled by a central clearing institution allowed participants on the market to trade without regard for the credit standing of the counterparty (Telser and Higinbotham 1977).

5.1. The mechanics of trading

Trading periods. A year was divided into three periods: January 4–April 8, April 17–October 8, and October 17–December 24[12]. The market was closed for about 10 days between two succeeding trading periods in order to make a rollover of open positions to the following period impossible. The last day of every trading period was the liquidation day (*kiri-ichi*, lit. 'closing the market'), when all positions had to be settled. During the last three days of a trading period no new positions could be taken.

Standard rice (*tatemono-mai*). The rice traded in futures contracts changed with every period. The so-called 'winter-standard' (*fuyu-tate*) and 'spring standard' (*haru-tate*) were chosen from the harvest of the feudal domains of Chikuzen, Higo, Chūgoku, and Hiroshima, depending on which of the four had the best harvest. The 'summer standard' (*natsu-tate*) was rice from Kaga (or, if the harvest was poor, Yonago). A feudal domain benefited from furnishing the standard rice, because the standard commanded a premium price and the domain enjoyed a number of privileges during the period when its rice was used as the standard. In turn, the domain was willing to bear the expenses of the exchange for the period.

Trading unit. In principle, one contract (*ichi-mai*, lit. 'one sheet (of paper)') was written on 100 *koku* rice. It is not clear whether a contract could be

[12]Various sources give different dates for the three trading periods. The other dates are January 8 – April 27, May 7 – October 8, and October 17 – December 23.

written on higher amounts in 10 *koku* units, such as 130 *koku*. 100 *koku* rice was quoted by the number of rice bales which differed in size from region to region, such as 200 bales of 5 *to*, 250 bales of 4 *to*, or 300 bales of 3 *to*. Trading was quoted by the number of contracts. For example, '3 *mai* (bills) for 23' would have been 300 *koku* rice for 23 *monme* per *koku*.

Tick. Minimum price movements were measured in the market price for one hundredth of a unit of the standard contract, hence the price for 1 *koku*.

Margin. For taking a futures position, the trader had to deposit up to one third of the total amount traded as good-faith at a clearinghouse. This margin was not an individual deposit with the broker at the clearinghouse which would have varied in line with his positions; instead, the margin was traded with the contract, i.e., it was taken over by the next purchaser. The reason for this seems to be that, in the formative years of the system, the bilateral element in each transaction was still prevalent and only later did margin practices change into what they are today. Nevertheless, the underlying function was the same: in return for the margin, the clearinghouse guaranteed the fulfillment of the contract.

Accounting. There was no central book in which all transactions were registered. Instead, each exchange member had his own 'trading notebook' (*baibai-techō*), in which he made an entry on every contract detailing the amount traded. Every evening exchange members would pass the notebooks on to their clearinghouses, which would then collectively register all transactions of the day.

5.2. Price fixing

Trading began at 8 a.m. for futures and at 10 a.m. for forwards and spots. The futures price at 10 a.m. was written on a board and was the opening price for forward transactions. At 12 a.m., the exchange closed for a lunch break.

The closing price at the end of the afternoon trading session was fixed in a sophisticated method called the *ruiyō* system (lit. 'establish and use'[13]). A wooden box containing a fuse cord was hung at the ridgepole of the exchange building. Exchange officials put fire on the cord and allowed trading to continue as long as the box was on fire. The prevailing price at the moment the fire went out became the day's official closing price, called the 'fuse cord price' (*hinawa-nedan*). However, traders were little impressed

[13]The original meaning of this word is not clear. It could as well be interpreted as 'to burn out and use'.

by the official closing of the market and had to be stopped from continuing their transactions by the 'watermen' (*mizukata*) who splashed water all over the market place in order to disperse the trading crowd. Because splashing was also of limited effectiveness, in their second attempt the watermen would dash whole buckets of water over the crowd, which usually stopped the day's trading. The prevailing price at this time, the 'bucket price' (*oke-nedan*), was the actual daily trading price which was registered in the books and used for mark-to-market or settlement. On the other hand, the official fuse cord price became the opening price of the following day's session [Shimamoto (1953, p. 41), Suzuki (1940, p. 100–101)].

This price fixing system included a settlement obligation: if no price was found at the time the fire went out, or if the box did not burn down completely by itself for some reason, all transactions of the day were declared void and open positions that had been kept overnight had to be cleared by the fuse cord price of the preceding trading day [Sugie (1984, p. 46)].

This rule had both positive and negative effects. On the positive side, the clearing obligation made hoarding or dumping practices almost impossible. For example, if a broker engaged in hoarding purchases and other market participants became aware of this, they simply stopped trading and left him standing alone on the market place. No fuse cord price could be found, as there was no trading, and all transactions of the day were nullified. In this way, the *ruiyō*-system ruled out cornering.

On the negative side, the clearing obligation encouraged riotous behavior. A broker who had suffered great losses during the day could certainly try to disturb trading at the market closing time, e.g. by charging through the market place on a horse. Or else, he could try to extinguish the fire before the box had burnt down. Brokers who had a 'big day' certainly wanted to see the box burn down without interference and have a fuse cord price established for the day, so that they could finalize their gains. It is not difficult to imagine how two groups of brokers – not unlike two basketball teams – would end up fighting over the burning wooden box at the ridgepole of the exchange building at the end of the afternoon session.

Market disturbances of this type became more and more frequent during the second half of the Tokugawa-period, and then became the rule at the end of the period. It was often the case that the market could not establish a fuse cord price for several days in a row, leading to the final breakdown of the system. It should be stressed, however, that the system of fixing exchange prices by use of a wooden box was very effective in preventing market manipulation and hoarding for a substantial period of time. The obligation to register all positions at the end of the trading day at the clearinghouse at the bucket price was equivalent in function to today's mark-to-market mechanism, i.e., the daily reassessment of all open positions.

5.3. The clearing system

Evidence suggests that, for a substantial period of time, traders settled all positions at the end of each trading day. If this was impossible, they could hold a position at the clearinghouse only overnight. In the course of time, it became more common to retain positions over longer periods, as evidenced by the system of '10-day-clearing' (*keshiai-hi*, lit. 'liquidation day').

Every evening brokers went to their clearinghouses and transcribed their transactions of the day into the trading book of the house. Every ten days the secretaries of the clearinghouses met at the central clearing place and assessed the positions of their customers. If they found a customer's position not balanced, they asked for settlement on the following day. In particular, those who had suffered losses were asked to pay the difference (maintenance margin) and those who had gained profits received disbursements from the clearing center [Shimamoto (1953, p. 73), Tanaka (1910, p. 421), Suzuki (1940, p. 103–104)]. This system thus represented a ten-day mark-to-market mechanism.

A special system, here called 'cash-or-carry' (*shōgin-shōmai*, lit. 'real silver–real rice'), was introduced for settling all positions at the end of the trading period in 1737. This system allowed for settlement by physical delivery as well as in cash during the last three days of each trading period. As the standard rice changed with every period, the purpose of the close-of-trading day was to clear all positions, close the exchange and then start again with new rice. Although positions were supposed to be settled according to the ten-day pattern, those traders who had kept open positions or had not yet paid for their losses had to clear all obligations during the last three days of the period either in cash or in rice [Tanaka (1910, p. 52), Miyamoto (1982, p. 55). In practice, only few contracts were settled by physical delivery except at the very end of the Tokugawa-period.

It is worth mentioning that futures transactions without clearing at the central place, 'in-house' or 'retail' futures, also existed. 'In-house' futures were possible because of the existence of four clearinghouses (and even more in the first half of the 18th century). A clearinghouse could settle futures transactions of its own clientele without taking it to the market or contacting the other clearinghouses [cf. for details Tanaka (1910, p. 42), Suzuki (1940, p. 107)]. Although these 'in-house' transactions, which were not settled at the central clearing place, comprised only a small fraction of the total value of all futures transactions, they are important in that they cast a new light on the existence of multiple clearinghouses which allowed such 'in-house' transactions that are not usually associated with the current characterization of a futures market.

5.4. The 'small futures' market

What was called small futures or '*koku* futures' (*ko-akinai*, *kokudate-*

akinai, lit. 'trading per *koku*) began as early as book-rice transactions, but did not come into widespread use before the end of the Tokugawa-period. The *koku* futures market derives its name from the fact that in contrast to book transactions, the standard contract was written not on the usual 100 but on 20 (later 10) *koku*.

According to early-18th century records, the trading year was divided into six trading periods; trading in the following period's contract began 15 days before the running contract matured. Thus, the strict division of periods as known in the book-rice market was abandoned. The settlement price was the mean of the forward closing prices of the preceding three days. If the small futures prices deviated from forward prices by more than 15 *monme*, all open positions had to be settled by taking up reverse positions or by physical delivery. Thus, the system provided for a price limit which, in contrast to present-day practices, was linked to price movements on the cash market[14]. Daily transactions were registered at the clearing center and mark-to-market was done the next morning, with margins being disbursed or replenished. Unlike book transactions, the margin was not traded. As known today, the margin was a 'good-faith' deposit of one market participant with his clearinghouse [Sugie (1984, p. 55), Shimamoto (1953, p. 47)]. The reason for this change in system might be that market participants realized an opportunity for reducing transaction costs by keeping individual margins.

The system went through several modifications over the years, but was not very active between 1750 and 1850. The Tenpō-years (1830–1843) saw an economic downturn resulting from a series of bad harvests, rice riots, and an increasing indebtedness of the bakufu and domains to the merchant class. Although the spot and forward prices of rice rose along with the general price level, futures prices did not rise because the *ruiyō*-system made regular price fixing impossible, creating a wide spread between spot and futures prices (cf. fig. 2); the market in book transactions collapsed altogether. Also, clearinghouses raised commissions and margin requirements in order to minimize the risk of guaranteeing futures positions. By April 1866, the authorities had to close the market for forward and book-rice transactions [Sugie (1984, p. 56), Shimamoto (1953, p. 56, 49)].

Meanwhile, the small futures system had been revised and simplified in 1863: the trading unit was 10 *koku*: a trading period lasted for one month; settlement day was the last day of the month; and all remaining open positions were cleared at the price valid ten days before settlement [Shimamoto (1953, p. 49)]. Small futures trading under the new system was active between 1866 and April 1869, when the authorities closed the Dōjima rice market following the Meiji-Restoration. The significance of the small futures market lies not so much in the actual trading during this period as in its

[14]It is noteworthy and probably worth further study in the context of futures markets in the 1980s that, in a period of economic deterioration, price limits were introduced to the market.

impact on the new trading rules adopted for the Dōjima commodities exchange opened in 1871.

6. Evaluation of the market

It was not because of abstract insight or prior economic reasoning that the rice bill market in Dōjima was organized. Rather, the market was a natural result of the given economic necessities of the time and its evolution was shaped in a trial-and-error manner by the market participants, who traded bills in order either to speculate on price fluctuations or to shift the risk of price fluctuations onto those who were willing to bear it.

A trader who auctioned rice at the warehouse and intended to sell it in a few weeks could hedge his assets in rice bills against a possible decline in prices by simultaneously taking a futures position. A rice wholesaler who signed a contract to deliver rice at a future date without having the rice at hand could hedge against a possible increase in prices by simultaneously taking an opposite futures position.

Successful risk shifting requires that there be speculators who are willing to take the risk. There was no lack of profit-seeking rice brokers in Ōsaka, especially because the seasonality of prices made rice an ideal object for speculation. Furthermore, rice is an agricultural product whose output is much more vulnerable to natural conditions (weather, floods, plagues, etc.) than to the marketing strategies of its producers. Thus, the variability of price changes increased the need for hedging by some traders and also created ample scope for speculation by others.

In a series of papers, Miyamoto (1977a, b, 1986) demonstrated a high correlation between spot prices and futures prices from 1751 through to the 1830s on the basis of annual and quarterly average price fluctuations, and concluded that the market was efficient until around 1830, when the hedging function of the market began to deteriorate[15] (see fig. 2). Although the lack of reliable data precludes a more vigorous testing of the efficiency hypothesis, the very fact that the Dōjima futures market showed a constant high trading volume for more than 100 years must indicate that the market fulfilled its purposes.

Regarding the mechanics of trading, one can classify the different types of transactions on the Dōjima rice market into forwards and futures according to the system of fig. 3.

(1) The issue of a rice bill by the warehouse represented a promise to

[15]An analysis based on annual data seems to be deficient in one important respect: it includes the liquidation days on which spot and futures prices are equal; because the 'liquidation day' in fact covered a period of about 14 days (three days of liquidation procedures and ten to eleven days of exchange holidays), use of annual average data must bias the result toward higher correlation.

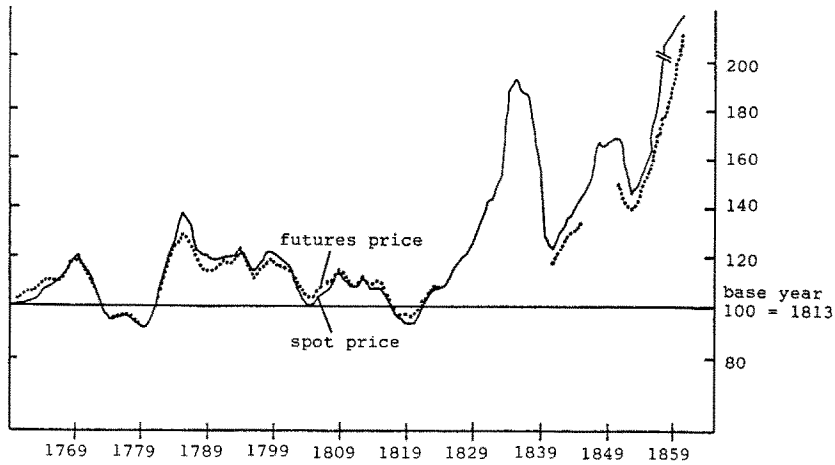

Fig. 2: Spot and futures prices between 1731 and 1859.
Source: Miyamoto (1977, p. 181).

deliver a specified amount of rice at a certain time in the future at the price of the day of settling the contract; this was a forward transaction.

(2) Trading (standardized) rice bills on the exchange, with a clearinghouse in charge of the settlement procedure and guaranteeing fulfillment of contracts, was a futures transaction.

(3) A rice bill that served as collateral at a credit house became a collateralized credit bill, but it regained its original character as a rice bill if it was then traded on the market; trading such a bill was thus a forward.

(4) The settlement of trading in credit bills, financing bills, or silverbills on the exchange was entrusted to clearinghouses; thus these were futures transactions.

Because the bills traded at the exchange were not bought (sold) in order to buy (sell) rice, there was hardly a connection to actual rice. However, the underlying commodity of all these bills, i.e., the commodity the bills were written on and priced in, was rice[16]. In this sense, the Dōjima rice market was a market for commodities forwards and futures.

Shimamoto (1953, 1969) and Sakudō (1961, p. 345) claim that the

[16]This is true for silverbills also, because they were written on a certain partial payment (margin) in relation to a certain amount of rice.

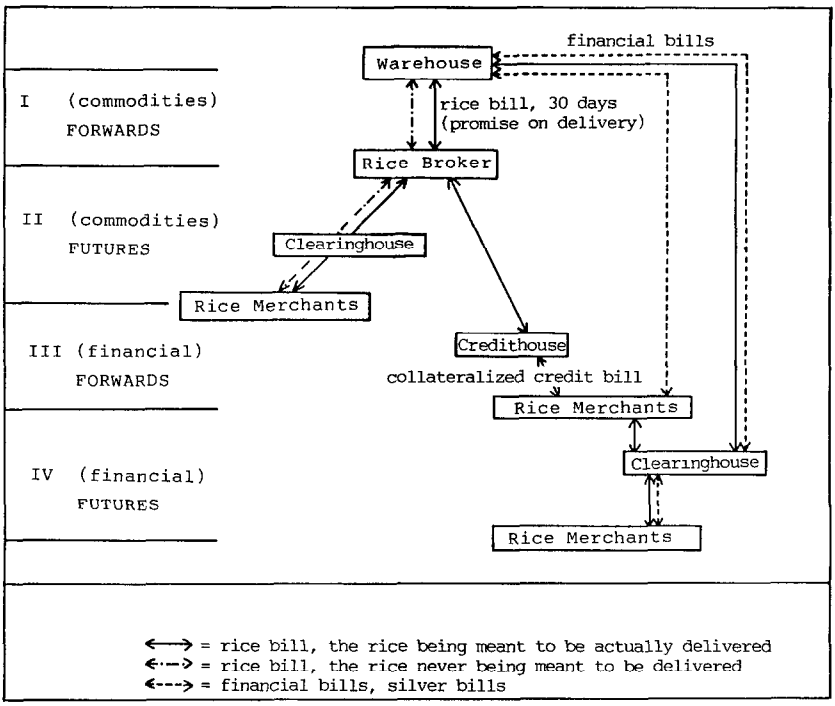

Fig. 3: The division of trading practices on the Dōjima exchange into forwards and futures.

Tokugawa-period Dōjima market was not a commodities exchange but was in fact a securities exchange. This claim is based on the assumption that no bill traded at Dōjima had any connection to its underlying commodity, and especially so the financing bills that made up the greater part of the contracts. As a logical extension of this assumption, trading practices in Dōjima would have to be divided into financial forwards and financial futures.

However, because it remains a fact that the underlying commodity of all contracts was rice, a more fundamental question concerns the extent to which the rice upon which the bills were written was in fact nothing but a commodity, or the extent to which rice can be considered to have functioned as 'money' in the Tokugawa-period. In the 17th and 18th century, rice played a unique role in the Japanese economy: size of land was measured in 'output of rice' (*kokudaka*), taxes were for the most part levied in rice, emoluments to *bushi* were paid in rice, and the wealth of merchants was mainly evaluated according to their holdings of rice bills. At the same time, there was a bona fide currency system with gold and copper (iron) coins and silver money as well as, in the second half of the period, government notes

and special notes and coins issued in each domain. This leads to two questions:

(1) Can a conventional currency system coexist with 'money in kind' (such as rice)?
(2) Can such 'money in kind' function both, as 'money' and as a non-monetary commodity?

In modern monetary theory, money must serve as

(1) a general (nationwide) medium of exchange,
(2) a store of value, and
(3) a unit of account.

According to these criteria, rice was never money in the strictest sense of the word. Although rice was used as a medium of exchange in local transactions at the very beginning of the Tokugawa-period, it was not used as a nationwide means of payment. Rice is also badly suited for storing valuables, except in its form as a rice bill. Rice, however, was used as the basic unit of account, particularly for fiscal purposes. If we want to fully capture the role of rice in Tokugawa-period Japan, a new concept of money may be needed, which allows for an object that is neither rare nor durable, neither quantitatively limited nor controllable, but nevertheless is the basic measuring unit of the economy and of economic policy.[17]

If rice in the Tokugawa-period is acknowledged to be monetary, rice bills can be categorized into commodity bills and securities, according to the way they were used. Fig. 3 then has to be divided into trading in commodities forwards and futures and trading in financial forwards and futures. In particular, financial forwards and futures would include transactions based on financial, credit, and silverbills as well as all unbacked bills (phases 3 and 4 in fig. 3). Under this interpretation, the Dōjima market was both, a commodities exchange and a securities exchange that offered forwards and futures in both parts of the market.

7. Summary and conclusions

Futures trading in rice, i.e., trading a certain kind of rice 'on the book'

[17]The ambiguous role of rice both as 'money' and as a commodity can be regarded as a reflection of the nature of financial systems prior to high degrees of specialization and the developments of fiat money replacing metals. The very same ambiguity can be observed in recent discussions as to whether gold should be considered simply as a commodity or as a monetary asset, and, accordingly, as to whether futures on gold are to be classified as commodities or financial futures.

based on a cash settlement system, materialized soon after the domains began to build their rice warehouses in Ōsaka. Rice bills were perfectly suited for futures trading, because

(1) the increased size of rice shipments to these warehouses in the mid-17th century provided market liquidity, and
(2) there were sharp seasonal fluctuations in these rice shipments.

Feudal lords who were typically in constant financial need, obtained financing in Ōsaka in two ways. One was the direct credit of an Ōsaka merchant. The second, indirect, was the issue of 'unbacked' rice bills that were empty promises of rice delivery. Because of the crucial role of this credit system in the economy, the bakufu began guaranteeing all rice bills in 1773, effectively changing the deficit financing bills of domains into bakufu-backed bonds.

In the 17th century, rice bills were traded as forwards. Maximum maturity was gradually extended to 18 months from the officially prescribed three weeks. When traders standardized bills in order to facilitate transactions, it sufficed to write all commitments in a personal trading book instead of exchanging the actual bill with each transaction. As trading became less and less bilateral, the merchants entrusted accounting and settlement procedures to one of the special settlement institutions, the clearinghouses. These houses in turn constituted an interdealer-market with a central clearing place and charged for registering, clearing and guaranteeing the fulfillment of the contracts. The margin requirement was between 5 and 30% of the total trading sum. The features of the trading system officially admitted in 1730 were as follows:

(1) one year consisted of three trading periods of a little less than four months each;
(2) the number of participants was confined to 1300 licensed rice merchants, i.e. exchange members;
(3) all contracts (i.e., rice bills) traded as futures were standardized;
(4) contracts were written on a certain brand of standard rice which was designated for each period;
(5) on the last day of the period all positions had to be cleared, either in cash or by physical delivery;
(6) the central clearing place, which was an institution made up of a number of individual clearinghouses, assumed contract obligations when a default occurred.

Judged against the integral features of a present-day futures market (see the introduction), 'book-rice' trading in Dōjima was undoubtedly trading in

futures. However, the Dōjima market had three features that distinguished the market from contemporary markets. First, daily reassessment of positions entailed settlement of the entire position, at least in the 18th century. Second, the margin differed from the later 'small' futures system and current practices in that a margin was not an individual account of a client at his clearinghouse, but was traded along with his specific position. Third, the price fixing system, connected with a clearing obligation, was originally designed to discourage market manipulations. However, in the very long run the system proved to be unfeasible because it allowed market participants to influence the very existence of a closing price.

'Small futures' were traded during the last five years of the Tokugawa-period. The trading system meets all the criteria of a modern futures market and had an important influence on the Meiji-period Dōjima commodities exchange.

It is important to recognize that the spontaneous development of an organized exchange at which standardized contracts were traded seems to support the view that there is an economic need for such a standardized market as a mechanism to reduce transaction costs and provide market liquidity. Also, the development of the Dōjima rice market is a reflection of the sophistication and ingenuity of Tokugawa-period Japanese merchants.

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