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Listing Policy and Development of the Tokyo Stock Exchange in the Prewar Period

Yasushi Hamao, Takeo Hoshi, and Tetsuji Okazaki

2.1 Introduction

The postwar Japanese financial system has been known as a bank-centered system, in which banks played a central role in corporate finance and governance. The mainstream view in the literature on economic history argued that the bank-centered system has a long history in Japan with its origin dating all the way back to the late nineteenth century, when Japan embarked upon its modern economic development (Bank of Japan, Institute for Monetary and Economic Studies 1986, 1995; Ishii 1997, 1999). Recent empirical studies have established, however, that the prewar Japanese economic system in general was substantially different from the postwar system, and, in particular, the financial system was characterized by large and active securities market with shareholders (not bankers) playing the central role in corporate finance and governance (Fujino and Teranishi 2000; Miwa and Ramseyer 2002; Okazaki 1995, 1999a,b, 2000; Okazaki, Sawada, and Yokoyama 2005; Hoshi and Kashyap 2001; Teranishi 2003).

The empirical evidence to support the importance of the stock market in

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prewar Japan mostly comes from the data from the 1920s and the 1930s. Although the data constraint becomes more severe as we move back time, a closer look at the earlier period reveals that the size of the Japanese stock market was relatively small during the first forty years of its existence. Then it took off to be a very active and important source of industrial funds. It is not surprising that the stock market started small, but it continued to be (relatively) small for the next forty years and then started to grow rather suddenly.

This chapter asks why the Japanese stock market developed in the way it did in the prewar period. To do this, we examine the development of the Tokyo Stock Exchange (*Tokyo Kabushiki Torihikijo,* TSE hereafter), which was established as the first stock exchange in Japan in 1878 and grew to be the largest stock exchange in prewar Japan.[1] Although the TSE was the first formal stock exchange in Japan and continued its dominance (except for a brief period in the late 1890s when many new stock exchanges were established), its absolute size was relatively small in the first forty years. Moreover, for these forty years, most of the companies listed on the TSE operated locally in Tokyo and nearby areas. We ask why the TSE stayed small and local for a substantial time after its establishment in 1878 and why it rather suddenly started to grow in the late 1910s to eventually become a sizable stock exchange with the nationwide scope in the following decade.

There has been little research on the prewar Japanese stock exchanges, especially for the period before the 1920s.[2] The main impediment has been the difficulty of obtaining data. Thus, one contribution of this chapter is the compilation of relevant data that used to be scattered around in various places. For example, we have constructed a comprehensive list of the companies listed on the TSE for each year from 1878 to 1936 from internal documents at the TSE and various other supplementary materials. The database has been augmented by adding company attributes such as industry classification, size, and the year of establishment.

We have also built another panel database, which contains basic financial information for all the cotton spinning companies that include both listed and nonlisted companies. The database contains 142 companies for the period of 1905 to 1936. This database allows us to examine the listing decision of each firm on the TSE.

The chapter is organized as follows. The next section presents an overview of financial system and stock market in prewar Japan and confirms the importance of the stock market in the prewar financial system. Section 2.3

1. When the exchange was reorganized and reopened under the occupation of the Allied Forces in 1949, the Japanese name was changed to *Tokyo Shōken Torihikijo* (literally meaning Tokyo Securities Exchange). The English name, however, continued to be Tokyo Stock Exchange.

2. The important exceptions that we are aware of are Shimura (1970), Noda (1980), and Kataoka (1987).

examines the development of the TSE in the prewar period. We find that the market was initially small and the listed companies were predominantly those in the Tokyo area. The TSE, however, started to grow suddenly in the late 1910s. Section 2.4 argues that the sudden spurt of growth cannot be explained by macroeconomic conditions such as the World War I boom. Section 2.5 studies the changes in the listing requirements in the TSE over time to see how the growth of the TSE was influenced by changes in its listing criteria and listing policy. Section 2.6 proposes a theoretical argument that can explain the development path of the TSE in the prewar period. The explanation focuses on an externality in a company's decision to list on a stock exchange: one company's decision to list on a stock exchange may increase the attractiveness of the stock exchange to other companies by increasing the size of the market. Section 2.7 uses the database for cotton spinning firms and analyzes their listing decisions and obtains the result that is consistent with the argument in section 2.6. Section 2.8 concludes.

2.2 Japanese Stock Market in the Prewar Financial System: An Overview

The size of the stock market in prewar Japan was substantial. Figure 2.1 shows the total market value of the stocks listed on all the stock exchanges in Japan divided by gross national product (GNP; gross domestic product [GDP] after 1955). In the prewar period, this ratio was around 1.0, which

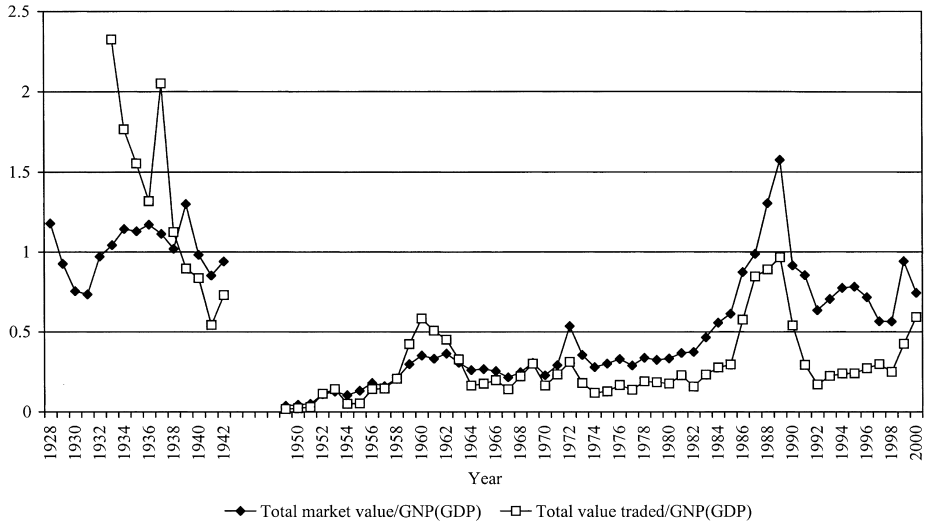

Fig. 2.1 Stock market development in Japan: 1928–2000

Sources: TSE, Tokyo Stock Exchange Annual Statistics, various issues; TSE, TSE Factbook (2004), Okawa (1974), Cabinet Office Socio-Economic Research Institute (2001).

is substantially higher than that in the postwar period, except during the stock market boom in the late 1980s. In particular, the ratio was consistently lower than 0.3 in the postwar high-growth period (1951 to 1973). The prewar stock market was large also in terms of the transaction volume. Just before the start of Sino-Japanese War in 1937, the total volume of the shares traded on all the exchanges was 2 to 2.5 times greater than GNP. On the other hand, the ratio was only 0.1 to 0.6 in the high-growth period, and it was lower than 1.0 even in the stock market boom of the late 1980s.

Table 2.1 compares the size of the prewar Japanese stock market to that of the prewar stock market in the United States and those of the stock markets in various countries (including Japan and the United States) in the early 1990s. The international data for the 1990s come from Demirguc-Kunt and Levine (2001), who report three measures of the stock market size for sixty-one countries: total market value of the listed stocks divided by GDP, the total value of the stocks traded in a year divided by GDP, and the latter divided by the former (turnover ratio). For comparison, we added data for Japan and the United States in 1936. The table shows that even though Japan was much less developed than the United States, the stock market in Japan in 1936 was much larger and more actively traded than that in the United States in 1936. Even compared with most of the countries (including Japan itself) in the 1990s, Japan's stock market in 1936 was much larger.

Another way to see the importance of the stock market in prewar Japan is to examine the sources of funds for corporations. Table 2.2, which reproduces table 2.3 in Hoshi and Kashyap (2001, 36), shows the sources of funds for the private nonfinancial corporate sector in prewar Japan. The original source of the data is Fujino and Teranishi (2000), which is considered to be the definitive work on the prewar pattern of corporate financing. The table shows the average proportion of each source of funds calculated from the levels of claims for three (overlapping) subperiods: 1902 to 1915, 1914 to 1929, and 1928 to 1940. Each subperiod uses a different primary data source for estimation.[3]

Table 2.2 shows that the shareholders contributed the majority of funds in each of the three subperiods. The proportion of paid-in capital and reserves was about 60 percent to 80 percent of the total capital and liabilities. In contrast, the proportion of the bank borrowings was small. Even if we assume all the borrowings come from banks and interpret all the bills payable as disguised bank borrowings (because some firms had their own bills discounted by banks), the amount of bank borrowings was never higher than 20 percent of the total funds in the corporate sector.

Having confirmed the importance of the use of equity and the stock market in the prewar Japanese financial system, let us now look at how it all

3. See the note for table 2.3 in Hoshi and Kashyap (2001, 36) for more details on the primary sources of data.

Table 2.1 **International comparison of stock market size**

	GDP per capita, 1990–1995 (US$)	Market capitalization/ GDP	Total value traded/ GDP	Turnover ratio
Japan 1936	830	1.17	1.32	1.12
United States 1936	6,727	0.72	0.25	0.34
Argentina	4,039	0.11	0.04	0.34
Australia	14,314	0.71	0.33	0.43
Austria	13,177	0.12	0.08	0.64
Bangladesh	194	0.04	0.01	0.09
Barbados	4,777	0.21	0.00	0.02
Belgium	14,482	0.36	0.05	0.15
Bolivia	755	0.02	0.00	0.01
Brazil	2,346	0.19	0.12	0.56
Canada	17,285	0.59	0.29	0.47
Chile	2,725	0.84	0.09	0.10
Colombia	1,432	0.13	0.01	0.10
Costa Rica	1,867	0.07	0.00	0.03
Cyprus	6,588	0.22	0.02	0.11
Denmark	17,023	0.34	0.16	0.45
Ecuador	1,322	0.10	0.01	0.14
Egypt	1,042	0.10	0.02	0.14
Finland	15,892	0.29	0.12	0.34
France	15,232	0.33	0.17	0.50
Germany	16,573	0.24	0.28	1.13
Ghana	533	0.15	0.00	0.03
Great Britain	11,794	1.13	0.55	0.48
Greece	6,552	0.15	0.06	0.36
Honduras	751	0.05	0.02	0.67
Hong Kong	10,538	1.96	1.08	0.52
Iceland	18,940	0.01	0.08	n.a.
India	385	0.28	0.08	0.35
Indonesia	609	0.18	0.08	0.45
Iran	2,397	0.04	0.01	0.21
Ireland	9,014	0.26	0.14	0.62
Israel	9,260	0.33	0.19	0.70
Italy	11,505	0.17	0.08	0.42
Jamaica	1,711	0.42	0.05	0.10
Japan	15,706	0.79	0.28	0.36
Jordan	1,289	0.65	0.12	0.20
Kenya	441	0.16	0.00	0.03
Korea	3,909	0.37	0.44	1.22
Malaysia	2,929	2.01	1.14	0.50
Mauritius	2,125	0.27	0.01	0.05
Mexico	2,952	0.32	0.13	0.41
Nepal	200	0.05	0.00	0.04
The Netherlands	13,955	0.69	0.43	0.56
New Zealand	9,492	0.49	0.14	0.27
Nigeria	551	0.06	0.00	0.01

(*continued*)

Table 2.1 (continued)

	GDP per capita, 1990–1995 (US$)	Market capitalization/ GDP	Total value traded/ GDP	Turnover ratio
Norway	20,135	0.26	0.14	0.53
Pakistan	436	0.16	0.06	0.34
Panama	1,950	0.09	0.00	0.04
Peru	1,292	0.11	0.04	0.30
The Philippines	734	0.52	0.15	0.26
Portugal	4,822	0.13	0.05	0.38
Singapore	11,152	1.37	0.70	0.50
South Africa	2,379	1.66	0.12	0.08
Spain	7,286	0.30	0.23	0.63
Sri Lanca	538	0.16	0.02	0.12
Sweden	18,982	0.62	0.33	0.47
Switzerland	19,530	0.98	0.76	0.74
Thailand	1,503	0.57	0.40	0.77
Trinidad and Tobago	3,685	0.01	0.10	n.a.
Tunisia	1,534	0.10	0.01	0.09
Turkey	2,259	0.14	0.16	1.04
United States	19,414	0.80	0.62	0.73
Urguay	2,514	0.01	0.00	0.03
Venezuela	3,167	0.12	0.03	0.26
Zimbabwe	804	0.23	0.01	0.07
Mean	6,547	0.39	0.17	0.35

Notes: Except for Japan 1936 and United States 1936 data, numbers are taken from Demurgüc-Kunt and Levine (2001). The data for Japan 1936 are from TSE (1937), except for the GNP data. Per capita GNP for Japan in 1936 is computed by dividing the GNP figure in Okawa (1974) by the population figure in Umemura (1988). It is the converted into U.S. dollars at the exchange rate in 1936 and translated to the 1990–1996 value by using GDP deflators in Gordon (1986) and the U.S. Council of Economic Advisors (2003). The U.S. 1936 data except for GNP figure are from the U.S. Bureau of the Census (1937). Per capita GNP for the U.S. in 1936 is computed by dividing the GNP figure in Gordon (1986) by the population figure from the U.S. Bureau of Census (1937). It is then translated into the 1990–1995 value by using GDP deflators in Gordon (1986) and the U.S. Council of Economic Advisors (2003). Means do not include Japan 1936 and United States 1936. United States 1936 data include New York Stock Exchange only. n.a. means data not available.

Table 2.2 **Funding patterns of Japanese corporations: 1902–1940**

Time period	Paid-in capital and reserves	Corporate bonds	Borrowings	Bills payable
1902–1915	82.3	9.5	3.2	5.1
1914–1929	74.8	14.9	4.1	6.2
1928–1940	66.4	18.5	6.7	8.4

Source: Hoshi and Kashyap (2001, 36, table 2.3).

Note: This table shows the percentage distribution of paid-in capital and debt.

started. Following the enactment of the Stock Exchange Act (*Kabushiki Torihikijo Jōrei*) in 1878 (ten years after the Meiji Restoration), the TSE was established as the first stock exchange in Japan. The Stock Exchange Act prescribed that a stock exchange must obtain a license from the government and that it must be organized as a joint-stock company with capital of 100,000 yen or larger (approximately 567 million yen in 2005 prices).[4] The Osaka Stock Exchange (*Osaka Kabushiki Torihikijo,* OSE) followed the TSE in the same year. Although the Ministry of Finance initially intended to license only the two stock exchanges, it changed the policy in 1880 and allowed new exchanges to be established, including Yokohama (1880), Kobe (1883), Kyoto (1884), and Nagoya (1886) (TSE 2002, 7).

In 1887, the Exchange Act (*Torihikijo Jōrei,* also known as the Bourse Act) was passed, which prescribed that all the exchanges, including the stock exchanges, must be membership organizations, not joint-stock companies. The existing stock exchanges were to be abolished when their current licenses expired and to restart as a new membership organization (TSE 2002, 16). The new regulation met strong resistance from the industry and was replaced by the new Exchange Act (*Torihikijo Hō*) in 1893. The new Exchange Act allowed each exchange to choose between a membership organization and a joint-stock company organization. The law continued to provide the legal basis of the exchanges throughout the rest of the prewar period.

The Exchange Act of 1893 also reduced the minimum capital of an exchange (that chose to organize as a joint-stock company) to 30,000 yen. The reduction of the minimum capital level led to the establishment of many new stock exchanges during the economic boom in the late 1890s. Some of the newly established exchanges, however, failed to generate active trading, which convinced the government to shut down small stock exchanges in rural areas (TSE 1928, 6–8; TSE 2002, 16–18; Noda 1980, 240–42).

The bar graph in figure 2.2 shows the evolution of the number of stock exchanges during this period. The number of stock exchanges began with two (Tokyo and Osaka) in 1878. While it increased to five in 1886, it decreased to three in 1891. Then a rapid increase in the number of exchanges began in 1894 as the new Exchange Act with a lower minimum capital standard took effect, and reached a peak of forty-six in 1897. After that it declined again, and has remained around ten throughout the rest of the prewar period.

Figure 2.2 also shows the total revenue of all stock exchanges (in solid line) and the percentage share of the TSE and OSE (in broken lines) revenues. As long-term data on the volume of stocks traded at all the exchanges are not available, we use the revenues (a major part of which was from trade

4. This is inflated by the Consumer Price Index (CPI). We linked CPI of Okawa et al. 1967 (134) with CPI by the Statistics Bureau of Ministry of Internal Affairs and Communications at 1955.

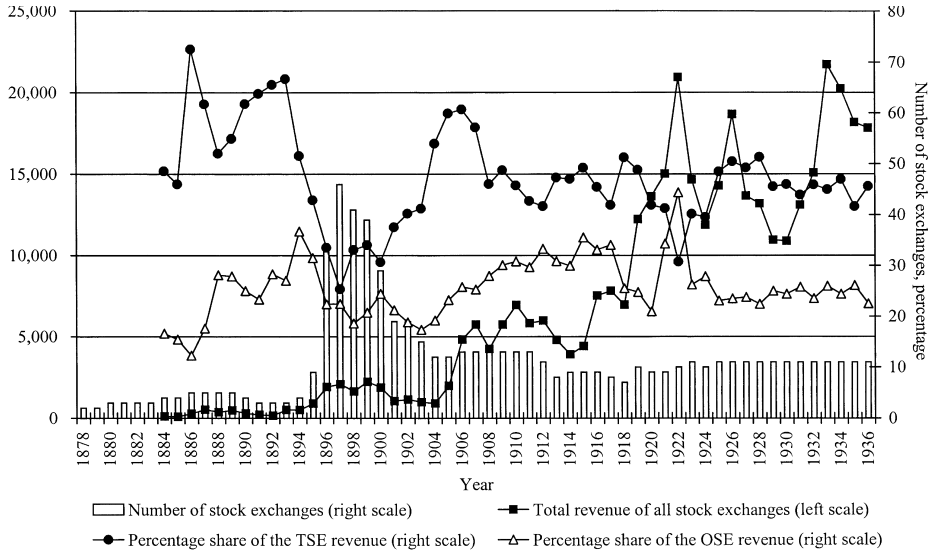

Fig. 2.2 Number of stock exchanges and the revenue share of the TSE

Sources: Toyo Keizai Shinposha (1927); Ministry of Commerce and Industry, *Handbook of Exchanges* (various issues).

commissions) as a proxy for the level of activities in the stock exchanges. The figure shows the total revenue of stock exchanges experienced two significant upward jumps: once from 1904 to 1906 and again from 1918 to 1922. The TSE continued to have the largest revenue throughout these years, except in 1922 when the OSE topped the rankings.[5] The share of the TSE started around 60 to 70 percent, but declined to 20 to 30 percent in the late 1890s, when the number of stock exchanges increased sharply, and then returned to 40 to 50 percent after that.

2.3 Development of the Tokyo Stock Exchange

This section examines the development of the Tokyo Stock Exchange in more detail. The stock market at the TSE was divided into two divisions. The Stock Exchange Act of 1878 classified stock transactions into spot transactions (*genba torihiki*) and futures transactions (*teiki torihiki*). Each spot contract required actual delivery of the traded shares.[6] *Teiki torihiki*

5. The extraordinarily large revenue of the OSE in 1922 resulted from an acquisition of another company. Thus, we can safely say that the TSE had the largest revenue from transaction commissions throughout the prewar period.

6. The Japanese name for spot transaction was changed three times during the prewar period. The Exchange Act of 1893 called it *jiki torihiki.* The organizational reform of the TSE in 1918 discussed in the following introduced the name *genbutsu torihiki.* Finally, the 1922 revision of the Exchange Act used *jitsubutsu torihiki.*

were similar to "time bargains," which were also observed in the financial centers in more advanced economies, such as London and New York.[7] In a *teiki torihiki,* a buyer (seller) could resell (repurchase) the stocks as many times as he wished, until the delivery date, and at the delivery date only the difference between the sell and the purchase was settled in cash (TSE 1928, 454). In the futures market, net cash settlement was the normal settlement method.

Before the revision of the Exchange Act in 1922, the futures market traded contracts with three different settlement days for each individual stock.[8] The shares sold had to be delivered before the settlement day, which was one day before the last trading day of the month (called *tōgiri*), one day before the last trading day of the next month (called *nakagiri*), or one day before the last trading day of the month after the next month (called *sakigiri*). Thus, the settlement period (the period between the start date of a transaction and the delivery date) never exceeded three months.

The 1922 revision of the Exchange Act ordered the exchanges to develop another type of future contracts with settlement period no longer than seven days. Following this legal change, the TSE introduced a new market for the type of transactions called the short-term futures transaction (*tanki seisan torihiki*) in 1924.[9] In the short-term futures, the deliveries of all the transactions that took place in the morning session of a day and in the afternoon session of the previous day had to happen by 2:00 P.M. of the day. The traders were allowed to postpone delivery up to a month, but they were required to pay a deferment fee in such a case.

The new Exchange Act also shortened the maximum settlement period for any futures trading from three months to two months. The old futures market of the TSE, which was now renamed the long-term futures transactions (*chōki seisan torihiki*), continued to use the system of three settlement days by changing those to the 15th of an odd month, and the 5th and the 25th of an even month.

Figure 2.3 shows the evolution of the number of stocks listed on each market of the TSE. Note that it is distinct "stocks," not companies, that are counted here. Large companies in prewar Japan often issued more than one class of shares with different proportions of paid-in parts. As a result, in 1915, for example, while the number of listed stock names was 227, the number of listed companies was 160, which meant one company issued 1.42 classes of shares, on average. As a concrete example, consider a company that had issued 20,000 shares, whose face value was 50 yen each, and

7. For a brief description of "time bargains" in London, see Michie (1999, 48–49). For New York, see Geisst (1997, 14).

8. Tokyo Stock Exchange (1932, 70–96) contains a detailed discussion of various transactions in the Tokyo Stock Exchange. Other sources for the discussion here include Osaka Stock Exchange (1928), Tokyo Stock Exchange (1928), and Kuwata (1940).

9. The Osaka Stock Exchange introduced the short-term futures in 1922 immediately following the enactment of the 1922 Exchange Act.

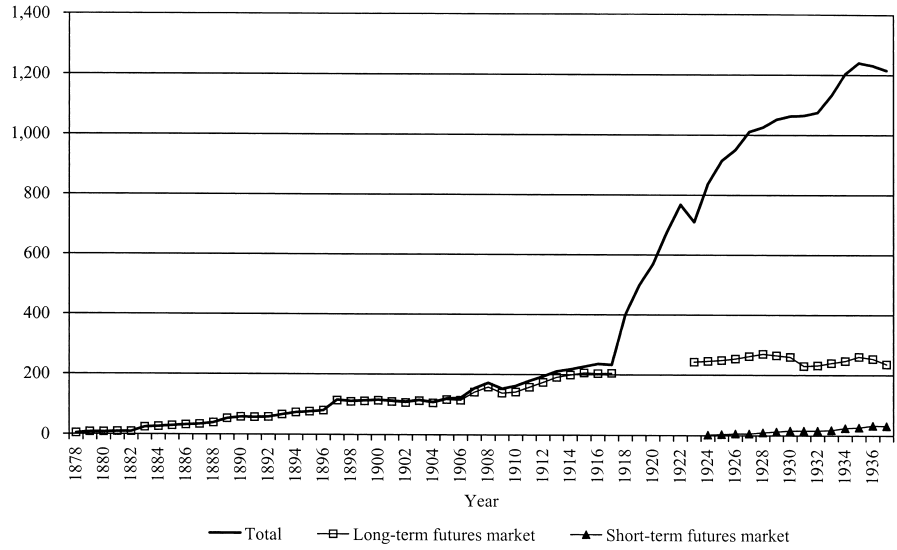

Fig. 2.3 Number of listed stocks on the TSE
Source: TSE (1938).

the capital was all paid-in. The total paid-in capital of the company is 1 million yen. Now suppose this company issues another 20,000 shares with face value of 50 yen each. Under the prewar practice of installment payment of capital, the company collects only a portion of the face value from the shareholders at the issuance. If the company collects 50 percent, the paid-in face value of the new stocks is 25 yen each, and the new total paid-in capital of the company becomes 1.5 million yen. This creates two distinct classes of stocks of the same company, which will be listed as two different stocks on an exchange.

Note also that all the stocks listed on the short-term futures market (after 1924) were also listed on the long-term futures market, and all the stocks listed on the long-term futures market were also listed on the spot market. Thus, the number of the stocks on the spot market is always larger than the number of the stocks on the long-term futures market, which in turn is larger than the number of the stocks on the short-term futures market. Finally, the number of stocks listed in the futures market is missing for the period between 1918 and 1922, presumably lost in the fire that completely destroyed the Tokyo Stock Exchange building during the Great Kanto Earthquake of 1923.

The number of the listed stocks began with four (First National Bank, Tokyo Kabutocho Rice Exchange, Tokyo Kakigaracho Rice Exchange, and the Tokyo Stock Exchange itself) in 1878. Until 1896, all of the listed stocks were listed on both the spot market and the (long-term) futures mar-

ket, and after that a small number of stocks emerged that were listed only on the spot market.

Figure 2.3 shows that there was a small upward jump in the number of listed shares in 1897 followed by a slight increase in the trend growth rate of the listed shares. A larger jump and a more drastic change in the trend growth happened in 1918. The number of listed stocks increased sharply from 233 to 402 in one year and then continued to grow. In the ten years from 1918 to 1927, the number of listed stocks increased each year by seventy-eight, on average. The growth is compared to a little less than six per year during the previous forty years. The short-term futures market started in 1924, but the number of stocks listed on the short-term futures market was very small. It was just thirty-six in 1936.

Figure 2.4 shows the total amount of (the book value of) paid-in capital of the stocks listed on the TSE. Figure 2.5 plots the same series divided by the nominal GNP of each year. Both figures are qualitatively similar to figure 2.3. The only notable exception is that the series start to decline after 1932 in figure 2.5, which suggests the growth of the book value of the listed companies started to fall behind the growth of GNP in the 1930s.

In figure 2.1 and table 2.1, we saw that the Japanese stock market in the 1920s and the 1930s was very large compared to the size of the economy. Figures 2.3, 2.4, and 2.5 suggest, however, the TSE was relatively small before the 1920s. The size of the market measured in the total book value of listed firms divided by GNP increased steadily from less than 5 percent in

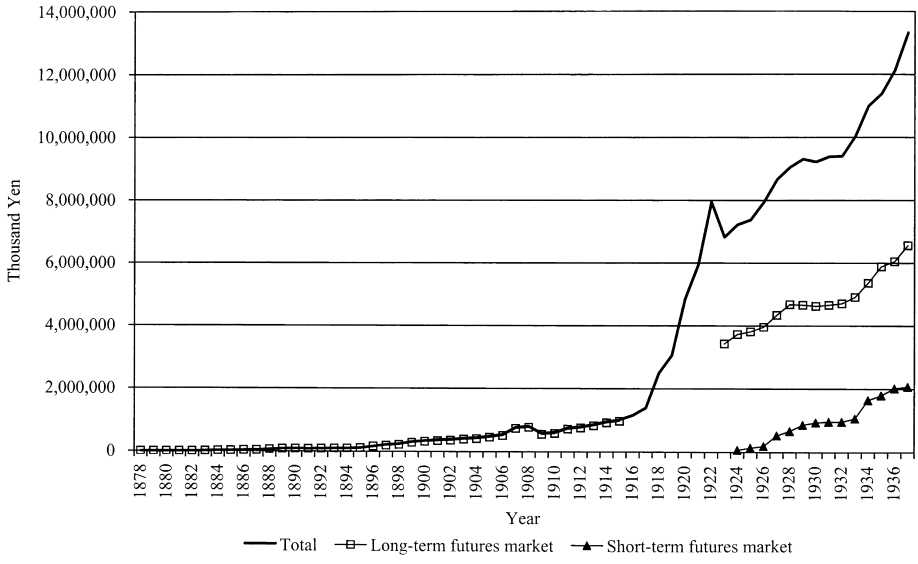

Fig. 2.4 Total book value of listed stocks on the TSE
Source: TSE (1938).

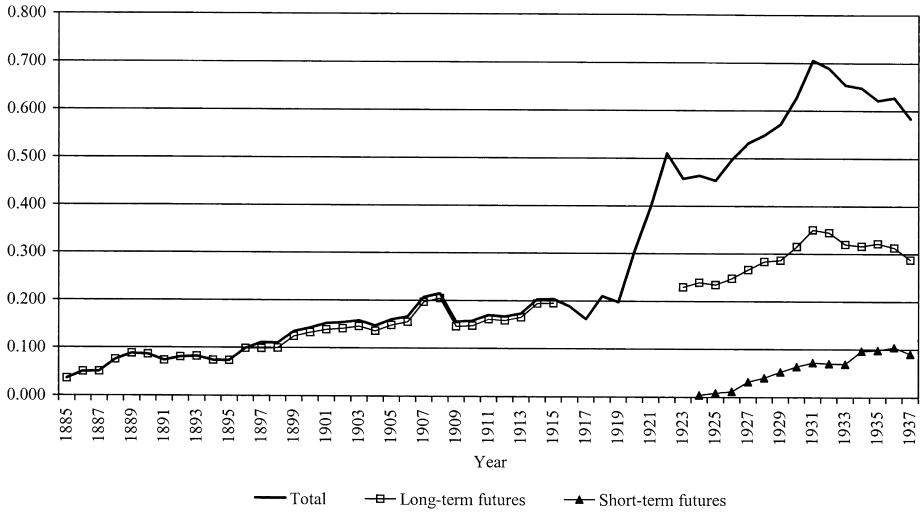

Fig. 2.5 Total face value of listed stocks on the TSE (ratio to GNP)
Sources: TSE (1938); Okawa (1974).

1885 to around 20 percent in 1920 (figure 2.5). The size during this period increased only by 0.5 percentage point every year on average. In the next three years, the size of the market jumped to 50 percent of GNP and continued to grow. In the twelve years from 1919 to 1931, the proportion of the TSE to GNP increased by 4.2 percentage point every year, on average.

Although data constraints prevent us from extending figure 2.1 back to the period before the 1920s, what happened in the TSE, the largest stock market in Japan, suggests that the size of the Japanese stock market as a whole was also relatively small before the 1920s. The growth rate of the market (measured in the book value of listed stocks) was rather small before the late 1910s, and then the market suddenly took off during the 1920s.

Before the 1920s, the TSE was also limited in its regional coverage: the listed companies were mostly from the eastern part of Japan. Over time, however, the TSE attracted companies from all over Japan and eventually became a nationwide stock market. Let us briefly trace changes in the regional distribution of the listed companies. Appendix A explains the sources of the data that we use here.

Table 2.3 shows the regional distribution of the headquarters of listed companies on the TSE. All the four listed companies in 1878 were located in Tokyo. Although the proportion of the companies in Tokyo declined to 50 percent by 1885, the share for the eastern Japan was still higher than 90 percent. The share of companies in the eastern Japan remained high (around 80 percent) in 1900 and 1915, but started to fall after that. The tim-

Table 2.3 **Regional distribution of companies listed on the Tokyo Stock Exchange: 1887–1935**

	1878	1885	1900	1915	1925	1935
Total	4	24	96	151	695	899
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
East	4	22	77	121	536	650
	(100.0)	(91.7)	(80.2)	(80.7)	(77.1)	(72.3)
Hokkaido	0	0	4	2	7	9
	(0.0)	(0.0)	(4.2)	(1.3)	(1.0)	(1.0)
Tohoku	0	2	0	0	8	16
	(0.0)	(8.3)	(0.0)	(0.0)	(1.2)	(1.8)
Kanto	4	17	67	110	487	569
	(100.0)	(70.8)	(69.8)	(73.3)	(70.1)	(63.3)
Tokyo	4	12	54	89	440	506
	(100.0)	(50.0)	(56.3)	(59.3)	(63.3)	(56.3)
Chubu	0	3	6	9	34	56
	(0.0)	(12.5)	(6.3)	(6.0)	(4.9)	(6.2)
West	0	2	19	22	105	171
	(0.0)	(8.3)	(19.8)	(14.7)	(15.1)	(19.0)
Kinki	0	2	11	16	82	135
	(0.0)	(8.3)	(11.5)	(10.7)	(11.8)	(15.0)
Osaka	0	2	4	13	66	105
	(0.0)	(8.3)	(4.2)	(8.7)	(9.5)	(11.7)
Chugoku	0	0	3	2	11	17
	(0.0)	(0.0)	(3.1)	(1.3)	(1.6)	(1.9)
Shikoku	0	0	0	0	1	5
	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.6)
Kyushu	0	0	5	5	11	14
	(0.0)	(0.0)	(5.2)	(2.7)	(1.6)	(1.6)
Colonies	0	0	0	7	32	42
	(0.0)	(0.0)	(0.0)	(4.7)	(4.6)	(4.7)
Foreign	0	0	0	0	22	36
	(0.0)	(0.0)	(0.0)	(0.0)	(3.2)	(4.0)

Notes: Numbers in parentheses are percentages.

Source: The data are from the authors' calculation based on the database discussed in appendix A.

ing coincides of the acceleration of the number of listed stocks at the TSE that we saw above. By 1935, the proportion of the listed companies in the eastern Japan declined to 72 percent, while the proportion of the listed companies in the Kinki region increased to 15 percent. Thus, over time, the TSE became the exchange with nationwide coverage.

2.4 Macroeconomic Condition and Growth of the TSE

The TSE grew to become the largest stock exchange in Japan with nationwide coverage, but the growth was rather slow, and the listed firms were

skewed to eastern Japan during the first forty years of its existence. Why did the TSE originally list relatively small number of stocks but rather suddenly start to list increasing number (and capitalization) of stocks? This and the next sections consider two types of possible explanations: one focusing on macroeconomic conditions and the other focusing on TSE rules on listing new stocks.

It is important to note that the growth of the stock market after the late 1910s was not just a result of accumulation of retained earnings within the firms that had already been listed. As figure 2.5 clearly shows, the stock exchange grew by listing new stocks on the market. Thus, the explanation must include some changes in listing behavior as its key component.

The period when the TSE experienced the very rapid growth coincides with the boom during and after the World War I. Japan joined the war, but it was far from major theaters of war and did not feel disruptive effects of the war very much. Rather, the war presented opportunities for many Japanese businesses to expand their operations in Asia at the cost of Western European business interest. Thus, World War I was a boon to the Japanese economy in general and for its stock market in particular.

Figure 2.6 shows monthly series of stock price index and wholesale price index from July 1914 to December 1936. Both series are made by the Bank of Japan and taken from the Ministry of Finance (various issues). Both indexes are normalized to 100 in July 1914. We indeed find that the stock price appreciated sharply as the war prolonged and stayed high until the crash in 1920. The stock price in 1917 and again right before the crash was

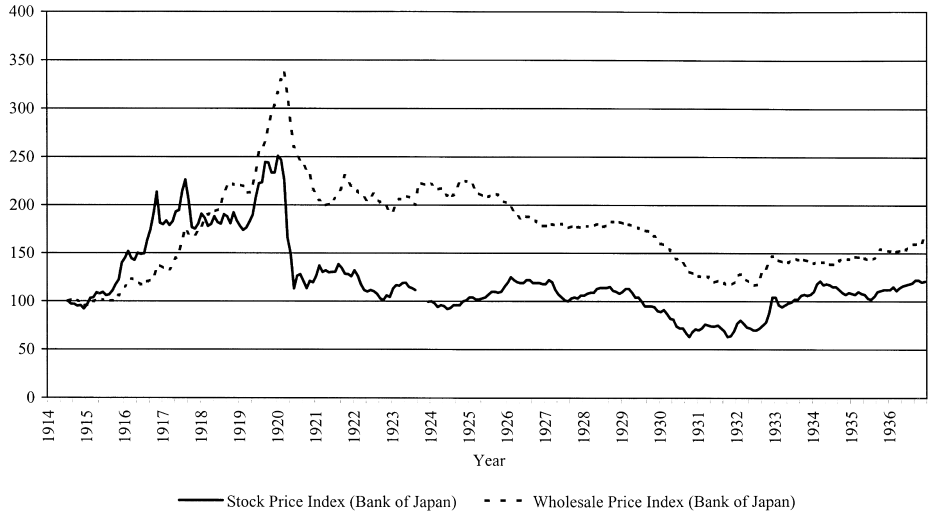

Fig. 2.6 Wholesale price index and stock price index (July 1914 = 100)
Source: Ministry of Finance, *Reference Book on Financial Issues* (various issues).

more than double the level in 1914. The WWI boom led to inflation as well. Measured in wholesale prices, the price level almost tripled between 1914 and 1920.

Thus, the macroeconomic condition in the late 1910s seemed to have been very favorable for the development of a stock market. The appreciation of stock prices, however, ended with a crash in 1920 as figure 2.6 shows. The WWI boom expanded deficit in the balance of payments, which prompted the Bank of Japan to tighten the monetary policy. The Bank of Japan discount rate, which was at 5.11 percent at the end of 1917, was raised twice each year 1918 and 1919 and reached 8.03 percent by the end of November 1919. In March 1920, the TSE experienced a crash, which spilled over to the commodities markets as well. Many stock and commodity exchanges (including the TSE and the OSE) temporarily suspended the trading. The financial crisis reached its peak in May, when the Seventy-Fourth Bank, a large bank in Yokohama that specialized in export finance, failed, which subsequently triggered failures of smaller banks and trading houses.

The high inflation, which tends to encourage investors to shift their investment from bank deposits to stock markets, also ended in 1920. Japan in the 1920s was mostly deflationary, but the listings on the TSE continued to grow well into the 1920s. This suggests it was more than just the WWI boom that caused the growth of the TSE.

Comparing the TSE with other stock markets that also benefited from the WWI boom confirms this point. Figure 2.7 shows the number of listed

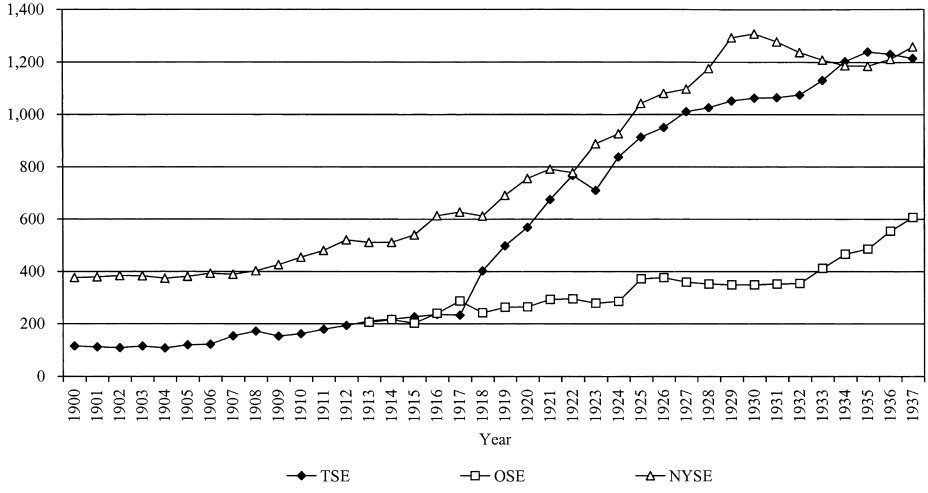

Fig. 2.7 Number of stocks listed: Tokyo, Osaka, and New York stock exchanges
Sources: TSE (1938); Osaka Stock Exchange, *Business Report* (various issues), New York Stock Exchange, *Fact Book* (www.nyse.com).

stocks on the New York Stock Exchange and the OSE, and compares those to the number of listed stocks on the TSE. The United States, like Japan, did not suffer very much from the WWI, and the economy and stock markets experienced huge boom in the 1920s. As figure 2.7 shows, the New York Stock Exchange added new listings in the late 1910s and the 1920s, but the growth rate was not very different from that of the early 1910s. We do not observe a kink in the late 1910s as we do for the TSE listings. We make similar observations for the listings on the OSE. The remarkable and sustained increase in the new listings that we see for the TSE is absent for the OSE. We conclude that the WWI boom is not sufficient to explain the sudden growth of the TSE in the 1910s.

2.5 Listing Criteria and Growth of the TSE

What can explain the sudden take off of the TSE, then? One possible explanation of the pattern of the growth of listed companies on the TSE is the relaxation of listing criteria over time. When a stock exchange starts its operation, it may want to restrict the companies that are listed to be only those that have high profitability or sizable assets to establish the reputation that the exchange deals with quality companies. As the exchange accumulates the reputation over time, it may be able to relax the tight listing regulation marginally, allowing more companies to be listed on the exchange. If we find that the TSE indeed relaxed the listing criteria around 1918, then it could explain the sudden growth of the TSE after that time.

This turns out not to be the case, however. The long-term futures market indeed had listing criteria that were relaxed over time, but there was no important change in 1918 (or nearby years). Perhaps more important, in the spot market, where most of rapid growth after 1918 took place, the TSE does not seem to have imposed any listing restrictions.

Let us first look at the changes in the listing criteria to the futures market. We are not aware of any document that summarizes the listing criteria at the TSE for the whole prewar period. Thus, we need to put together the relevant information scattered in various places.

The earliest mention of the listing restriction that we can find is in TSE (1928):

> When the Exchange Act was passed in 1893, the government instructed the TSE to increase the number of stocks traded as much as possible. Consequently, the TSE replaced the existing listing criteria (number of stocks no fewer than 4,000, total face value not less than 200,000 yen, and total paid-in face value not less than 100,000 yen) with the new criteria (number of stocks no fewer than 3,000, total face value not less than 150,000 yen, and total paid-in face value not less than 75,000 yen). The TSE decided that the stocks that do not satisfy the new criteria should be traded only on the spot market. The new criteria were used from May 1894. (33–34)

Then, following the 1914 revision of the Exchange Act, listing of securities on the futures market required an approval from the Ministry of Agriculture and Commerce (MAC). Accordingly, the MAC set the following listing criteria for the futures market.

> (i) Issuing firm must have been established more than 2 years ago.
> (ii) Total paid-in face value (of the newly listed class of shares) must not be less than 1,000,000 yen to be listed on the Tokyo or Osaka stock exchange.
> (iii) Total paid-in face value (of the newly listed class of shares) must not be less than 500,000 yen to be listed on a stock exchange other than Tokyo and Osaka. (TSE 1963, Part on Institutions and Organizations, 3)

Compared with the 1894 TSE rule that we saw earlier (75,000 yen minimum paid-in face value), the new MAC rule tightened the listing standard by increasing the minimum paid-in face value by more than 1,300 percent, while the general price level only doubled over the twenty years.

In 1915, the MAC added the following criteria for newly listing class of shares in a company that had already listed shares on the futures market (TSE 1963, Part on Institutions and Organizations, 3).

> (i) Total paid-in face value (of the newly listed class of shares) must not be less than 500,000 yen to be listed on the Tokyo or Osaka stock exchange.
> (ii) Total paid-in face value (of the newly listed class of shares) must not be less than 250,000 yen to be listed on a stock exchange other than Tokyo and Osaka.

These criteria set by the MAC provided the minimum requirement that a firm that wants to list its stocks had to satisfy. The TSE seems to have evaluated some additional aspects that were not explicitly stated as well. The internal rules of the TSE enacted in 1915 prescribed as follows (Research Bureau of the Bank of Japan 1916, 93).

> When a joint-stock company requests the TSE to start trading its stocks or debentures, the TSE should examine its articles of incorporation as well as its assets and business status to decide whether the request should be approved or not (Article 1).

Moreover, the revised Exchange Act of 1922 obliged the exchange to set up a council to decide on when a stock or a bond could be listed or delisted.

In May 1921, the listing criteria of the TSE were revised to be the following.

> (i) Issuing firm must have been established more than 2 years ago.
> (ii) Total face value (of the newly listed class of shares) must be more than 3,000,000 yen, of which more than 1,000,000 yen already paid in; the number of shares must be greater than 60,000.
> (iii) For a new class shares of a company that had already listed shares in the futures market, total face value (of the newly listed class of shares)

must be more than 2,000,000 yen, of which more than 500 thousand yen already paid in; the number of shares must be greater than 40,000.

These new criteria were used at least until the beginning of the Sino-Japanese War in 1937 (The Research Division of the TSE 1932; Hatano 1938).

In contrast to the futures market, the spot market of the TSE does not seem to have imposed any explicit listing criteria. In a 1932 publication, the TSE stated, "we do not impose any condition on the listing" (TSE 1932, 95) in the spot market. Although we find several documents that spell out the listing criteria for futures market as we saw above, we are not aware of any documents that specify the listing criteria for the spot market. Thus, it seems safe to conclude that the TSE did not have explicit listing criteria for the spot market.

The companies that wished to be listed on the spot market were still required to apply for it. Even this requirement to apply for the listing, however, was eliminated in 1918, and the TSE decided that they can start transaction of a stock and quoting its price without the company's application to be listed on the exchange (TSE 1928, 88).

Figures 2.3, 2.4, and 2.5 suggest that the change in 1918 had a major impact on the subsequent increase of the size of the TSE. The number and amount of shares listed on the TSE increased rapidly after 1918, especially in the spot market.

According to TSE (1928, 88; and other relevant references), the change in 1918 was motivated by the TSE's attempt to bring the spot exchange transactions that took place outside the exchange into the exchange.[10] Since the late nineteenth century, stock trading outside the exchanges was quite active (Kataoka 1987). A large number of stocks were traded over the counters of spot market brokers (*genbutsu don'ya*) and *saitori* brokers intermediated between those brokers. In 1906, these brokers outside the exchange filed an application to the local government of Tokyo to establish a new stock exchange specialized in spot trading. This attempt was not materialized mainly due to the strong opposition from the TSE.

As the outside trading increased, the TSE started to try integrating those trades inside the exchange. The spot market brokers also came to consider that it was convenient to interlink their trading with the trading inside the

10. This is in contrast to what happened in New York, where the curb market continued to exist and competed with the New York Stock Exchange (NYSE). In the early twentieth century, an official document by the NYSE wrote "The curb market represents, first, securities that cannot be listed; second, securities in the process of evolution from reorganization certificates to a more solid status; and third, securities of corporations which have been unwilling to submit their figures and statistics to the proper committees of the Stock Exchange" (Michie 1987, 206–7). As the New York curb market started to trade shares of large companies listed on the NYSE, competing with the NYSE, "the over-the-counter market began to emerge in New York, better known as the *unlisted market,*" providing competition for the curb market. (Geisst, 1997, 165)

TSE. Thus, in 1918, the TSE invited *saitori* brokers, who intermediated spot transactions outside the TSE, to trade only inside the exchange (Association of the TSE *Saitori* Members 1975, 65, 72). The TSE also set up the Monitoring Department (*kansatsu-bu*) to ensure that spot transactions were conducted within the exchange and following the TSE rules (TSE 1928, 46; TSE 2002, 30; Association of the TSE *Saitori* Members 1975, 72). This change made it difficult for investors to trade shares outside the exchange.

The rapid increase of listed shares in the TSE after this 1918 reform may not be surprising if it was just a result of the TSE's newly listing the stocks that had been traded outside the exchange by the spot traders. If this was the only reason for the rapid expansion of the TSE, the growth would have leveled off after a while, when most of the outside trading was already brought inside the exchange. But figures 2.3, 2.4, and 2.5 show the TSE continued to grow well into the late 1920s. Furthermore, as we examine below, the integration of the outside trading took place rather quickly.

To study how the outside trading was absorbed into the TSE following the 1918 reform, we collected the advertisement that a major spot broker, Momijiya, ran in *Tokyo Asahi Shimbun,* a major newspaper in Tokyo. We obtained the first advertisement of Momijiya in the months of June and December of each year from 1916 to 1921. Then we compared the stocks on the Momijiya advertisement to the listed stocks on the TSE as of the end of March of that year published in *Kin'yū Jikō Sankōsho.* The result is summarized in table 2.4.

Because the new listing policy of the TSE was implemented in September 1918 (TSE 1928, 88), the first time we would observe that impact in table 2.4 is the June 1919 column, which compares the stocks advertised by Momijiya in June 1919 to the stocks listed on the TSE in March 1919. We find the number of stocks advertised by Momijiya but not listed on the TSE, which was around twenty before the change, fell to six by June 1919, and to zero by December 1921. Thus, we can conclude that all the major stocks in the outside market were quickly listed on the TSE following the change in 1918. The outside market was completely absorbed by the TSE by 1921.

The TSE continued to grow even after 1921. This implies that the impact of the policy change in 1918 was more than just absorbing the outside market into the TSE. In this section, we examined if the changes in listing rules on the TSE can explain the pattern of its growth. The listing criteria on the futures market went through several changes, but those are not closely related to the changes in the growth rate of the TSE that we see in figures 2.3, 2.4, and 2.5. Moreover, the growth spurt in the 1920s, which is the most prominent change, was mostly due to the expansion of the spot market. The TSE does not seem to have explicit listing restrictions on the spot market. Prior to 1918, the companies only had to apply to the TSE to be listed. This rule changed in 1918, which led to the sustained growth of the spot

Table 2.4 **Stocks advertised by a spot broker (*Momijiya*) but not listed on the Tokyo Stock Exchange (TSE)**

	June 1916	Dec. 1916	June 1917	Dec. 1917	June 1918	Dec. 1918	June 1919	Dec. 1919	June 1920	Dec. 1920	June 1921	Dec. 1921
No. of stocks advertised by *Momijiya* (row a)	118	114	115	116	117	115	115	111	102	95	101	97
Of which not listed on the TSE (row b)	28	27	19	28	22	22	6	5	2	1	0	0
row b / row a (%)	23.73	23.68	16.52	24.14	18.80	19.13	5.22	4.50	1.96	1.05	0.00	0.00

Source: Authors' calculation based on the data collected from *Tokyo Asahi Shimbun* (1916–1921) and *Kin'yū Jikō Sankōsho* (various years).

market. Then why did many companies fail to apply for listing before 1918? Because they did not seem to have faced any listing criteria, this suggests they did not find the benefit of being listed. Why? The next section builds an explanation for these questions based on the recent literature on initial public offerings (IPOs).

2.6 Market Liquidity and the Decision to List Stocks

There is a large and growing literature on IPOs and listing decisions of firms, but we find the results of two recent papers especially relevant for our purpose. They are Ellul and Pagano (2006) and Baruch and Saar (forthcoming).

First, Ellul and Pagano (2006) shows that the extent of IPO underpricing is high when the (expected) liquidity of the stock after the IPO is low. Thus, underpricing, which constitutes an important part of the cost of IPO, is decreasing in the expected aftermarket liquidity. Assuming there is some variation in the benefit of IPO across firms, so that only those firms whose benefits are higher than the costs decide to be listed on the stock exchange, we can argue that the number of firms that decide to be listed is a increasing function of the expected liquidity.

Second, Baruch and Saar (forthcoming) provide an example that shows (among other things) that the liquidity of an individual stock is an increasing function of the number of firms listed in the market. Using an example that is a more general case of Baruch and Saar (forthcoming), we show this is indeed the case in appendix B.

Combining these two arguments, we can now establish that the number of listed stocks is an increasing function of the market liquidity, which in turn is an increasing function of the number of listed stocks. This implies a possibility of multiple equilibria. In one equilibrium, the market liquidity is expected to be high, which encourages many firms to be listed and makes the market liquidity indeed high. In another equilibrium, the market liquidity is expected to be low, which leads to a low number of listed firms and low liquidity.

The key to the story here is externality. Market liquidity is an important factor for a company decision to list its shares on the market, but when a company makes its listing decision, it does not consider the effect of its listing on the market liquidity. In this sense, the argument here is closely related to the literature on multiple equilibria in the financial market developed by Diamond (1987) and Pagano (1989a,b), for example. Pagano (1989a) builds a model of risk-averse investors with endogenous supply of corporate equity to show two (or more) equilibria. In one equilibrium, the market for corporate equity is thin, and the price volatility is high, which reduces both demand and supply of stocks and keeps the market thin, while in the other equilibrium, the market is thick and the price volatility is

low, which encourages demand and supply of stocks. Pagano (1989b) shows that the positive feedback between trading volume and liquidity can lead traders to concentrate all exchanges on a single market or create a parallel market for large trades.

Applying the dual equilibria argument to the TSE in the prewar period, we argue that the TSE before 1918 may have been in the low market liquidity equilibrium. It was in equilibrium in the sense that that the firms who were not listed did not have incentive to be listed *given* the existing level of market liquidity. From this point of view, the listing policy change in 1918 can be viewed as an exogenous shock that increased the market liquidity. This led to the listings of many companies that were previously not listed. More important, the increased market liquidity should have convinced some firms that they would be better off if their shares are listed. Thus, the 1918 policy reform may have shifted the equilibrium from the low liquidity one to the high liquidity one.

The explanation here assumes that listing on the TSE during the prewar period was very much like the IPO today. We can find evidence that suggests this characterization of listings is reasonable.

First, there are some anecdotes that show the companies decided to list their stocks to increase the capital by attracting new shareholders. For example, Noda (1980, 70–73) reports an example of Kyushu Railroad (*Kyushu Tetsudo*). The Kyushu Railroad was established in 1888 with official capital of ¥11 million, of which ¥7.5 million was planned to be funded initially. Because the financial market condition was rather tight in 1888, the shareholders were required to pay only ¥5 per share (for the par value of ¥50 per share) as the first installment to acquire shares, but collecting such a small portion was already difficult. Only 38.0 percent of the shareholders made the first installment payment by the due date. For the second installment of ¥5 per share that was due in March 1989, only 11.6 percent of the shareholders met the due date.

At this point, Seinosuke Imamura, a director of the Kyushu Railroad, advised the president to list the Kyushu Railroad stock on a stock exchange to facilitate the trades of the stock and to encourage the future installment payments.[11] Following this advice, the Kyushu Railroad listed shares on the TSE and the OSE in 1989. The strategy was successful. The stock price quickly rose above the par (paid-in) value, and the Kyushu Railroad did not have trouble collecting installment payments in time (at least until the financial panic of 1890).

Another example is Miyagi Boseki Dento, which listed its shares on the TSE in 1910. Miyagi Boseki started as a cotton spinning company in 1882

11. Seinosuke Imamura was also one of the founders of the Tokyo Stock Exchange and a large securities broker.

near Sendai, Miyagi Prefecture. In 1888, it succeeded in generating electricity using water mills originally designed for cotton spinning machines. In 1899, Miyagi Boseki merged an electricity company in the prefecture, Sendai Dento, and changed the name to add "Dento": Japanese for electric lamps (Kinugawa 1938, 338–46). In 1909, the company established the first hydroelectric power plant in Japan and started providing electricity for lamps in Sendai.

Figure 2.8 shows the official amount of capital, the paid-in capital, and the amount of total assets (book value) for Miyagi Boseki Dento around the listing. The figure shows that Miyagi financed the investment (including the building of the hydroelectric power plant) by collecting unpaid part of the capital first, until the existing shares were fully paid-in in 1909. The company listed its shares on the TSE next year and issued new shares. The figure suggests that the proceeds from the new share issues and subsequent collection of unpaid part of new shares were used to finance the continued expansion of Miyagi.

Figure 2.9 shows the number of shareholders and the top-ten shareholders concentration rate for Miyagi during this period. Before the listing of the shares in 1910, the number of shareholders gradually declined, and the shareholder concentration increased. This suggests that some shareholders failed to meet the required payments for the unpaid part of the shares and lost their rights. After listing the stock in 1910, the number of shareholders increased by more than 50 percent, and the shareholder con-

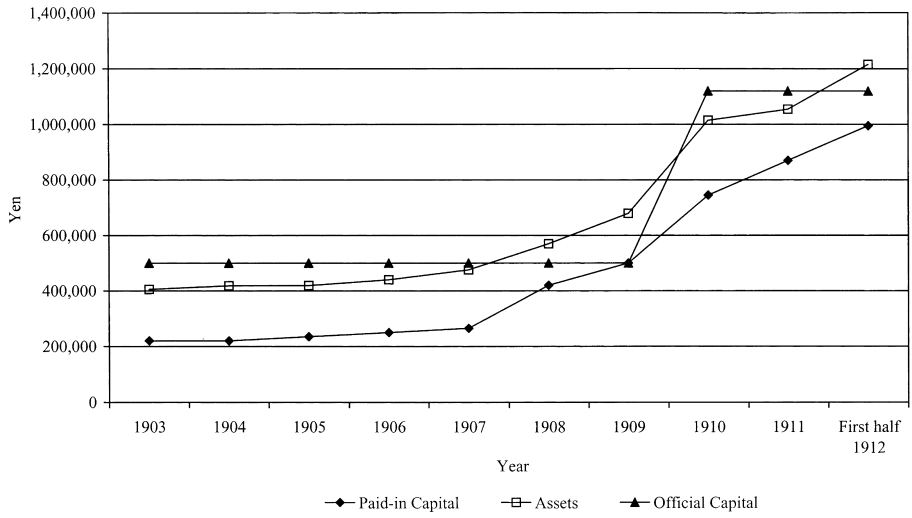

Fig. 2.8 Assets and capital, *Miyagi Boseki Dento*
Source: Miyagi Boseki Dento, Business Report (various issues).

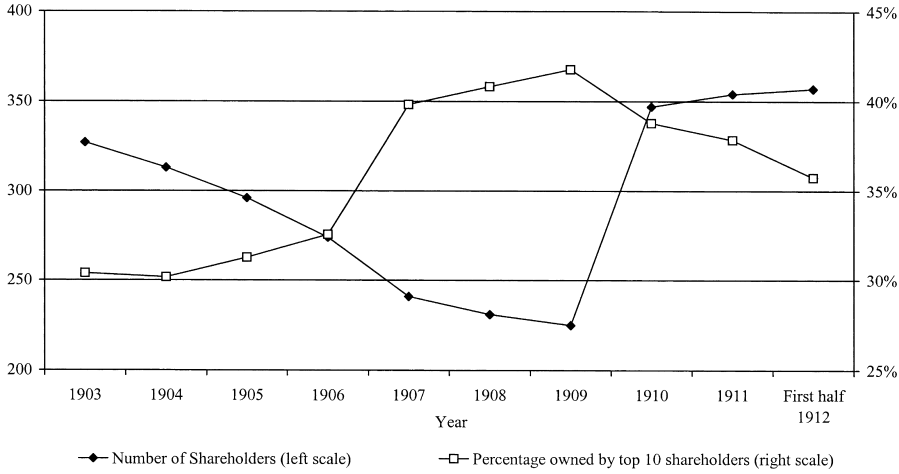

Fig. 2.9 Number of shareholders and ownership concentration of top-ten shareholders, *Miyagi Boseki Dento*

Source: Miyagi Boseki Dento, Business Report (various issues).

centration started to come down, suggesting the listing enhanced the shareholder base substantially.

The examples of Kyushu Railroad and Miyagi Boseki Dento show that the companies consciously decided to list their stock on the stock exchange to broaden the shareholder base and to increase the (paid-in) capital. The listing on the stock exchanges indeed made it easier for the companies to increase the capital.

Additional evidence that shows that listing on the stock exchange broadened the shareholder base and made it easier for the company to raise capital comes from a database of thirty-nine major joint stock companies in Tokyo during the 1890s. We divide the thirty-nine firms into three groups. The stocks of eleven companies were already listed on the TSE before 1890. Five companies are newly listed on the TSE between 1890 and 1899 (four in 1893 and one in 1894). The remaining twenty-three companies were not listed on the TSE (at least until 1900). Figures 2.10 and 2.11 respectively show the average number of shareholders and the average amount of paid-in capital for each of the three groups. To control for the size difference between these groups in 1890 so that we can focus on the difference in growth experience during the 1890s, the figure shows the index number normalizing the average for each group in 1890 to be 100. The figure clearly shows the newly listed firms increased the number of shareholders and the amount of paid-in capital during the 1890s. The already listed firms and the unlisted firms, on the other hand, did not increase the number of shareholders

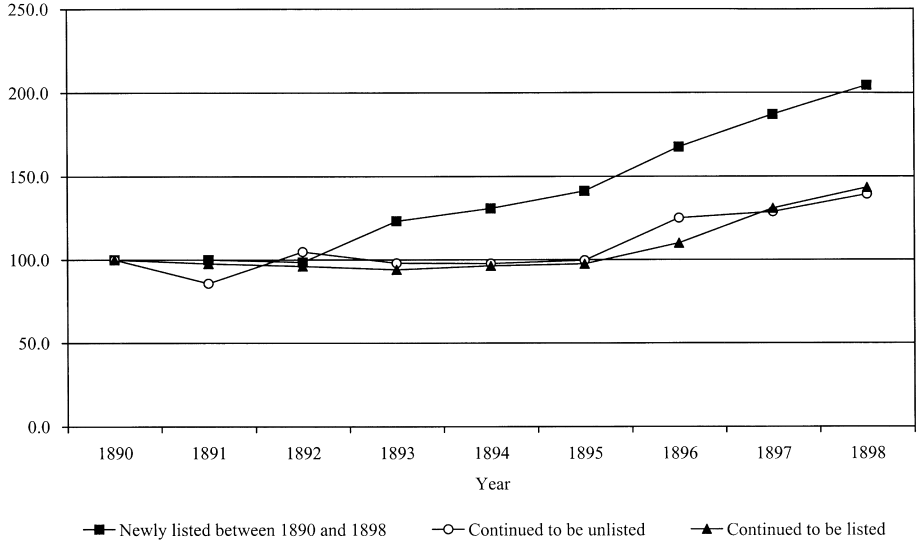

Fig. 2.10 Average number of shareholders, thirty-nine firms in Tokyo (1880 = 100)
Source: Tokyo Prefecture, *Statistical Handbook of Tokyo Prefecture* (various issues).

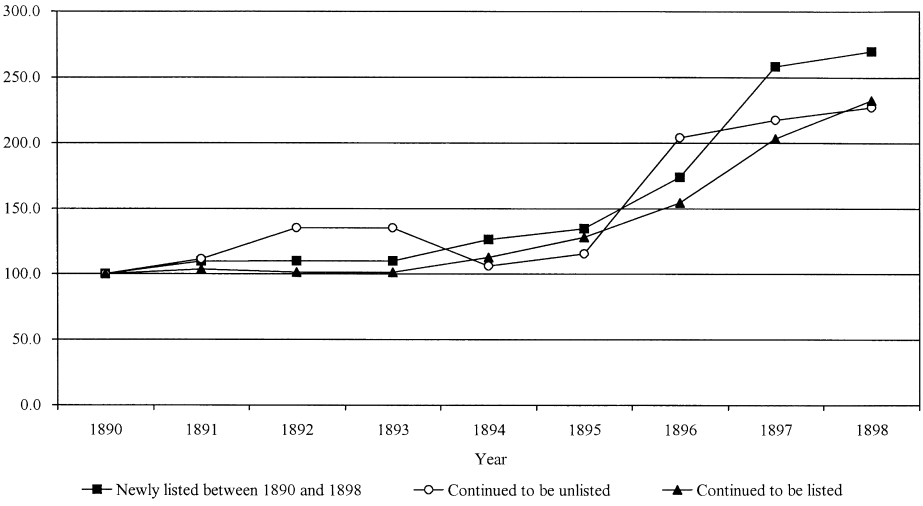

Fig. 2.11 Average amount of paid-in capital, thirty-nine firms in Tokyo (1880 = 100)
Source: Tokyo Prefecture, *Statistical Handbook of Tokyo Prefecture* (various issues).

very much. They increased the amounts of paid-in capital, but the growth rate was lower than that for the newly listed firms.

2.7 Listing Decisions of Cotton Spinning Firms

In this section, we use the data from cotton spinning industry to test a key implication of our argument that implies a listing decision depends on the size of the stock exchange. If the stock market is large and has large liquidity, the potential underpricing problem is mitigated, and the net benefit of listing increases. Thus, as a market expands, the likelihood of new listings tends to go up. This section estimates a simple probit model that explains new listing decisions of cotton spinning firms.

Cotton spinning was a leading industry in prewar Japan, and many of these companies were eventually listed on the TSE. More important, consistent data are available on both unlisted and listed companies, which allow us to analyze what factors influenced the decision to be listed. The data on cotton spinning firms are taken from the various issues of the *Menshi Bōseki Jijō Sankōsho* (*Reference Book on the Cotton Spinning Industry*) published by the Japan Cotton Spinning Association. The sample covers the period between 1905 and 1936.

We take all the companies whose financial data are available in the *Menshi Bōseki Jijō Sankōsho* and checked whether they were listed on the TSE at the end of each year by referring to the materials used in section 2.3. Figure 2.12 presents an overview of the sample. The number of firms in each year was twenty-five to thirty-five until the late 1910s and fifty and seventy after that. Of these, the number of firms listed on the TSE was five to six until the late 1910s, and it increased to more than twenty in the late 1920s and 1930s. The number of firms listed on the long-term futures market was nine at the peak (1933 to 1935). Until 1932, the only firm listed on the short-term futures market was Kanegafuchi Bōseki. Nisshin Bōseki was added in 1933.

The cotton spinning industry in Japan was geographically concentrated around Osaka (Takamura 1971). Reflecting this, the proportion of companies located in the eastern regions (Hokkaido, Tohoku, Kanto, and Chubu) was 42 percent at the peak (1936) and 14 percent at the bottom (1914). (See figure 2.13.) Companies from the eastern regions nevertheless represented a higher proportion of listed companies on the TSE. This suggests that there was home bias with respect to listing on the TSE. The magnitude of the bias substantially declined after the late 1910s.

To examine the determinants of listing on the TSE by cotton spinning firms, we estimate a regression model similar to those estimated by Pagano, Panetta, and Zingales (1998) in their study of the Italian IPOs. They analyzed the determinants of IPOs by using panel data of Italian firms in 1982

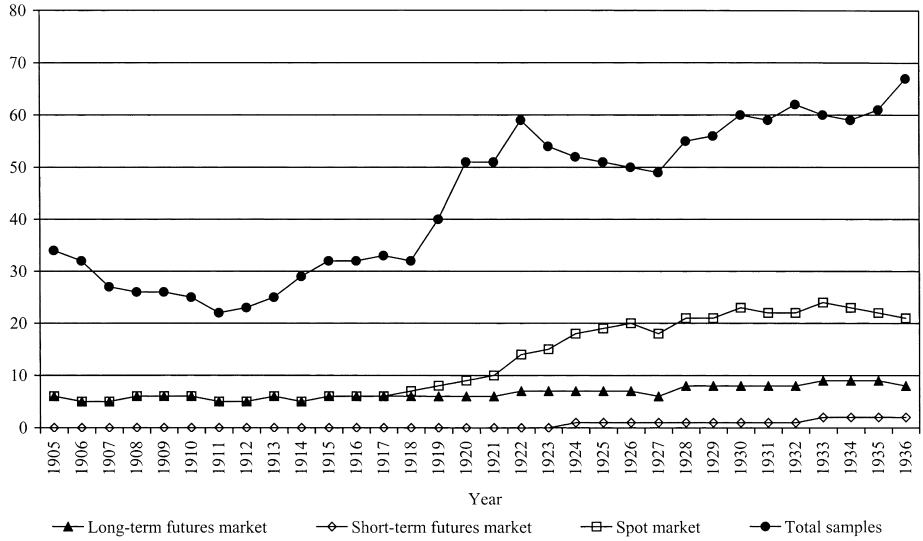

Fig. 2.12 Number of cotton spinning firms listed on the TSE: 1905–1936
Source: See next.

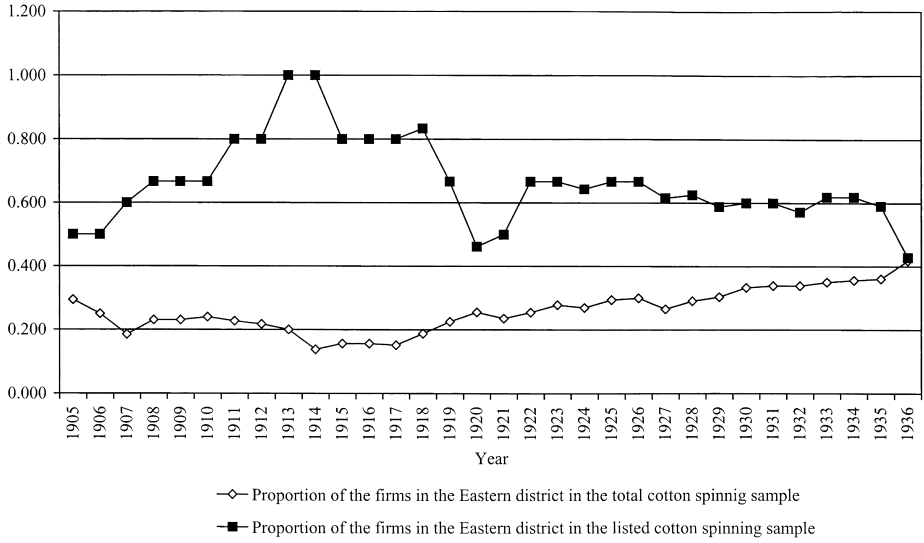

Fig. 2.13 Regional bias of cotton spinning firms listed on the TSE
Source: See text.

to 1992. Using the firms that conformed to the listing criteria for the Milan Stock Exchange but were not listed, they regressed the dummy variable denoting IPO to several explanatory variables on corporate attributes and the environment. They found that a firm is more likely to decide to go public if the amount of sales is high, the sales growth is high, it has high return on assets (ROA), and the firms in the same industry that are already listed show high market-to-book ratio.

The probit model that we estimate is the following:

$$\Pr(L_{it} = 1) = \Phi[\beta_0 + \beta_1 \log(CAP_{it-1}) + \beta_2 Age_{it-1} + \beta_3 ROE_{it-1} + \beta_4 East_i + \beta_5 \log(TSE_{t-1})],$$

where L_{it} is the dummy variable that takes 0 if firm i has never listed on the TSE as of year t. It takes 1 if the firm was newly listed on the spot market of the TSE in year t. The companies that were newly listed on the TSE in year t are dropped from the sample in year $t + 1$ on. Thus, we try to estimate the factors that influence the new listings. The expression $\Phi(\cdot)$ denotes a cumulative normal distribution function. CAP is the paid-in capital normalized by the average paid-in capital of the total joint-stock companies in Japan. Age is the years from the foundation of the firm. East is the dummy variable that takes 1 if the headquarter of the firm was located in the eastern regions of Japan, and 0 otherwise. Finally, TSE_t is the total amount of capital of the stocks listed on the spot market of the TSE in year t. If the market size is the important determinant of listing decision of individual firms, we expect to find the coefficient of TSE to be positive.

We estimate the regression separately for two subperiods: the period before 1918 and the period after 1918. The listing policy change in 1918 suggests that the listings before 1918 were initiated by the firms. They had to apply to be listed. Thus, by looking at the listing events, we can study what factors influenced the firm's decision to seek listing. After 1918, the TSE was able to initiate the listing without any requests from the firms. Thus, we can consider some listing events after 1918 continued to be the firms' decision while some listing decisions were done solely by the TSE. The fact that the listing observations after 1918 include these two different types of decisions makes it difficult to interpret the regression result for this period.

Table 2.5 reports the result. The first column shows the estimation result for the period before the 1918 change. The coefficient on CAP is positive though statistically significant only at 10 percent level, suggesting that the probability of listing was higher for large firms. The coefficient on East is positive and statistically significant at 5 percent level, suggesting that there was a home bias in listing on the TSE. The coefficient on TSE is positive though it is statistically significant only at the 10 percent level.

Thus, the result from the period before 1918 suggests that large firms in the eastern part of Japan were more likely to be listed on the TSE. It also suggests larger market size of the TSE encouraged the firms to be listed on

Table 2.5 **Probit model of listing decision**

	1905–1917	1918–1935
log(paid-in capital)	3.004*	0.549***
	(1.699)	(0.205)
Age	0.050	0.013
	(0.074)	(0.013)
ROE	–6.393	0.205
	(4.029)	(1.034)
East	7.099**	–0.090
	(3.512)	(0.346)
log(TSE)	3.749*	–0.318
	(2.128)	(0.382)
No. of observations	296	644

Notes: The dependent variable is a dummy variable that takes one if the company lists its shares on the Tokyo Stock Exchange (TSE) in that year. ROE = return on equity. After the listing event, the company is dropped from the sample, so that all the observations with the dummy variable = 0 are the companies that have never been listed on the TSE. The model is estimated with probit estimation. Numbers in parentheses show the standard errors of the coefficient estimates.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

the market, providing suggestive evidence for the key implication of our story.

The second column of table 2.5 reports the results from the period after 1918. Here the only statistically significant coefficient is CAP. This may be a result of large firms continued to be more likely to be listed. Or this may reflect the TSE's preference toward large firms when they listed the stocks without waiting for the applications. If we were able to distinguish the listings initiated by the firms from those initiated by the TSE, we could check whether the listings initiated by the companies continued to be influenced by the market size after 1918 (which is a prediction of our story). Unfortunately, we have not been able to find such information so far.

2.8 Concluding Remarks

The size of the stock market relative to the size of national economy was large in the late 1920s and 1930s Japan. During the first forty years since the establishment of the TSE in 1878, however, the market was relatively small and the listed firms were concentrated in the areas close to Tokyo. This chapter examined why the TSE stayed relatively stagnant during the first forty years and why it suddenly took off in the late 1910s.

We have found a small change in the TSE's policy toward listing in its spot market in 1918. Before 1918, the firms had to apply to the TSE to be

listed. After 1918, the TSE started trading some stocks without explicit applications from those firms. We argue that this apparently small policy change allowed the TSE to escape from the low liquidity equilibrium and to take off.

The argument that we advanced to explain the existence of the low liquidity equilibrium in the prewar stock market in Japan can be generalized to consider stock market development in other parts of the world in other times. The possibility that low expected liquidity discourages firms from listing their stocks in the market and justifies the expectation may be quite general.

The self-confirming nature of the expectation about the market liquidity implies several interventions that may be necessary for stock exchanges in developing economies to develop. The TSE solved the problem by listing major companies without waiting for their applications to be listed. Alternatively, a stock exchange (or the government) may be able to subsidize new companies to be listed on the stock exchange. Finally, there may be ways to attract more traders to the stock exchange to increase the market liquidity in general. In this case, what is more important for the liquidity (in the sense that large transactions can take place without changing the market price very much) is the presence of noise traders, as is shown by the models of stock market microstructure (see, for example, Kyle 1985).

Appendix A

Compilation of Listing Data

We have compiled the list of all the listed stocks in 1878, 1885, 1900, 1915, 1925, and 1935.

The information for 1878 and 1885 was taken from the TSE (1928). The TSE (1928) reports the listing (and delisting) dates for all the stocks on the futures market. Similar information is not available for the stocks listed only on the spot market, but this is not a problem for the period before 1896, when all the stocks on the spot market were also listed in the futures market. Thus, we can use the data to create a complete list of listed stocks for 1878 and 1885.

A complete list of the listed stocks and their face values is available in the business reports of the TSE each year from 1900 to 1918. So we take the information for the years 1900 and 1915 from this source. With respect to 1925 and 1935, we take the data on the listed stocks and their face value from the unpublished version of TSE business reports, held at the TSE.

The information on the capital of each company was taken from various government reports, including *Ginkō-ka Hōkoku* (*The Report of the Bank-*

ing Section of the Ministry of Finance), *Ginkō-kyoku Nenpō* (*Annual Report of the Banking Bureau of the Ministry of Finance*), *Teikoku Tōkei Nenkan* (*The Imperial Statistical Year Book*), and *Nōshōmu Tōkei Hyō* (*The Statistics of Agriculture and Commerce*).

In addition to these government reports, we used *Zenkoku Shogaisha Yakuinroku* (*Directory of Corporate Directors*), 1900 and 1912 issues; *Ginkō Kaisha Yōroku* (*Directory of Banks and Companies*), 1925 and 1935 issues; *Teikoku Ginkō Kaisha Yōroku* (*Imperial Directory of Banks and Companies*), 1925 issue; and *Kabushiki Nenkan* (*Year Book of Corporate Stocks*), 1926 and 1936 issues, to collect the location, establishment year, and industry of each listed firm. We use the industry classification employed by the TSE (1938).

The data show interesting changes of industrial composition of listed firms over time. Of the twenty-four companies that had been listed before 1885, we see twenty of them were banks (and nineteen of them national banks). The concentration of listed companies in banking is understandable because the National Bank Act was the only law that defined joint stock companies and the limited liability of shareholders (Miyamoto 1990; Takamura 1996; Yoshida 1998, 28). Legislation for joint stock companies in other industries had to wait till the Commercial Code of 1893.

By 1890, the number of listed companies increased to ninety-six. The number of listed banks declined as the National Bank Act was phased out, but many railway companies were newly listed. Companies in other industries, including coal and petroleum, cotton spinning, and other textiles and foods, were also listed during this period.

By 1915, the number of listed companies increased further, and the industries represented became more diversified. There were 160 listed companies. We can identify the industries for 151 of them. The share of the railway companies declined to 21.2 percent. While new companies running electric railways in the urban areas emerged, large railway companies disappeared due to the nationalization of the main lines in 1906 (Noda 1980, 310–13). The electricity industry saw its share go up sharply from 1900 to 1915. The electricity companies, which were in the early stages of development and needed large-scale investment, actively raised funds from the stock market (Kikkawa 1995, chapter 1). Besides electricity, the shares of such industries as coal and petroleum, sugar, and gas also went up in this period.

By 1925, the number of listed companies reached 712, following the expansion of the spot market after 1918. The industries became even more diverse. The share of the railways, which still had the largest share, was only 8.3 percent. The shares of such industries as insurance, machinery, chemistry and metal, which developed during World War I, went up. In 1935, 919 companies were listed, and the industrial composition was similar to that in 1925.

Appendix B

This appendix shows that the market liquidity is an increasing function of the number of firms listed in the market using a standard model of stock market microstructure. Baruch and Saar (forthcoming) consider a special case of this model and obtain a similar result.

Consider k listed stocks, whose fundamental values depend on n ($\leq k$) signals:

$$\mathbf{V} = \mathbf{M} + \mathbf{FS} + \mathbf{\Theta}, \tag{B1}$$

where $\mathbf{V}$ is ($k \times 1$) vector of the fundamental values, $\mathbf{M}$ is ($k \times 1$) vector of the mean fundamental values, $\mathbf{S}$ is ($n \times 1$) vector of signals, $\mathbf{F}$ is ($k \times n$) matrix whose (i, j) element shows how the fundamental value of stock i is influenced by the signal j, and $\mathbf{\Theta}$ is ($k \times 1$) vector of idiosyncratic shocks. $\mathbf{F}$ is assumed to have rank k.

We assume the signals are distributed normally, and the covariance matrix of $\mathbf{S}$ is given by $\sigma^2\mathbf{I}$, where $\mathbf{I}$ is the identity matrix. The idiosyncratic shocks follow the standard normal distribution and are assumed to be independent with each other and with $\mathbf{S}$.

Following Kyle (1985) and the related literature, we assume the market price of a stock is determined by the market maker so that the price is equal to the expected fundamental value of the stock given the order flows the market maker observes. Let $\mathbf{Q}$ be ($k \times 1$) vector of the orders by the informed traders, who observe the values of $\mathbf{S}$ before they submit the orders. The informed traders decide their position to maximize the expected profit from trading, given the pricing rule of the market maker. The market also has noise traders, whose orders are denoted by ($k \times 1$) vector $\mathbf{X}$. We assume $\mathbf{X}$ follows a normal distribution with mean zero and variance $\sigma_x^2\mathbf{I}$. The market maker and both types of traders are assumed to be risk neutral.

Under the assumption of normal distributions, the equilibrium pricing rule and hence the optimal trading strategy for the informed traders become linear functions. Let us denote these as follows.

$$\mathbf{Q} = \mathbf{BS} \tag{B2}$$

$$\mathbf{P} = \mathbf{M} + \mathbf{\Lambda}(\mathbf{Q} + \mathbf{X}), \tag{B3}$$

where $\mathbf{B}$ is ($k \times n$) matrix whose (i, j) element shows how the informed traders adjust their order of stock i responding to signal j, $\mathbf{P}$ is ($k \times 1$) vector of the market prices of the stocks, and $\mathbf{\Lambda}$ is ($k \times k$) matrix whose (i, j) element shows how the market maker adjust the price of stock i when the order flow for stock j changes. Note that the price cannot respond to $\mathbf{Q}$ and $\mathbf{X}$ differently because the market maker cannot distinguish which orders come from the informed traders.

The informed traders maximize their expected profits from trading:

$$E\pi = E[(\mathbf{V} - \mathbf{P})^T\mathbf{Q}] = (\mathbf{FS} - \mathbf{\Lambda Q})^T\mathbf{Q},$$

where the superscript T denotes the transpose of the matrix, and E denotes the expectation operator. The first order condition is given by:

$$\mathbf{FS} - \mathbf{\Lambda Q} - \mathbf{\Lambda}^T\mathbf{Q} = 0.$$

Thus,

$$\mathbf{Q} = (\mathbf{\Lambda} + \mathbf{\Lambda}^T)^{-1}\mathbf{FS}, \text{ which implies:}$$

$$\mathbf{B} = (\mathbf{\Lambda} + \mathbf{\Lambda}^T)^{-1}\mathbf{F} \tag{B4}$$

If we divide the variance-covariance matrix of the vector $(\mathbf{V}^T, \mathbf{Q}^T + \mathbf{X}^T)^T$ into submatrices as follows,

$$\mathrm{Var}\begin{pmatrix}\mathbf{V}\\ \mathbf{Q}+\mathbf{X}\end{pmatrix} = \begin{pmatrix}\Sigma_{\mathbf{VV}} & \Sigma_{\mathbf{VQ}}\\ \Sigma_{\mathbf{QV}} & \Sigma_{\mathbf{QQ}}\end{pmatrix}.$$

Then, one can show:[12]

$$\mathbf{P} = E[\mathbf{V} \mid \mathbf{Q} + \mathbf{X}] = \mathbf{M} + \Sigma_{\mathbf{VQ}}\,\Sigma_{\mathbf{QQ}}^{-1}\,(\mathbf{Q} + \mathbf{X}). \tag{B5}$$

From equations (B1) and (B2), we can calculate:

$$\begin{aligned}\Sigma_{\mathbf{VQ}} &= \sigma^2\mathbf{FB}^T\\ \Sigma_{\mathbf{QQ}} &= \sigma_x^2\mathbf{I} + \sigma^2\mathbf{BB}^T.\end{aligned} \tag{B6}$$

Substituting equation (B6) into equation (B5) and comparing the result with equation (B3), it is straightforward to see:

$$\mathbf{\Lambda} = \sigma^2\mathbf{FB}^T[\sigma_x^2\mathbf{I} + \sigma^2\mathbf{BB}^T]^{-1} = \mathbf{FB}^T\left[\frac{1}{h^2}\,\mathbf{I} + \mathbf{BB}^T\right]^{-1}, \tag{B7}$$

where h denotes the square root of the signal to noise ratio ($\sqrt{\sigma_2/\sigma_x^2}$), which shows up repeatedly in the following calculation.

If $\mathbf{\Lambda}$ is symmetric (which can be confirmed), we can rewrite equation (B4) to get:[13]

$$\mathbf{B} = \frac{1}{2}\mathbf{\Lambda}^{-1}\mathbf{F}. \tag{B8}$$

Multiplying equation (B7) from the left by $\mathbf{\Lambda}^{-1}$ and substituting equation (B8), we get:

$$\mathrm{I} = 2\mathbf{BB}^T\left[\frac{1}{h^2}\,\mathbf{I} + \mathbf{BB}^T\right]^{-1}.$$

Multiplying both sides by $(1/h^2)\mathbf{I} + \mathbf{BB}^T$:

12. See, for example, Anderson and Moore (1979, theorem 3.1, 25–28).

13. The algebra used to get to the equation (B9) follow appendix A of Baruch and Saar (forthcoming).

$$\frac{1}{h^2}\mathbf{I} + \mathbf{B}\mathbf{B}^T = 2\mathbf{B}\mathbf{B}^T.$$

Thus, $\mathbf{I} = h^2\mathbf{B}\mathbf{B}^T$.

Substituting equation (B8) into this, we get

$$\mathbf{\Lambda}\mathbf{\Lambda}^T = \frac{h^2}{4}\mathbf{F}\mathbf{F}^T. \tag{B9}$$

The market liquidity is often defined as "depth" of the market, which is "the ability of the market to absorb quantities without having a large effect on price" (Kyle, 1985, 1330). Following this idea, we can argue the market liquidity is inversely related to the "magnitude" of $\mathbf{\Lambda}$ because a "large" $\mathbf{\Lambda}$ implies that the prices are very sensitive to any changes in order flows. Here we focus on the "magnitude" of $\mathbf{\Lambda}\mathbf{\Lambda}^T$ because it moves in the same direction as the "magnitude" of $\mathbf{\Lambda}$, and use the sum of the eigenvalues of this matrix as the measure of the "magnitude."

To consider how the market liquidity changes with the number of stocks listed (k), let us partition the matrix $\mathbf{F}$ into the first $k-1$ rows and the kth row.

$$\mathbf{F} = \begin{bmatrix} \mathbf{G} \\ \mathbf{g} \end{bmatrix} \tag{B10}$$

Now $\mathbf{G}$ is $[(k-1) \times n)]$ matrix, and $\mathbf{g}$ is $(1 \times n)$ vector. Similarly, partition $\mathbf{\Lambda}$ into a $[(k-1) \times (k-1)]$ matrix and the remaining parts.

$$\mathbf{\Lambda} = \begin{bmatrix} \mathbf{V} & \mathbf{v}^T \\ \mathbf{v} & \lambda_{kk} \end{bmatrix}, \tag{B11}$$

where $\mathbf{V}$ is $[(k-1) \times (k-1)]$ matrix, $\mathbf{v}$ is $[(1 \times (k-1)]$ vector, and λ_{kk} is a scalar.

Let $\Gamma(k; j)$ denote the liquidity of the first j stocks when k stocks are listed, which we measure as the sum of the eigenvalues of the submatrix of $\mathbf{\Lambda}\mathbf{\Lambda}^T$ that contains the upper left $j \times j$ elements. Because the sum of the eigenvalues is equal to the trace of the matrix, using equation (B9) and the partition of $\mathbf{F}$ and $\mathbf{\Lambda}$, we see:

$$\Gamma(k-1; k-1) = \frac{h^2}{4} \operatorname{tr} \mathbf{G}\mathbf{G}^T, \tag{B12}$$

where tr denotes the trace of the matrix.

To compare this to $\Gamma(k; k-1)$, we first substitute equations (B10) and (B11) into equation (B9) to get:

$$\begin{bmatrix} \mathbf{V} & \mathbf{v}^T \\ \mathbf{v} & \lambda_{kk} \end{bmatrix} \begin{bmatrix} \mathbf{V}^T & \mathbf{v} \\ \mathbf{v}^t & \lambda_{kk} \end{bmatrix} = \frac{h^2}{4} \begin{bmatrix} \mathbf{G} \\ \mathbf{g} \end{bmatrix} [\mathbf{G}^T \quad \mathbf{g}^T].$$

Thus,

$$\begin{bmatrix} \mathbf{V}\mathbf{V}^T + \mathbf{v}^T\mathbf{v}^T & \mathbf{V}\mathbf{v} + \mathbf{v}^T\lambda_{kk} \\ \mathbf{v}\mathbf{V}^T + \lambda_{kk}\mathbf{v}^T & \mathbf{v}\mathbf{v} + \lambda_{kk}^2 \end{bmatrix} = \frac{h^2}{4}\begin{bmatrix} \mathbf{G}\mathbf{G}^T & \mathbf{G}\mathbf{g}^T \\ \mathbf{g}\mathbf{G}^T & \mathbf{g}\mathbf{g}^T \end{bmatrix}.$$

Therefore,

$$\mathrm{tr}\mathbf{V}\mathbf{V}^T + \mathrm{tr}\mathbf{v}^T\mathbf{v}^T = \frac{h^2}{4}\mathrm{tr}\mathbf{G}\mathbf{G}^T.$$

Because $\mathrm{tr}\mathbf{v}^T\mathbf{v}^T$ is the sum of square of each element of $\mathbf{v}$, it must be positive. Noting this, we establish:

$$\Gamma(k; k-1) = \mathrm{tr}\mathbf{V}\mathbf{V}^T = \frac{h^2}{4}\mathrm{tr}\mathbf{G}\mathbf{G}^T - \mathrm{tr}\mathbf{v}^T\mathbf{v}^T < \frac{h^2}{4}\mathrm{tr}\mathbf{G}\mathbf{G}^T = \mathbf{\Gamma}(k-1; k-1).$$

Thus, the price response of a set of stocks becomes smaller when an additional stock is listed on the market. In this sense, the market liquidity is an increasing function of the number of stocks listed.[14] The result has a very intuitive interpretation. As the number of listed stocks grows, the information useful in predicting the fundamental value of a stock can be found in the order flows of many stocks, as long as their fundamental values are influenced by the same factors as well. Thus, the information revealed by the order flow of any single stock becomes smaller, leading to a smaller price response to the order flow (and, hence, increased liquidity).

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14. Baruch and Saar (forthcoming) also obtain this result for a special case, although this is not the main focus of their paper.

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