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Banking Network and Financial Market Integration: A Case of Japan during the Late 19th Century

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1. Introduction

In this paper, I test the effectiveness of banking networks in integrating the national financial market. I focus on Japan during the late 19th century, when its financial system was in the process of modernization. I compare the effectiveness of 1) networks operated exclusively by private banks and 2) the network operated by the central bank and its correspondent partners.

After the enforced opening of the treaty ports in the 1850s, Japan began to trade internationally on a major scale. After the Meiji Restoration in 1868, the new government moved to establish modern monetary and financial systems with some trial and error. In the course of events, the government introduced a multiple issuing bank system based on the US model. The private sector quickly responded to the government's initiative by formulating a mesh-like banking network. The government then changed its policy by establishing the Bank of Japan (BOJ) in a bid to supplant the existing private networks with a central banking system of a European style. As a result, two types of networks co-existed during the early days of the BOJ. Tsurumi (1991) argues that the existing private banks and the new central bank competed each other[1].

At the onset of financial modernization in the 1870s, the Japanese government considered two options: 1) to construct correspondent networks among private issuing banks, as in the United States, or 2) to construct a single network operated by the central bank and its correspondent partners, as in Europe. The Japanese government first decided to adopt the former because the Japanese economy was decentralized, as in the United States.[2] The private issuing banks chartered by the national government were called "the national banks" named after the counterparts in the United States.

After the Seinan Civil War of 1877, the government began to lean towards the establishment of a central bank as the sole issuer of convertible banknotes. Masayoshi Matsukata became Finance Minister in 1882. At the founding of the BOJ, he declared that the central bank was to serve as the hub of Japan's national financial and payment system, pumping in liquidity just as a heart pumps blood to the human body. He blamed the existing national banks for driving up interest rates and hampering the national financial integration by failing to adequately cooperate with each other to adjust inter-regional surpluses and deficits of funds. He aimed at smoothing finances and helping the

[1] Tsurumi (1991), p.114.
[2] Bank of Japan (1982), pp.16-19; Ministry of Finance (1905), pp.25-26; Shizume and Tsurumi (2016), p.5.

economy in general by establishing the central bank.[3]

The government divested the national banks of the right to issue banknotes, granting it instead to the BOJ alone. The BOJ started issuing banknotes in 1885. The transformation from Japan's multiple issuing bank system to a single issuing bank system, the conversion of the previous national banks into ordinary banks, was completed by 1899.[4]

2. Quantitative Analyses

2.1 Banking Structure in the 1880s

Private banks flourished in the early 1880s in Japan (Table 1). The official statistics reported that 149 national banks, 90 private banks other than national banks, and more than 369 quasi-banks operated in Japan in 1881, the year before the BOJ was established.

The national banks, the main players in private financial activities, had been allowed to issue their own banknotes and were regulated by the government in return. Other private banks could operate more freely but were prohibited from issuing banknotes. While most of them were smaller and less influential than the national banks, some of them, such as Mitsui Bank, were just as powerful. Traditional money-changers and merchants also operated banking business on an unregulated basis. They were less powerful than the national banks and other major private banks.[5]

The Banking Bureau within the Ministry of Finance (MOF) compiled a report of its operations each year. The second report (1881) contained charts of the bilateral relationships between private banks. The BOJ also reported on its business to shareholders semiannually. The BOJ's 5th report (1885) included a table of the relationships between the BOJ and private banks. Tsurumi (1991) once studied the data in detail, but his analysis was purely descriptive. In this paper, we re-explore the statistics and employ some econometric analyses.

From the MOF Report, we find 842 bilateral relationships between private banks as of 1880 and 134 relationships between the BOJ and private banks as of 1884. The national banks were the main players in the network, while some other private banks and quasi-banks were also involved. From 1882, the first year of its operation, to 1893, the BOJ consisted of only its Headquarters in Tokyo and one branch in Osaka. In 1893, it established the West Branch (*Saibu Shiten*) in Shimonoseki, Yamaguchi Prefecture (later moved to Moji, Fukuoka Prefecture) and two offices in Hokkaido.

[3] Bank of Japan (1958), p.992, Bank of Japan (1982), pp.134-136.
[4] Shizume and Tsurumi (2016), p.13.
[5] A footnote from the official statistics acknowledged that the numbers of private banks and quasi-banks might be underestimated. The government, the footnote explained, had not been monitoring the activities of these institutions. Shizume and Tsurumi (2016), p.6.

Table 1. Private Financial Institutions as of the end of 1881

	National Banks			Private Banks excl. NBs			Quasi-banks			Grand Total Capital 1)
Prefecture	Number	Average Capital 1)	Total Capital 1)	Number	Average Capital 1)	Total Capital 1)	Number	Average Capital 1)	Total Capital 1)	
Tokyo	15	1,528	22,926	13	275	3,570	2	0	155	26,651
Osaka	13	224	2,910	11	51	560	1	50	50	3,520
Kanagawa	4	280	1,120	5	111	555	57	19	1,105	2,780
Nagano	5	178	890	17	78	1,330	10	0	5	2,225
Shizuoka	5	138	690	10	118	1,175	4	37	149	2,014
Fukushima	6	180	1,080	3	57	170	15	0	183	1,433
Ishikawa	4	130	520	1	30	30	42	18	747	1,297
Ibaraki	4	93	370	2	260	520	10	18	183	1,073
Kagoshima	3	167	500	1	400	400	12	13	151	1,051
Niigata	5	206	1,030	0	0	0	1	18	18	1,048
Yamaguchi	2	340	680	0	0	0	4	73	291	971
Nagasaki	5	140	700	2	85	170	3	15	46	916
Aichi	4	168	670	3	77	230	0	0	0	900
Oita	3	110	330	0	0	0	75	7	557	887
Gunma	2	250	500	0	0	0	14	24	340	840
Yamanashi	1	250	250	1	100	100	25	19	474	824
Gifu	6	87	520	3	85	255	5	0	32	807
Hyogo	6	108	650	0	0	0	8	20	157	807
Tokushima	1	260	260	1	500	500	0	0	0	760
Ehime	4	110	440	1	80	80	12	16	192	712
Shiga	3	167	500	1	100	100	2	0	60	660
Kochi	4	163	650	0	0	0	1	10	10	660
Saitama	1	200	200	3	37	110	16	22	348	658
Fukuoka	3	117	350	1	120	120	8	20	161	631
Yamagata	4	138	550	1	30	30	4	4	17	597
Okayama	2	190	380	4	45	180	0	0	0	560
Mie	4	88	350	2	50	100	10	7	66	516
Tochigi	1	300	300	1	100	100	7	11	74	474
Hiroshima	2	165	330	0	0	0	5	24	120	450
Kyoto	4	100	400	1	30	30	0	0	0	430
Shimane	2	140	280	0	0	0	9	9	80	360
Fukui	4	88	350	0	0	0	0	0	0	350
Aomori	2	150	300	1	2	2	4	0	33	335
Hokkaido	2	165	330	0	0	0	0	0	0	330
Tottori	2	135	270	0	0	0	1	17	17	287
Kumamoto	3	88	265	0	0	0	0	0	0	265
Miyagi	1	250	250	0	0	0	0	0	0	250
Chiba	2	108	215	1	30	30	0	0	0	245
Wakayama	1	200	200	0	0	0	0	0	0	200
Akita	1	100	100	0	0	0	2	37	75	175
Iwate	2	75	150	0	0	0	0	0	0	150
Okinawa	1	130	130	0	0	0	0	0	0	130
Total	149	295	43,886	90	116	10,447	369	16	5,895	60,228
Total excl. 15th Bank		176	26,060							

1) thousand yen.

Source: *The Second National Statistical Abstract of Japanese Empir*e, 1884.

2.2 Econometric Analysis

2.2.1 Descriptive Statistics

Was the networking of private banks insufficient to integrate the national financial market as Matsukata claimed? Did the BOJ network complement the gap? These are empirical questions. To answer them, I construct a dataset comprising 1) the number of pair-wise relationships among banks, and 2) correlations in monthly lending interest rates at the prefectural level.

First, we identify all the pairwise relationships between banks and classify them into the following categories: relationships within private banks and between the BOJ and private banks, relationships within the branches of a bank, and relationships across different banks through correspondent contracts. Then we compile those pairwise relationships at the prefectural level to build a matrix of the numbers of pairwise relationships between prefectures, creating data for 48*47/2=1128 pairs of prefectures.[6]

Second, we calculate correlations in monthly lending interest rates at the prefectural level using the MOF statistics for a five-year window from July 1886 to June 1891.[7] The MOF reported the low and high ends of the rates. We use the low rate because the high rate contains extraordinary high-risk premiums in some cases. As the data are missing for Sakai (now South Osaka and Nara), Kagawa, and Okinawa Prefectures, and overseas, we obtain 44*43/2=946 pairs. Tables 2 and 3 summarize the descriptive statistics of the banks and their pairwise relationships at the prefectural level.

We find 305 bank offices within the network: 155 headquarters of private banks, 108 branches of private banks, and the one headquarters and one branch of the BOJ. The largest number of bank offices in any single prefecture was 38 (Tokyo), and every prefecture had at least one office (Table 2).

We find 810 bilateral relationships between banks across prefectures, of which 679 relationships were between private banks and 131 were associated with the BOJ (all but one were between the BOJ and private banks, the one exception being the relationship between the BOJ Headquarters in Tokyo and its Osaka Branch).[8] Among the private banks, 50 were relationships between branches in-house and 629 were between different banks. In terms of the number of relationships, the banking network was operated mainly through correspondent networks rather than branch banking. The correlation in lending interest rates between pairs of prefectures was positive on average, indicating that interest rates tended to move together at the prefectural level. The standard

[6] We divide the country into 47 prefectures and add one area representing overseas.

[7] We start the five-year window from July 1886, when the data was available for the first time. The data is downloadable from the website of the Institute for Monetary and Economic Studies: http://www.imes.boj.or.jp/english/hstat/data/prefecture/index.html

[8] We exclude relationships within a prefecture. There were 129 such relationships, including one in Sakai Prefecture.

deviation, however, was larger than the average, suggesting that the correlation was negative in many cases and that the degree of market integration varied across prefectures. (Table 3)

Table 2. Descriptive Statistics on the Banks (47 prefectures)

	Total	Average	Max	Min	S.D.
Offices of Banks/Quasi-Banks in the network	305	6.354	38	1	6.057
Private Banks (National Banks and other Banks)	303	6.313	37	1	5.896
Headquarters	155	3.229	16	0	2.702
Branches	108	2.250	14	0	2.496
of Banks in other Prefectures	85	1.771	14	0	2.496
of Banks in the Prefecture	23	0.479	5	0	0.935
Quasi-Banks, Trading Houses, etc.	40	0.833	7	0	1.462
The Bank of Japan	2	0.042	1	0	0.200
Headquarters	1	0.021	1	0	0.143
Branches	1	0.021	1	0	0.143

Source: The Second Report of the Banking Bureau, Ministry of Finance, 1882.

Table 3. Descriptive Statistics on the Pairwise Relationships between Banks (44 prefectures)

	Total	Average	Max	Min	S.D.
Relationships between Private Banks	679	0.718	27	0	1.965
Branch networking	50	0.053	5	0	0.389
Correspondence networking	629	0.665	22	0	1.734
in association with the 1st National Bank	128	0.135	5	0	0.547
Relationships in association with the Bank of Japan	131	0.138	8	0	0.683
Correlation in Lending Interest Rates	-	0.271	0.912	-0.906	0.361

Sources: The Report of the Banking Bureau, Ministry of Finance; various years..

2.2.2 Effects of the Private Bank and Central Bank Networks

We run the ordinary least squares (OLS) regression represented in equation (1).

$$CR_{i,j} = \alpha_0 + \alpha_1 NWPB_{i,j} + \alpha_2 NWCB_{i,j} + \varepsilon_{i,j} \qquad (1),$$

where $CR_{i,j}$ is the correlation in the monthly lending rates of banks between prefectures i and j from July 1886 to June 1891, $NWPB_{i,j}$ is the number of bilateral relationships between private banks in prefectures i and j, and $NWCB_{i,j}$ is the number of bilateral relationships between the BOJ and private banks in prefectures i and j.

The regression analysis shows that the bilateral relationship between private banks helped to significantly converge interest rates between prefectures, increasing the interest rate correlation between prefectures by 0.043 points (from 0.242 to 0.284), while the bilateral relationship between the central bank and its partners did not (Table 4).[9] This suggests that the network of the new central bank added comparatively little to the existing private bank network in terms of financial market integration across prefectures.

Table 4. Effects of the banking networks on the convergence of bank lending rates

Dependent variable: correlation of lending rate

	All prefectures														
Ind. variables	Coefficient		(S.E).			Coefficient		(S.E).			Coefficient		(S.E).		
Constant	0.242	(	0.012	)	**	0.262	(	0.012	)	**	0.241	(	0.012	)	**
Private banks	0.041	(	0.006	)	**	-					0.043	(	0.007	)	**
BOJ	-					0.064	(	0.017	)	**	-0.012	(	0.021	)	
Adj. R2	0.048					0.014					0.047				

**: significant at the 1 percent level.

The networks among banks involve two kinds of relationships: the relationship between the headquarters of a bank and its branches, and correspondent contracts between banks. Here we run a regression with variables identifying relationships between different banks through correspondent contracts from those within the headquarters and branches of individual banks.

$$CR_{i,j} = \alpha_0 + \alpha_1 PBbranch_{i,j} + \alpha_2 PBcorres_{i,j} + \alpha_3 CBbranch_{i,j} + \alpha_4 CBcorres_{i,j} + \varepsilon_{i,j} \quad (2),$$

where $PBbranch_{i,j}$ is the number of branch relationships of individual private banks in prefectures i and j, $PBcorres_{i,j}$ is the number of bilateral relationships through correspondent contracts between private banks in prefectures i and j, $CBbranch_{i,j}$ is the number of branch relationships of the BOJ in prefectures i and j, and $CBcorres_{i,j}$ is the number of bilateral relationships through correspondent contracts between the BOJ and private banks in prefectures i and j.

Table 5. Effects of branch/correspondent networks on convergence in bank lending rates

Dependent variable: lending rate correlation

	All prefectures									
Independent variables	Coefficient		(S.E).			Coefficient		(S.E).		
Constant	0.237	(	0.012	)	**	0.240	(	0.012	)	**
PB branch	0.023	(	0.039	)		-0.002	(	0.034	)	
PB correspondent	0.053	(	0.009	)	**	0.047	(	0.008	)	**
BOJ branch	-0.651	(	0.437	)		-				
BOJ correspondent	-0.019	(	0.023	)		-				
Adj. R2	0.049					0.048				

**: significant at the 1 percent level.

[9] To check robustness, the regression with the same equation and the sample of Tokyo/Osaka and other prefectures returns qualitatively equal results.

The regression analysis shows that the correspondent networks among different banks significantly converged interest rates among prefectures, whereas the branch networks within individual banks and the networking associated with the BOJ had no such effect (Table 5). In a nutshell, the correspondent networks among different banks were key to the integration of the national financial market.

To compare networking activities of a private bank and the central bank, we use the case of *Dai-ichi Kokuritsu Ginko* (the First National Bank) and the BOJ. The First National Bank, led by Eiichi Shibusawa, a prominent entrepreneur who had formerly served in the Ministry of Finance, operated a headquarters in Tokyo and eight branches, including one overseas (Busan, Korea). The bank had 131 bilateral relationships with other banks and eight between its own headquarters and branches. The Tokyo Headquarters had 48 bilateral relationships, the Osaka Branch, 41, and the Kyoto Branch, 23. The networking of the First National Bank was comparable to that of the BOJ in numbers. The BOJ operated a headquarters and one branch and had 134 bilateral relationships with other banks and one bilateral relationship between its own headquarters and branch.

Table 6. Effects of the Private Bank and Central Bank Networks

Dependent variable: lending rate correlation

	All prefectures				
	coefficient		(S.E).		
constant	0.241	(	0.012	)	**
NB excl. 1st-NB	0.035	(	0.008	)	**
1st-NB	0.088	(	0.024	)	**
BOJ	-0.015	(	0.021	)	
adj. R2	0.050				

**: significant at the 1 percent level.
*: significant at the 5 percent level.

The network of the First National Bank significantly increased the correlations in prefectural lending rates by 0.088 (from 0.241 to 0.329). The networks of other private banks increased the correlations by 0.035 (from 0.241 to 0.276). The effect by the First National Bank was more than double that of the other private banks, suggesting that the former contributed more to the national financial market integration. The coefficient for the BOJ network is negative and statistically insignificant, suggesting that the new central bank did little to nothing for the integration (Table 6).

3. Narrative Analyses

Narrative analyses show that some of the leading private banks such as the First National Bank rigorously constructed their own networks to integrate the national financial market. They did so by building branches in regional financial centers and organizing other private banks as their correspondent partners.

Shibusawa, the founder of the First National Bank, had been working to integrate the national financial and payment systems for years. He led a series of attempts to build up a coordination mechanism to connect private banks with each other. He established the National Bankers Association (*Takuzen-Kai*, later *Ginko Syukaijo*) in 1877 and the clearing house in Osaka in 1879. He proposed an “Exchange Reserve System” for national banks at meetings of the National Bankers Association in 1877 and 1878. His plan was modeled after the US system, which his subordinate had studied intensively in the United States at his instruction. The point of discussion was the reserve city provision and the distribution of the heavy burden shouldered by “clearing” banks in the cities. He tried to persuade other bankers in different regions to build a national payment system. After heated debates about the burden, the association concluded by making a proposal to the government on a system with two reserve cities, Tokyo and Osaka. The government, however, chose not to adopt the plan from the private sector.[10]

After the failure of the National Bankers’ Association’s plan, some regional bankers’ associations set up clearing systems in regional bases. In 1880, the Kyushu Bankers Association, led by the Eighteenth National Bank in Nagasaki, initiated a plan for a national clearing system for the exchange of bills. It proposed the introduction of a "Joint Domestic Exchange (*Rentai Kawase)* System" with six regional centers (Hakodate, Sendai, Niigata, Nagoya, Hiroshima, and Nagasaki) and the two national centers (Tokyo and Osaka). The system was launched as a regional clearing system in Kyushu. The system never expanded to a nationwide scale, though the governor of the Eighteenth National Bank had tried to persuade members of other bankers’ associations and the BOJ to move in that direction. Bankers Associations in the Chugoku-Shikoku Region and the Oshu-Hokkai Region adopted the system in 1888 and 1893, respectively. The two big cities, Tokyo and Osaka, were dissuaded from participating by the heavy burdens of the clearing procedures. The BOJ also chose not to accept the plan, judging that the timing was "premature."[11]

In parallel with these developments, Shibusawa coordinated correspondent contracts with other banks. He helped, for example, two affiliated national banks in Gunma Prefecture, a leading center of silk production. His elder brother Kisaku Shibusawa participated in the establishment of the Thirty-Ninth National Bank in Maebashi as a shareholder, while managers of the Fortieth National Bank in Tatebayashi studied the banking business in Eiichi Shibusawa’s First National

[10] Tsurumi (1991), pp.102-111, Shizume and Tsurumi (2016), pp.11-12.

[11] Tsurumi (1991), pp.111-114, Shizume and Tsurumi (2016), p.12.

Bank. The Thirty-Ninth and Fortieth National Banks both had correspondent contracts with his bank.[12]

Eiichi also helped establish other banks such as the Sixteenth National Bank in Gifu, Gifu Prefecture, the Nineteenth National Bank in Ueda, Nagano Prefecture, and the Sixty-Ninth National Bank in Nagaoka, Niigata Prefecture. Correspondent contracts were also concluded between his bank and the Sixth National Bank in Fukushima Prefecture. Nagano, Gifu, and Fukushima, like Gunma, were leading centers of silk production, while Niigata was one of Japan's largest rice-producing prefectures.

A few of the other banks also built extended network systems. While different banks explored different networking policies, private banks formed a mesh-like network system as a whole. The Third National Bank in Tokyo had 75 bilateral relationships, mainly in the central part of Japan. The Forty-Fourth National Bank in Tokyo had 61 and Mitsui Bank in Tokyo had 54, including some in the northeastern and western coastal areas of the country. The Sixth National Bank in Fukushima had 37, mainly with other banks in Fukushima and banks in neighboring prefectures.[13]

These kinds of relationships were evolutionary in nature. Private banks formed networks by correspondent contracts and branching to adjust regional discrepancies in the supply and demand of funds along with commodity flows. The number of bilateral relationships between Tokyo and Osaka, the two commercial centers, was the largest, at 27. Tokyo held 15 bilateral relationships with Fukushima, a silk-producing prefecture, 13 and 12 with Kanagawa and Hyogo, the respective sites of the Yokohama and Kobe treaty ports, and 11 with the industrial centers of Kyoto and Aichi. Osaka had 10 bilateral relationships with Hyogo. The banks converged interest rates among regions that otherwise would have tended to diverge as the volumes of interregional commodity trade grew, causing different patterns of seasonal and cyclical demand for funds. Through this converging effect, the private banks helped integrate the national financial market.

The establishment of the BOJ seemed not to add any significant effects on the convergence of regional interest rates in the BOJ's early days. In fact, the official interest rates of the BOJ differed between its Tokyo Headquarters and Osaka Branch (Chart 1). Although the interest rates in Tokyo and Osaka were positively correlated, different patterns of demand for funds prevented their full convergence. In its early days, the BOJ set its lending rate in accordance with local financial conditions in the same manner as other banks.

The BOJ changed its stance toward the financial market for the first time after facing the banking panic of 1890 in Osaka and western Japan. After the panic the bank expanded its own national branch network and actively extended its lending operations by adding company stocks to

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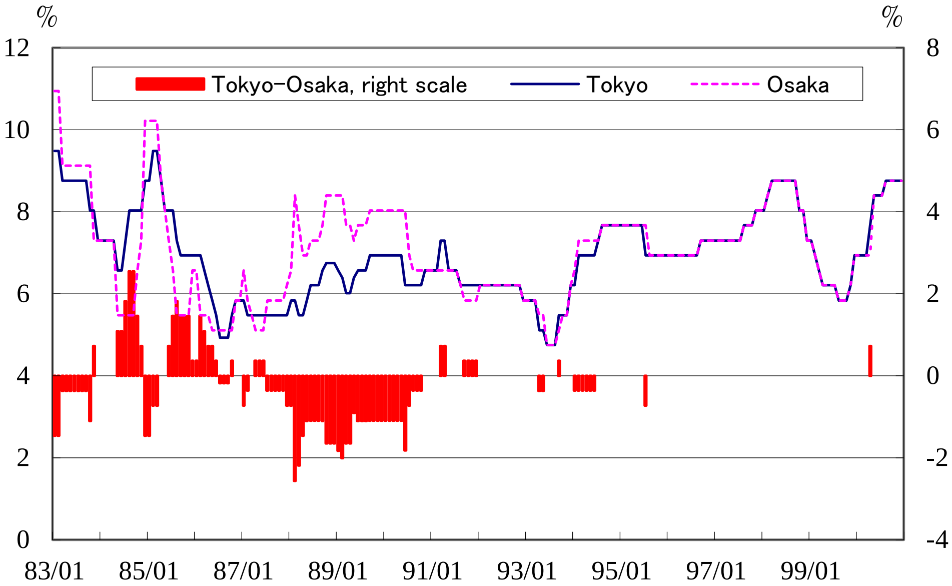
[12] Gunma Bank (1964), pp.XX-XX.

[13] Tsurumi (1991) explains the relation between commodity flows and the correspondent networks among private banks. Tsurumi (1991), pp.104-107.

eligible collaterals, paving the way to act as the lender of the last resort (LLR) toward the end of the century.

Chart 1. Official Discount Rates of the BOJ in Tokyo and Osaka



Source: the Bank of Japan.

4. Conclusion

The analyses of this paper reveal that the newly established central bank did no better than private banks in integrating the national financial market. Mitchener and Ohnuki (2007) demonstrates an integration of the national financial market over the long run (up toward the 1920s)[14]. This paper shows that the existing private banks had already contributed to the market integration to a certain extent, and that the BOJ needed time to learn to play its role as a central bank. These findings have a broader implication on the evolution of central banking. The Bank of England and Federal Reserve System did not undertake their roles as actively and promptly in their early days as they did in their later days. The Bank of Japan was no exception in this regard.

[14] Mitchener and Ohnuki (2007), pp.129-153.

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