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Non-performing Loans and Branch Deregulation

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# Non-performing Loans and Branch Deregulation<sup>1</sup>

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## Highlights

1 This paper discusses why banks provide loans to firms to induce overinvestments under branch deregulation.

2 When regulation is temporarily relaxed in a restricted market, a bank's rush to increase its branches and employees, even if it cannot make a profit, and the loss incurred by non-performing loans (*npl*), are regarded as entry costs.

3 The deregulation of local branches of banks in China from 2009–2014 can be considered as a quasi-natural experiment on the potential impacts on bank behavior and performance.

4 Based on macro- and micro-panel bank data, the branch deregulation policy significantly reduced the quality of bank offerings and profits, whereas the number of branches and employees, as well as *npl*, increased significantly.

## Abstract

The paper attempts to theoretically and empirically explain why banks provide loans to firms to induce overinvestments. In an oligopoly market with strict restrictions in which regulation is temporally relaxed, a bank is likely to increase its branches, as well as employees, even if it cannot make a short-term profit. The reason for this is that the loss of profit by non-performing loans (*npl*) is regarded as an entry cost. Branch restrictions were relaxed for local (commercial and city) banks in China in the period 2009–2014, whereas the “big four” banks operated without restrictions. Therefore, this deregulation can be considered as a quasi-natural experiment on the potential impacts on bank behavior and performance. Analysis of macro- and micro-panel bank data (> 1,700 observations from 2007–2017) showed that branch deregulation policy significantly decreased quality of offerings and profits, while significantly increasing the number of branches, employees, and *npl*.

JEL classification: G21, G28

Keywords: Bank, Branch deregulation, Non-performing loans

## **1 Introduction**

### **1.1 Non-performing loans and banking problems in China**

Since 2011, the number of non-performing loans (*npl*, hereinafter) has increased, whereas the return of asset (*roa*) has decreased, even though bank assets showed a continuous increase (Figure 1). Wan (2015, 2018b, 2021d)<sup>1</sup> discussed possible reasons as to why *npl* showed an increase in line with bank assets, and found that corporate overinvestments via housing bubbles resulted in a higher number of *npl*, even when a bubble was ongoing. This phenomenon has garnered serious consideration from political leaders, as indicated by President Xi Jinping's remark on April 2, 2018 that "We must prevent and solve the problem of financial risk."<sup>3</sup>

A natural question arises as to why banks offer loans to firms that induce overinvestments (Qiu and Wan 2018; 2021a, 2021b; Wan 2021b, 2021c; Wan and Qiu 2020)?<sup>4</sup> One reason may be the bank branch deregulation policy in operation in China.

### **1.2 Bank regulation and branch deregulation**

The establishment of new bank branches is strictly regulated by the China Banking Regulatory Commission (CBRC). For historical reasons (Lin et al. 2015), the

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<sup>3</sup> For details, see [http://www.xinhuanet.com/2018-04/02/c\\_1122627816.htm](http://www.xinhuanet.com/2018-04/02/c_1122627816.htm)

<sup>4</sup> A housing bubble induces speculative saving and was one of the causes of the US-China trade war, as shown by Wan (2021a).

Industrial and Commercial Bank of China, Bank of China, Construction Bank of China, and Agricultural Bank of China (the “big four” banks) have branches in almost every city and county, whereas commercial and city banks cannot open a new branch in any other city or county without the CBRC’s permission. To promote bank competition, the CBRC relaxed branch regulations in the period 2009–2014. On April 30, 2009, the CBRC issued a new policy, the “Policy on New Branches for Middle and Small Commercial Banks and City Banks.” The key focus of the new policy was to make it easier for commercial and city banks to open new branches in other cities and counties. When the policy was enacted, the number of branches increased, as shown in Figures 2 and 3. Table 1 shows the regional distribution of the banking industry from 2010–2012 and the increase in the number of branches.

### **1.3 Contribution of this research**

Here, we present a theoretical framework and use macro- and micro-data to identify the potential impacts of the branch deregulation policy on bank behavior and performance. Because the branch deregulation policy cannot be expected to continue indefinitely, commercial and city banks have strong incentives to rapidly expand their branches and scale in a short period of time. The profit and quality of bank assets for

commercial and city banks are thus lower in the short term, as the scale economy takes some time to be realized. Thus, the market share of the big four banks, as well as the market concentration, would be reduced in the short term by new branches. We used macro- and micro-panel bank data (> 1,700 observations from 2007–2017) to perform a panel estimation. The market share of the big four banks was reduced considerably by the branch deregulation policy. Additionally, the return of equity (*roe*, hereinafter) decreased significantly, whereas the number of branches, employees, and *npl* increased.

This paper is organized as follows. Section 2 presents a theoretical framework and hypotheses. Section 3 reports the data set and estimation results. The conclusion and policy implications are given in Section 4.

## **2 Theoretical Framework**

### **2.1 Related literature**

Striuh (2000) reported that the share of good banks increased with branch deregulation. In contrast, bank competition and redistribution of the market were negatively impacted (Striuh and Strahan, 2002). Bank profit, bank management efficiency, and regional economic growth were affected by branch deregulation policy in the United States (US) (Amel and Liang 1992; Beger 2000; Strahan 1995). In a

similar study conducted in Japan, Nagano (2012) found that although profit efficiency and cost efficiency did not improve significantly over the short run, the introduction of cross-regional banking branches improved profits and costs in the long term.

## 2.2 Entry of new bank branches and branch deregulation

Here, we assume that the supply of bank loans increases linearly with the interest rate, a supply curve  $S(r)$  as shown in Figure 4. Each bank faces two “downward” linear demand curves pertaining to banking loans. The first curve,  $D_1(r)$ , expresses the demand for loans after adjustment of the credit risk (*npl, ex-post*), while the second curve,  $D_2(r)$ , represents the demand for loans before adjusting for credit risk (*npl, ex-ante*). We further assume that the bank is able to identify the credit risk associated with each loan, and that this risk increases with the volume of loans. Hence, the slope of  $D_1(r)$  is lower than that of  $D_2(r)$ . We obtain three market equilibriums: perfect competition ( $E_1$  in Figure 4) and a monopoly market ( $E_2$  in Figure 4) as well as an unusual or special market ( $F_3$  in Figure 4). As shown by Seade (1980), the entry of a new bank branch pushes the market equilibrium downward following the  $D_1(r)$  for the given oligopoly market. From this, we propose the following.



***Proposition 1:***

Branch deregulation policy will increase market competition.

***Proof:***

Suppose that there are  $n$  ( $> 1$ ) cities; every city has only one city bank, and every city bank has only one branch in its own city. When a city bank is permitted to launch a new branch in another city, a maximum of  $n(n-1)$  new branches will be newly established. With the entry of new bank branches, the market will become more competitive. ***Q.E.D.***

Because branch deregulation policy was temporarily applicable to city banks and other non-big four banks, these banks were incentivized to launch new branches. After the launch of a new bank branch, the market share of the big four banks decreases due to the limited loan demand.

***Proposition 2:***

Branch deregulation policy decreases the profit and quality of bank assets (proxied by  $npl$ ), at least in the short term. Deregulation may also cause a banking crisis.

**Proof:**

The *ex-ante* interest rate decreases with the loan size, following  $D_2(r)$ , and the credit risk of a loan (proxied by  $npl$ ) increases with the loan size, given that the slope of  $D_1(r)$  is lower than that of  $D_2(r)$ .

For simplicity, we further assume that  $S(r)=\mu r$ ,  $D_1(r)=r_H-\eta_1 r$ ,  $D_2(r)=r_H-\eta_2 r$ ,  $r_H>0$ ,  $\mu>0$ ,  $\eta_1>\eta_2>0$ , and a regularity condition of  $\mu r_H \frac{\eta_1}{\mu+\eta_1} < \left(\frac{\eta_2}{\mu+\eta_2}\right)^2$ . For the unusual *ex-ante* equilibrium  $F_3$ , the banking sector suffers *ex-post* big loss following the  $D_1(r)$ , and the total surplus defined by summation of area of two triangles ( $\Delta O r_H E_1$  and  $\Delta L_4 L_3 E_3$ ) could be strictly negative as shown by

$$\Delta O r_H E_1 + \Delta L_4 L_3 E_3 < 0 \text{ iff } \mu r_H \frac{\eta_1}{\mu+\eta_1} < \left(\frac{\eta_2}{\mu+\eta_2}\right)^2. \quad (1)$$

At the *ex-ante* equilibrium  $F_3$  in Figure 4, the *ex-post* profit is negative and the total (or social) surplus is also strictly negative; thus, a banking crisis occurs. ***Q.E.D.***

### 3 Empirical Analysis

#### 3.1 Macro data and individual bank data

For macro data on bank branches and bank employees, we visited the official website of the China Banking Association and extracted data from the Corporate

Responsibility Report 2007–2017, as well as the Annual Report of the CBRC 2006–2017. We collected data on the regional distribution of the banking industry from 2010–2012, from the official website of the People’s Bank of China.

We included 545 observations from the “Statistical Report of Commercial Banks 2007–2013” in our analyses. We downloaded the annual financial report of every bank from the official website and hand-collected the relevant information for 2014–2017, following the procedure used by Wan (2015, 2018b). Ultimately, over 1,700 observations were obtained.

Figure 5 compares branches, employees, and assets of banks distributed nationwide for the period 2007–2017. The results showed that the sample well-represented the banking industry in China. Statistics for the main variables, for the full sample and subsamples (the big four banks, commercial and city banks, rural banks, and foreign banks), are summarized in Table 2a–e.

### **3.2 Empirical specification and estimation method**

To test *Propositions 1* and *2*, we used the following equation to identify the potential impacts on bank behavior and performance:

$$Y_{it} = \sum_{n=1}^j \beta_n X_{nit} + c_i + \varepsilon_{it}. \quad (2)$$

For **Proposition 1**, the share of the big-four banks relative to all banks is  $Y$  in Equation (2), which is proxied by six variables (branch, employee, asset, deposit, loan, and profit). The independent variables in Equation (2) are constant, time trends, or dummy years. Here, the time trend or dummy year is expected to capture the impact of branch deregulation policy on the share of the big four banks.

For **Proposition 2**, employee, deposit, loan, profit,  $roa$ ,  $roe$ , and  $npl$  were used as dependent variables ( $Y$ ) in Equation (2). Independent variables included asset ( $X_1$ ), number of bank branches ( $X_2$ ), time trend ( $X_3$ ), and a constant term ( $X_4$ ). Natural logarithm transformations were performed for  $Y$ ,  $X_1$ , and  $X_2$ . The coefficient of the bank branches ( $X_2$ ),  $\beta_2$ , was used to test **Proposition 2**.

The time-invariant specific effect is given by  $c_i$ , and the random error term is represented by  $\varepsilon_{it}$  in Equation (2). A fixed effect estimation method with robust standard errors was used to obtain the results.

### 3.3 Estimation results

The reduction in the share of the big four banks from 2007–2017 is shown in Table 3. The data from Table 3 were used to perform a panel estimation; the results are summarized in Table 4. The coefficients of the time trend and dummy years from 2014–

2017 were significantly negative. These results support **Proposition 1** and imply that the branch deregulation policy promoted bank competition by significantly decreasing the share of the big four banks.

The estimation results for the full sample are summarized in Table 5a. The branches showed significantly positive coefficients for employees, deposits, and loans. This implies that the branch deregulation policy increased the size of the banking industry. On the other hand, the branches showed negative coefficients with respect to profits and *roa*, as well as significantly negative coefficients for *roe* and *npl*. These results support **Proposition 2**, indicating that the branch deregulation policy decreased the profits and quality of bank loans, at least in the short term.

Regulation and deregulation policies depend on the type of bank. Here, we divided the full sample into four subsamples, consisting of the big four banks, commercial and city banks, rural banks, and foreign banks. The estimation results are summarized in Tables 5b–e, respectively.

For the big four banks (Table 5b), the branches showed similar results to those of the estimation based on the full sample, i.e., too many branches would result in a higher *npl*. However, this outcome could be interpreted in different ways. For example, if the big four banks were considered as one “special bank,” then the number of

branches of the big four banks would be reduced significantly by the branch deregulation policy. Hence, the branch deregulation policy significantly decreased the *npl* of the big four banks.

Regarding the commercial and city banks (Table 5c), the branches showed similar trends to the estimation results for the full sample, as well as a significantly negative coefficient for *roa*. Commercial and city banks increased their numbers of branches following implementation of the bank deregulation policy; hence, bank profits and the quality of bank assets were significantly reduced.

For rural banks (Table 5d) and foreign banks (Table 5e), the significance of the coefficients of the branches for *roa*, *roe*, and *npl* disappeared. Thus, the impacts of bank branch deregulation policy on these two types of banks could not be confirmed using the current data set and estimation method.

### **3.4 Robust estimation results**

Bank performance, as proxied by *roa* or *npl*, would be affected by the macro situation, similar to the economic cycle or monetary policy. To control for these potential macro effects, we performed two types of estimations. The first one was a panel estimation with dummy years; notably, dummy year 2007 was omitted from the

estimation. The results are summarized in Table 6. The branch had a significantly positive impact on *employee*, *deposit*, and *loan*, whereas it had a significantly negative impact on *npl*. These results are consistent with those in Table 5.

The second estimation was a year by year cross-sectional estimation. We also created four dummy entries for the big four banks (*big4*), commercial and city banks (dropped in the estimation), rural banks (*rural*), and foreign banks (*foreign*). The results are summarized in Table 7a–k (11 tables for 11 years; 2007–2017). The *branch* had positive coefficients on *npl* for every year, and the coefficients were all significant except for 2008 and 2017. The coefficients of the branches on *profit* were significantly negative for 2007, 2008 and 2016, but insignificant for the other years. The coefficients of the branches on *roa* were significantly negative for 2007–2009, significantly positive for 2013, but insignificant for the other years. The coefficients of the branches on *roe* were significantly negative for 2007, significantly positive for 2014, but insignificant for the other years. Hence, the impacts of the number of branches on *profit*, *roa*, and *roe* were not stable, despite the steady increase in *npl*. These results are also consistent with those derived by panel estimations shown in Tables 5 and 6.

### **3.5 Explanation and a plausible scenario**

Credit availability, proxied by the number of banks in the region, exacerbated land prices before the Great Depression in the US (Rajan and Ramcharan 2015). A similar event took place during a land pricing bubble in Japan, as shown in Figures 6 and 7. The number of bank branches, and the land price at the city and national levels, were positively correlated, with correlation coefficients of 0.638 (p-value = 0.065) and 0.776 (p-value = 0.014), respectively. The bursting of a land pricing bubble caused the Great Depression in the US, and a financial crisis and two lost decades of economic growth in Japan.

We determined that branch deregulation increased the number of *npl* in China. The results have yet to be reported in the literature, similar to the findings for Japan and the US. As argued by Wan (2015, 2018b), the housing bubble led to overinvestments in corporate sectors and raised the *npl* of the banking sector, even in an ongoing bubble economy. We tend to consider the pushing of loans (overinvestment) associated with the bubble economy as the reason. One plausible scenario is as follows. Due to the branch deregulation policy, newcomers (commercial and city banks) cannot find good borrowers, because the number thereof is limited, at least in the short term. Thus, they must instead issue loans to bad borrowers (e.g., “bubble borrowers”) for the new banking branches to survive. This competition escalates the housing bubble and “bubbly



overinvestments.” Thus, the soft landing policy described by Wan (2018a, 2021c) would be necessary for the current situation in China.

#### **4 Conclusions and Policy Implications**

We have theoretically and empirically examined the impacts of branch deregulation policy on bank behavior and performance by analyzing macro- and micro-panel bank data (> 1,700 observations from 2007–2017). Theoretically and empirically, we found that the branch deregulation policy significantly decreased the number of quality assets due to the significant increases in the numbers of branches and employees of the non-big four banks. As a result, the policy significantly reduced the returns on assets and equity for commercial and city banks, while also significantly increasing the number of *npl*, especially for commercial and city banks.

The decrease in profit and increase in *npl* damaged the banking industry, thus introducing instability into the financial system. Hence, an appropriate implementation pace of branch deregulation policy is necessary.

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Table 1: Distribution of branch, employee, and asset by region  
(Ratio of regional quantity to nationwide, %)

Region	Year	Branch	Employee	Asset
East	2010	39.5	44.0	60.5
	2011	39.0	43.7	60.2
	2012	39.5	44.3	59.5
Central	2010	23.6	21.0	14.8
	2011	24.0	21.3	14.6
	2012	23.4	21.1	14.9
West	2010	27.0	23.9	17.5
	2011	27.3	24.0	17.9
	2012	27.7	24.1	18.5
North East	2010	9.9	11.1	7.3
	2011	9.7	11.0	7.2
	2012	9.4	10.6	7.1

Source: People's Bank of China.

Table 2a: Summary statistics (full sample)

Variable	Obs	Mean	Std. Dev.	Min	Max
asset (million Yuan)	1,741	659,697.10	2,498,240.00	1,340.39	26,100,000.00
deposit (million Yuan)	1,740	491,579.00	2,074,337.00	117.60	37,800,000.00
loan (million Yuan)	1,740	327,559.20	1,316,524.00	0.00	14,200,000.00
equity (million Yuan)	1,739	44,036.99	176,798.20	110.49	2,141,056.00
profit before tax (million Yuan)	1,740	8,805.92	36,558.70	-438.00	364,641.00
profit after tax (million Yuan)	1,732	6,814.86	28,383.23	-231.00	287,451.00
roa (%)	1,730	1.13	0.64	-2.84	10.73
roe (%)	1,141	16.09	7.09	-5.31	60.31
ratio of cost to income (%)	1,184	37.82	15.20	14.37	194.71
capital (million Yuan)	1,464	60,328.72	223,776.30	20.83	2,406,920.00
capital ratio (%)	1,729	16.86	27.66	0.43	570.00
npl (%)	1,724	1.40	1.14	0.00	23.50
reserve for npl (million Yuan)	1,715	9,191.42	37,456.53	0.13	404,300.00
coverage ratio for npl (%)	1,641	337.66	608.25	1.70	11,175.40
liquidity ratio (%)	1,636	134.35	1,245.53	22.65	20,648.00
employee (persons)	1,745	14,064.73	60,871.12	39.00	503,082.00
branch (number of institutions)	1,755	566.13	2,681.62	1.00	24,452.00
ln(asset)	1,741	11.31	1.74	7.20	17.08
ln(capital ratio)	1,729	2.66	0.41	-0.84	6.35
ln(npl)	1,724	-4.65	1.19	-9.61	-1.45
ln(employee)	1,745	7.57	1.53	3.66	13.13
ln(branch)	1,755	4.32	1.52	0.00	10.10
year	1,755	2012.821	2.782071	2007	2017

Source: Author's calculation based on the processed data.

Table 2b: Summary statistics (big four banks)

Variable	Obs	Mean	Std. Dev.	Min	Max
asset (million Yuan)	44	14,300,000.00	5,244,680.00	5,995,553.00	26,100,000.00
deposit (million Yuan)	44	11,000,000.00	3,719,143.00	4,400,111.00	19,200,000.00
loan (million Yuan)	44	7,498,580.00	2,996,310.00	2,850,561.00	14,200,000.00
equity (million Yuan)	44	969,823.40	479,924.90	88,628.00	2,141,056.00
profit before tax (million Yuan)	44	208,351.50	88,716.87	32,561.00	364,641.00
profit after tax (million Yuan)	44	160,783.50	70,340.74	11,872.00	287,451.00
roa (%)	44	1.19	0.19	0.54	1.47
roe (%)	42	17.96	3.80	7.86	23.44
ratio of cost to income (%)	44	31.98	4.79	24.46	44.71
capital (million Yuan)	43	1,154,321.00	538,201.20	319,483.00	2,406,920.00
capital ratio (%)	44	13.12	1.44	9.41	15.50
npl (%)	44	2.14	3.37	0.85	23.50
reserve for npl (million Yuan)	44	208,152.60	92,035.17	49,382.00	404,300.00
coverage ratio for npl (%)	44	188.57	70.72	6.04	367.04
liquidity ratio (%)	44	42.69	7.40	26.80	56.73
employee (persons)	44	378,569.50	77,238.44	237,379.00	503,082.00
branch (number of institutions)	44	16,514.27	4,691.85	10,834.00	24,452.00
ln(asset)	44	16.40	0.40	15.61	17.08
ln(capital ratio)	44	1.19	0.19	0.54	1.47
ln(npl)	44	2.57	0.12	2.24	2.74
ln(employee)	44	-4.12	0.56	-4.77	-1.45
ln(branch)	44	12.82	0.21	12.38	13.13
year	44	2012	3.198837	2007	2017

Source: Author's calculation based on the processed data.



Table 2c: Summary statistics (commercial and city banks)

Variable	Obs	Mean	Std. Dev.	Min	Max
asset (million Yuan)	1,085	433,268.10	1,069,690.00	2,543.47	9,038,254.00
deposit (million Yuan)	1,084	274,539.70	647,416.70	1,678.69	4,930,345.00
loan (million Yuan)	1,084	199,976.90	521,888.10	1,077.74	4,569,140.00
equity (million Yuan)	1,084	27,423.08	71,418.35	111.00	671,143.00
profit before tax (million Yuan)	1,084	5,139.90	12,898.44	-186.26	90,680.00
profit after tax (million Yuan)	1,082	3,951.50	9,933.15	-162.00	70,638.00
roa (%)	1,075	1.13	0.46	-0.50	2.70
roe (%)	893	16.73	6.96	-5.31	60.31
ratio of cost to income (%)	808	34.34	9.63	14.37	194.71
capital (million Yuan)	943	37,349.43	90,715.49	20.83	790,381.00
capital ratio (%)	1,078	13.42	6.25	5.55	148.19
npl (%)	1,079	1.30	0.83	0.00	7.85
reserve for npl (million Yuan)	1,070	5,530.51	15,097.80	6.09	150,432.00
coverage ratio for npl (%)	1,050	332.77	501.67	1.70	6,321.21
liquidity ratio (%)	1,039	52.67	15.70	22.65	256.50
employee (persons)	1,085	6,317.03	13,490.12	39.00	98,010.00
branch (number of institutions)	1,089	189.64	387.32	2.00	3,371.00
ln(asset)	1,085	11.53	1.57	7.84	16.02
ln(capital ratio)	1,075	1.13	0.46	-0.50	2.70
ln(npl)	1,078	2.56	0.24	1.71	5.00
ln(employee)	1,079	-4.58	0.84	-9.61	-2.54
ln(branch)	1,085	7.79	1.21	3.66	11.49
year	1,089	2012.629	2.841092	2007	2017

Source: Author's calculation based on the processed data.

Table 2d: Summary statistics (rural banks)

Variable	Obs	Mean	Std. Dev.	Min	Max
asset (million Yuan)	367	88,796.72	127,283.10	1,340.39	816,303.00
deposit (million Yuan)	367	170,383.00	1,972,357.00	1,130.98	37,800,000.00
loan (million Yuan)	367	42,711.66	56,231.60	803.59	361,985.70
equity (million Yuan)	366	6,517.37	9,078.30	110.49	74,311.00
profit before tax (million Yuan)	367	1,229.50	1,697.07	11.18	8,332.99
profit after tax (million Yuan)	361	961.28	1,358.15	0.70	7,673.92
roa (%)	366	1.37	0.65	0.03	7.50
roe (%)	140	16.58	5.55	0.14	35.79
ratio of cost to income (%)	211	35.22	7.11	22.18	77.72
capital (million Yuan)	244	7,135.49	9,802.10	128.16	65,288.16
capital ratio (%)	362	13.89	2.06	8.30	24.31
npl (%)	361	1.99	1.23	0.00	11.45
reserve for npl (million Yuan)	357	1,627.46	2,066.40	21.75	11,929.24
coverage ratio for npl (%)	360	245.63	102.61	45.50	666.07
liquidity ratio (%)	336	51.62	17.39	26.45	120.47
employee (persons)	363	1,936.61	2,295.67	94.00	15,443.00
branch (number of institutions)	369	146.61	224.33	10.00	1,770.00
ln(asset)	367	10.54	1.39	7.20	13.61
ln(capital ratio)	366	1.37	0.65	0.03	7.50
ln(npl)	362	2.62	0.14	2.12	3.19
ln(employee)	361	-4.07	0.61	-9.61	-2.17
ln(branch)	363	7.05	1.01	4.54	9.64
year	369	2013.52	2.33714	2007	2017

Source: Author's calculation based on the processed data.

Table 2e: Summary statistics (foreign banks)

Variable	Obs	Mean	Std. Dev.	Min	Max
asset (million Yuan)	245	70,595.99	77,587.19	2,041.00	467,936.00
deposit (million Yuan)	245	43,328.35	49,911.61	117.60	268,393.00
loan (million Yuan)	245	30,879.13	34,626.41	0.00	185,596.00
equity (million Yuan)	245	7,331.09	6,867.26	1,168.19	46,871.00
profit before tax (million Yuan)	245	538.61	852.42	-438.00	6,028.00
profit after tax (million Yuan)	245	433.93	735.97	-231.00	5,377.00
roa (%)	245	0.74	1.03	-2.84	10.73
roe (%)	66	5.20	3.70	-0.30	17.60
ratio of cost to income (%)	121	67.64	23.58	15.14	190.54
capital (million Yuan)	234	7,367.00	7,158.73	303.86	47,627.00
capital ratio (%)	245	37.05	69.01	0.43	570.00
npl (%)	240	0.82	0.93	0.00	4.51
reserve for npl (million Yuan)	244	434.16	511.80	0.13	3,224.00
coverage ratio for npl (%)	187	577.38	1,319.75	19.47	11,175.40
liquidity ratio (%)	217	672.15	3,377.29	31.70	20,648.00
employee (persons)	253	1,300.15	1,513.21	41.00	6,926.00
branch (number of institutions)	253	24.90	34.10	1.00	178.00
ln(asset)	245	10.57	1.21	7.62	13.06
ln(capital ratio)	245	0.74	1.03	-2.84	10.73
ln(npl)	245	3.18	0.75	-0.84	6.35
ln(employee)	240	-5.93	2.07	-9.61	-3.10
ln(branch)	253	6.44	1.33	3.71	8.84
year	253	2012.771	2.881732	2007	2017

Source: Author's calculation based on the processed data.

Table 3: Share of the big-four banks to all banks, 2007-2017 (%)

Year	Ratio of employees of the big-four banks to ones of all banks	Ratio of branches of the big-four banks to ones of all banks	Ratio of assets of the big-four banks to ones of all banks	Ratio of deposits of the big-four banks to ones of all banks	Ratio of loans of the big-four banks to ones of all banks	Ratio of net profits of the big-four banks to ones of all banks
2007	50	36	51	55	49	49
2008	51	36	50	54	46	55
2009	48	39	49	52	46	57
2010	47	33	47	50	45	56
2011	46	32	45	59	59	60
2012	46	32	42	54	51	58
2013	44	32	41	54	56	56
2014	44	31	40	50	42	44
2015	43	30	39	38	32	44
2016	40	30	35	39	39	42
2017	38	29	36	39	38	41

Source: Author's calculation based on the processed data.

Table 4: Regression on share of the big four banks to all banks  
(fixed effect estimation with robust standard errors)

<i>Dependent Variables</i>	<i>share</i>	<i>share</i>
(Independent Variables)		
dummy_2008		0.0001 (0.0135)
dummy_2009		0.0018 (0.0198)
dummy_2010		-0.0207 (0.0204)
dummy_2011		0.0186 (0.0337)
dummy_2012		-0.0119 (0.0278)
dummy_2013		-0.0102 (0.0317)
dummy_2014		-0.0681*** (0.0120)
dummy_2015		-0.109*** (0.0256)
dummy_2016		-0.108*** (0.0182)
dummy_2017		-0.117*** (0.0161)
year	-0.0134*** (0.0014)	
Constant	27.370*** (2.731)	0.485*** (0.0153)
Observations	66	66
R-squared	0.518	0.696
Number of group	6	6

Robust standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 5a: Regression on impacts of branch deregulation

(full sample, fixed effect estimation with robust standard errors)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.213*** (0.0485)	0.566*** (0.0814)	0.623*** (0.0742)	1.083*** (0.133)	-0.134 (0.280)	4.184*** (0.901)	-0.342** (0.139)	
branch	0.534*** (0.0753)	0.129** (0.0651)	0.150*** (0.0530)	-0.121 (0.0907)	-0.102 (0.0985)	-1.932** (0.869)	0.497*** (0.189)	
year	-0.0022 (0.00748)	0.0554*** (0.0165)	0.0284* (0.0148)	-0.0166 (0.0286)	0.0149 (0.0492)	-0.322*** (0.186)	0.0704* (0.0389)	
Constant	7.242 (14.63)	-107.4*** (32.46)	-54.41* (29.09)	28.35 (56.31)	-26.96 (96.25)	2,636*** (366.1)	-144.6* (76.55)	
Observations	1,731	1,740	1,739	1,740	1,730	1,141	1,724	
R-squared	0.759	0.717	0.839	0.381	0.021	0.185	0.059	
Number of bank	264	266	266	266	265	207	265	

Robust standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 5b: Regression on impacts of branch deregulation

(the big four banks, fixed effect estimation with robust standard errors)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.205 (0.125)	1.062*** (0.0687)	1.078** (0.198)	2.565** (0.624)	1.475** (0.365)	36.98** (8.897)	-5.788*** (0.948)	
branch	0.843*** (0.0915)	-0.185 (0.221)	0.827 (0.415)	-2.299 (1.792)	-1.455 (1.346)	-7.040 (8.764)	4.877* (1.785)	
year	-0.00735 (0.0149)	-0.0177* (0.00658)	-0.00359 (0.0235)	-0.150* (0.0573)	-0.145** (0.0449)	-4.754** (1.038)	0.569** (0.103)	
Constant	16.10 (27.73)	36.22* (14.05)	-2.712 (43.90)	294.5* (112.8)	282.6** (76.31)	9,045** (2,026)	-1,101** (196.4)	
Observations	44	44	44	44	44	42	44	
R-squared	0.893	0.996	0.991	0.931	0.549	0.680	0.822	
Number of bank	4	4	4	4	4	4	4	

Robust standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 5c: Regression on impacts of branch deregulation

(commercial and city banks, fixed effect estimation with robust standard errors)

<i>Dependent</i>							
	<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>							
(Independent Variables)							
asset	0.289*** (0.0692)	0.712*** (0.102)	0.524*** (0.0591)	1.161*** (0.130)	0.155** (0.0705)	4.763*** (0.951)	-0.241* (0.140)
branch	0.443*** (0.0839)	0.150** (0.0657)	0.196*** (0.0658)	-0.0606 (0.108)	-0.147** (0.0726)	-1.718* (1.011)	0.665*** (0.217)
year	-0.00759 (0.0126)	0.0110 (0.0200)	0.0493*** (0.0121)	-0.0451 (0.0338)	-0.0417** (0.0197)	-1.529*** (0.234)	0.0184 (0.0410)
Constant	17.74 (24.67)	-19.92 (39.24)	-95.37*** (23.84)	84.65 (66.53)	84.01** (38.88)	3,046*** (461.4)	-41.87 (80.71)
Observations	1,081	1,084	1,084	1,084	1,075	893	1,079
R-squared	0.787	0.900	0.883	0.611	0.056	0.200	0.098
Number of bank	137	138	138	138	137	130	138

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.



Table 5d: Regression on impacts of branch deregulation

(rural banks, fixed effect estimation with robust standard errors)

<i>Dependent</i>							
	<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>							
(Independent Variables)							
asset	0.0758 (0.179)	0.391 (0.256)	0.613*** (0.0788)	0.932*** (0.230)	0.0845 (0.244)	7.255* (4.333)	-0.646 (0.426)
branch	0.521* (0.269)	0.0569 (0.0846)	0.0495 (0.0364)	-0.202 (0.148)	-0.308 (0.188)	-0.339 (1.319)	0.285 (0.291)
year	0.00372 (0.0296)	0.0922 (0.0586)	0.0416*** (0.0127)	-0.00157 (0.0492)	-0.0282 (0.0412)	-1.784*** (0.650)	0.0999 (0.0828)
Constant	-3.550 (57.65)	-179.7 (115.3)	-80.51*** (24.65)	0.482 (97.11)	58.72 (80.84)	3,529*** (1,267)	-199.7 (162.0)
Observations	361	367	367	367	366	140	361
R-squared	0.386	0.334	0.948	0.566	0.020	0.100	0.028
Number of bank	93	94	94	94	94	58	94

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 5e: Regression on impacts of branch deregulation

(foreign banks, fixed effect estimation with robust standard errors)

<i>Dependent</i>							
	<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>							
(Independent Variables)							
asset	0.0429 (0.0361)	0.651*** (0.233)	0.613** (0.252)	1.211** (0.554)	-1.199 (1.132)	1.577 (2.126)	0.561 (0.378)
branch	1.017*** (0.0349)	0.395 (0.268)	-0.0525 (0.255)	-0.433 (0.472)	0.363 (0.578)	1.185 (2.990)	-1.185 (0.830)
year	-0.00359 (0.00692)	0.0774** (0.0292)	0.00616 (0.0364)	0.0144 (0.0570)	0.0865 (0.105)	-0.474** (0.188)	0.182** (0.0778)
Constant	10.59 (13.77)	-153.9** (57.04)	-9.225 (71.01)	-35.65 (111.9)	-161.6 (201.1)	937.9** (363.9)	-375.0** (155.5)
Observations	245	245	244	245	245	66	240
R-squared	0.863	0.596	0.371	0.077	0.112	0.070	0.144
Number of bank	30	30	30	30	30	15	29

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 6: Regression on impacts of branch deregulation  
(full sample, fixed effect estimation with robust standard errors, dummy\_2007 dropped)

<i>Dependent Variables</i>	<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
(IndependentVariables)							
asset	0.192*** (0.0506)	0.524*** (0.0849)	0.621*** (0.0788)	0.931*** (0.136)	-0.256 (0.286)	2.823*** (0.893)	-0.0871 (0.140)
branch	0.538*** (0.0763)	0.143** (0.0670)	0.153*** (0.0536)	-0.112 (0.0970)	-0.0926 (0.102)	-1.281 (0.779)	0.438** (0.173)
dummy_2008	-0.0175 (0.0397)	0.0149 (0.0416)	0.0306 (0.0217)	0.231* (0.118)	0.322*** (0.0965)	2.138* (1.095)	-0.190 (0.127)
dummy_2009	0.00640 (0.0358)	0.178*** (0.0486)	0.100*** (0.0348)	0.0955 (0.141)	0.124 (0.117)	-0.887 (1.030)	-0.414*** (0.153)
dummy_2010	0.0255 (0.0448)	0.304*** (0.0687)	0.123** (0.0511)	0.316** (0.159)	0.372** (0.184)	0.745 (1.208)	-0.768*** (0.185)
dummy_2011	0.0540 (0.0531)	0.378*** (0.0876)	0.116 (0.0707)	0.637*** (0.197)	0.619** (0.242)	0.246 (1.300)	-0.969*** (0.246)
dummy_2012	0.0616 (0.0584)	0.444*** (0.105)	0.172* (0.0876)	0.571** (0.222)	0.671** (0.285)	-0.415 (1.435)	-0.821*** (0.265)
dummy_2013	0.0727 (0.0645)	0.517*** (0.120)	0.204* (0.105)	0.507** (0.239)	0.612* (0.333)	-1.673 (1.553)	-0.797*** (0.289)
dummy_2014	0.0506 (0.0727)	0.517*** (0.134)	0.239** (0.114)	0.561** (0.233)	0.726** (0.361)	-4.126** (1.681)	-0.483 (0.326)
dummy_2015	0.0447 (0.0733)	0.536*** (0.145)	0.223* (0.130)	0.440 (0.276)	0.576 (0.398)	-6.650*** (1.771)	-0.272 (0.347)
dummy_2016	0.00982 (0.0800)	0.575*** (0.159)	0.266* (0.139)	0.345 (0.290)	0.520 (0.449)	-7.832*** (1.820)	-0.215 (0.375)
dummy_2017	0.0199 (0.0837)	0.707*** (0.171)	0.321** (0.151)	0.218 (0.328)	0.522 (0.531)	-8.590*** (1.980)	-0.299 (0.401)
Constant	3.031*** (0.420)	3.950*** (0.797)	2.606*** (0.735)	-3.724*** (1.290)	3.894 (2.584)	-8.410 (9.138)	-5.037*** (1.611)
Observations	1,731	1,740	1,739	1,740	1,730	1,141	1,724
R-squared	0.765	0.726	0.840	0.418	0.112	0.274	0.194
Number of bank	264	266	266	266	265	207	265

Robust standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 7a: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2007)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.494*** (0.149)	0.938*** (0.0210)	0.969*** (0.0205)	1.418*** (0.174)	0.142** (0.0637)	3.549** (1.416)	-0.634** (0.299)	
branch	0.411** (0.204)	0.100** (0.0500)	0.0282 (0.0380)	-0.696** (0.313)	-0.301*** (0.105)	-4.784** (2.316)	1.234** (0.506)	
big4	0.469 (0.377)	-0.228 (0.197)	-0.0609 (0.126)	1.896** (0.918)	0.949*** (0.341)	7.883 (6.739)	-2.667** (1.297)	
rural	-0.352 (0.239)	0.0960*** (0.0301)	0.0374 (0.0493)	0.317 (0.378)	0.298 (0.291)	6.654*** (1.930)	0.225 (0.340)	
foreign	-0.0397 (0.282)	-0.720** (0.291)	0.235* (0.133)	-2.770** (1.339)	-0.752*** (0.204)		-1.689** (0.811)	
Constant	0.505 (0.746)	0.0172 (0.134)	-0.417*** (0.123)	-6.225*** (0.743)	0.666* (0.388)	-1.869 (8.894)	-2.326* (1.173)	
Observations	62	62	62	62	62	43	61	
R-squared	0.965	0.986	0.993	0.844	0.186	0.140	0.591	

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 7b: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2008)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.202** (0.0912)	0.861*** (0.0891)	0.891*** (0.0917)	1.422*** (0.206)	0.267** (0.118)	2.838* (1.682)	-0.211 (0.202)	
branch	0.864*** (0.147)	0.231 (0.145)	0.190 (0.143)	-0.723** (0.340)	-0.577*** (0.218)	-2.690 (2.336)	0.463 (0.309)	
big4	-0.516 (0.331)	-0.532 (0.379)	-0.571* (0.325)	1.929** (0.938)	1.791** (0.785)	-0.866 (5.855)	-0.950 (0.765)	
rural	-0.526*** (0.158)	-0.0299 (0.0996)	0.0396 (0.0986)	0.444 (0.416)	0.379 (0.281)	4.130* (2.181)	0.720*** (0.207)	
foreign	0.422* (0.251)	-0.848*** (0.190)	0.125 (0.141)	-2.311** (1.130)	-0.649 (0.560)	-14.69*** (4.901)	-2.000** (0.818)	
Constant	1.698*** (0.379)	0.305 (0.413)	-0.281 (0.405)	-6.056*** (0.980)	0.633 (0.733)	-0.578 (10.68)	-3.765*** (1.014)	
Observations	82	82	82	82	82	56	82	
R-squared	0.962	0.968	0.977	0.710	0.109	0.132	0.487	

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 7c: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2009)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.316*** (0.0628)	0.830*** (0.0872)	0.886*** (0.0866)	1.153*** (0.127)	0.0759 (0.0589)	1.791 (1.131)	-0.265 (0.184)	
branch	0.680*** (0.0941)	0.277* (0.140)	0.210 (0.138)	-0.156 (0.197)	-0.168** (0.0828)	-2.427 (1.624)	0.476* (0.282)	
big4	-0.137 (0.202)	-0.620* (0.334)	-0.567* (0.325)	0.269 (0.528)	0.577*** (0.204)	5.662 (4.066)	-0.744 (0.700)	
rural	-0.450*** (0.117)	-0.196 (0.136)	-0.0671 (0.127)	0.110 (0.257)	0.0591 (0.148)	-0.277 (3.015)	0.481 (0.315)	
foreign	0.143 (0.126)	-0.417*** (0.127)	0.112 (0.131)	-1.622*** (0.469)	-0.853*** (0.227)	-16.10*** (2.507)	-1.123* (0.624)	
Constant	1.239*** (0.316)	0.484 (0.391)	-0.312 (0.388)	-5.636*** (0.720)	0.905** (0.358)	8.433 (7.132)	-3.607*** (0.965)	
Observations	105	105	105	105	105	75	105	
R-squared	0.968	0.970	0.972	0.818	0.214	0.181	0.343	

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 7d: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2010)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.312*** (0.0478)	0.847*** (0.0768)	0.870*** (0.0713)	1.011*** (0.0767)	-0.0720 (0.0504)	0.295 (1.491)	-0.299* (0.159)	
branch	0.706*** (0.0684)	0.236* (0.125)	0.232** (0.110)	-0.0169 (0.126)	-0.00837 (0.0673)	-1.031 (1.868)	0.546** (0.232)	
big4	-0.218 (0.153)	-0.451 (0.305)	-0.457* (0.240)	0.226 (0.404)	0.409** (0.196)	5.356 (3.801)	-0.853 (0.588)	
rural	-0.524*** (0.0783)	-0.278* (0.142)	-0.0718 (0.106)	0.0653 (0.168)	0.102 (0.118)	-1.550 (2.591)	0.246 (0.260)	
foreign	0.228** (0.0989)	-0.280* (0.145)	0.280** (0.125)	-1.415*** (0.429)	-0.722*** (0.147)	-16.79*** (2.148)	-0.860 (0.524)	
Constant	1.121*** (0.272)	0.437 (0.361)	-0.328 (0.333)	-4.486*** (0.524)	2.032*** (0.370)	21.49** (10.19)	-3.917*** (1.009)	
Observations	131	132	132	132	131	96	130	
R-squared	0.967	0.952	0.971	0.813	0.282	0.189	0.316	

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 7e: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2011)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.397*** (0.0574)	0.857*** (0.0487)	0.855*** (0.0463)	0.896*** (0.0986)	-0.105* (0.0606)	0.0457 (1.066)	-0.488*** (0.144)	
branch	0.552*** (0.0863)	0.171** (0.0792)	0.246*** (0.0725)	0.134 (0.168)	0.0344 (0.0871)	0.939 (1.556)	0.774*** (0.215)	
big4	0.173 (0.194)	-0.114 (0.196)	-0.403** (0.186)	-0.0506 (0.403)	0.308 (0.232)	-3.517 (3.855)	-0.966* (0.548)	
rural	-0.298*** (0.104)	-0.124 (0.0859)	0.0447 (0.0739)	0.0259 (0.125)	-0.0002 (0.0994)	-0.762 (1.658)	0.147 (0.232)	
foreign	0.0461 (0.125)	-0.140 (0.0873)	0.0876 (0.0893)	-0.336 (0.266)	-0.435*** (0.153)	-11.53*** (2.138)	-0.152 (0.424)	
Constant	0.806*** (0.307)	0.571** (0.235)	-0.279 (0.243)	-3.704*** (0.426)	2.376*** (0.388)	14.87** (6.917)	-3.015*** (0.920)	
Observations	166	167	167	167	166	116	166	
R-squared	0.951	0.967	0.964	0.927	0.167	0.202	0.278	

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.



Table 7f: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2012)

<i>Dependent</i>							
	<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>							
(Independent Variables)							
asset	0.371*** (0.0413)	0.857*** (0.0225)	0.868*** (0.0221)	1.028*** (0.0999)	-0.0780 (0.0592)	1.037 (1.035)	-0.449*** (0.130)
branch	0.613*** (0.0604)	0.200*** (0.0512)	0.198*** (0.0387)	-0.0314 (0.137)	-0.0108 (0.0837)	0.0124 (1.510)	0.707*** (0.212)
big4	0.0124 (0.142)	-0.252 (0.179)	-0.181 (0.131)	0.208 (0.305)	0.415* (0.211)	-2.972 (3.620)	-1.016* (0.552)
rural	-0.310*** (0.0653)	-0.0564 (0.0379)	0.110*** (0.0399)	0.170 (0.176)	0.0410 (0.112)	-1.538 (1.840)	0.378** (0.176)
foreign	0.201** (0.0924)	-0.0579 (0.0686)	0.141** (0.0704)	-0.929*** (0.308)	-0.674*** (0.154)	-12.74*** (1.770)	-0.0485 (0.343)
Constant	0.786*** (0.240)	0.427*** (0.117)	-0.221* (0.133)	-4.491*** (0.653)	2.292*** (0.380)	6.727 (6.416)	-3.031*** (0.748)
Observations	201	202	201	203	202	139	201
R-squared	0.957	0.981	0.978	0.808	0.205	0.260	0.322

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 7g: Regression on impacts of branch deregulation  
(Ordinary Least Squares with robust standard errors, cross section for year=2013)

<i>Dependent</i>							
	<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>							
(Independent Variables)							
asset	0.341*** (0.0425)	0.849*** (0.0162)	0.863*** (0.0279)	0.893*** (0.0968)	-0.144*** (0.0521)	0.271 (0.762)	-0.267** (0.110)
branch	0.652*** (0.0603)	0.208*** (0.0369)	0.261*** (0.0631)	0.212 (0.146)	0.136* (0.0699)	1.031 (1.138)	0.458*** (0.157)
big4	-0.0728 (0.136)	-0.263* (0.137)	-0.448* (0.259)	-0.377 (0.341)	0.0484 (0.179)	-4.041 (2.731)	-0.784* (0.420)
rural	-0.364*** (0.0632)	-0.0618** (0.0266)	0.0985** (0.0444)	0.00579 (0.102)	-0.0405 (0.0924)	-0.697 (1.164)	0.317** (0.138)
foreign	0.189* (0.0984)	-0.0312 (0.0634)	0.0430 (0.108)	-1.126*** (0.347)	-0.678*** (0.124)	-9.808*** (1.774)	-0.662** (0.330)
Constant	0.960*** (0.257)	0.491*** (0.106)	-0.445* (0.228)	-4.003*** (0.554)	2.351*** (0.356)	10.08** (4.612)	-3.822*** (0.754)
Observations	234	236	236	236	234	193	234
R-squared	0.952	0.985	0.953	0.864	0.303	0.244	0.286

Robust standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 7h: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2014)

<i>Dependent</i>							
	<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>							
(Independent Variables)							
asset	0.405*** (0.0580)	0.865*** (0.0340)	0.808*** (0.0528)	1.018*** (0.110)	-0.118 (0.0718)	-1.126 (0.825)	-0.332*** (0.119)
branch	0.579*** (0.0735)	0.176*** (0.0451)	0.316*** (0.0912)	-0.133 (0.183)	0.0177 (0.0959)	2.211* (1.145)	0.576*** (0.179)
big4	0.0530 (0.151)	-0.134 (0.116)	-0.414 (0.274)	0.845* (0.438)	0.618*** (0.227)	-4.630 (2.987)	-1.205*** (0.453)
rural	-0.330*** (0.0937)	0.0343 (0.0518)	0.122*** (0.0464)	0.184* (0.112)	0.250* (0.141)	-6.702** (3.338)	0.185 (0.130)
foreign	0.145 (0.101)	-0.0278 (0.0622)	0.165 (0.123)	-1.156** (0.536)	-0.487*** (0.172)	-8.173*** (1.873)	-0.450 (0.321)
Constant	0.485 (0.404)	0.390 (0.248)	-0.0669 (0.313)	-3.969*** (0.523)	2.530*** (0.488)	19.20*** (5.421)	-3.244*** (0.742)
Observations	195	196	196	196	195	115	194
R-squared	0.948	0.980	0.953	0.818	0.209	0.238	0.302

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 7i: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2015)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.341*** (0.0492)	0.814*** (0.0633)	0.832*** (0.0628)	1.032*** (0.117)	-0.0147 (0.0466)	-0.174 (0.632)	-0.182** (0.0825)	
branch	0.642*** (0.0678)	0.223*** (0.0788)	0.285*** (0.0815)	-0.0926 (0.153)	-0.0547 (0.0675)	0.843 (0.873)	0.340*** (0.115)	
big4	0.0813 (0.137)	-0.107 (0.129)	-0.282 (0.244)	0.616** (0.299)	0.588*** (0.207)	-2.161 (2.507)	-0.623* (0.348)	
rural	-0.339*** (0.0748)	-0.00622 (0.0866)	0.207** (0.0885)	0.251* (0.142)	0.301*** (0.0922)	-2.045 (1.284)	0.208** (0.105)	
foreign	0.307*** (0.103)	-0.0211 (0.0896)	0.167 (0.141)	-1.036*** (0.386)	-0.343** (0.155)	-8.640*** (1.264)	-0.493* (0.278)	
Constant	0.885*** (0.311)	0.738* (0.425)	-0.291 (0.494)	-4.476*** (0.754)	1.444*** (0.358)	11.70*** (4.364)	-3.716*** (0.634)	
Observations	197	198	198	198	197	116	195	
R-squared	0.959	0.967	0.926	0.830	0.138	0.236	0.241	

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 7j: Regression on impacts of branch deregulation

(Ordinary Least Squares with robust standard errors, cross section for year=2016)

<i>Dependent</i>		<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>								
(Independent Variables)								
asset	0.372*** (0.0472)	0.814*** (0.0585)	0.872*** (0.0877)	1.102*** (0.0568)	-0.0357 (0.0613)	1.048* (0.605)	-0.148 (0.120)	
branch	0.625*** (0.0662)	0.202*** (0.0668)	0.243*** (0.0795)	-0.166** (0.0790)	-0.0301 (0.0595)	-0.642 (0.825)	0.276* (0.148)	
big4	0.0814 (0.134)	0.0356 (0.103)	-0.275 (0.188)	0.706*** (0.201)	0.576*** (0.201)	-1.947 (2.502)	-0.543 (0.346)	
rural	-0.258*** (0.0676)	-0.163 (0.127)	0.183 (0.116)	0.365*** (0.0977)	0.379*** (0.120)	-1.990* (1.054)	0.168 (0.130)	
foreign	0.387*** (0.105)	0.0301 (0.0817)	-0.00970 (0.204)	-0.868*** (0.208)	-0.339*** (0.120)	-9.329*** (1.328)	-0.606** (0.300)	
Constant	0.496* (0.291)	0.839* (0.432)	-0.553 (0.756)	-5.129*** (0.396)	1.463*** (0.560)	3.298 (4.341)	-3.715*** (0.893)	
Observations	189	190	190	190	188	107	188	
R-squared	0.963	0.956	0.930	0.932	0.137	0.241	0.209	

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 7k: Regression on impacts of branch deregulation

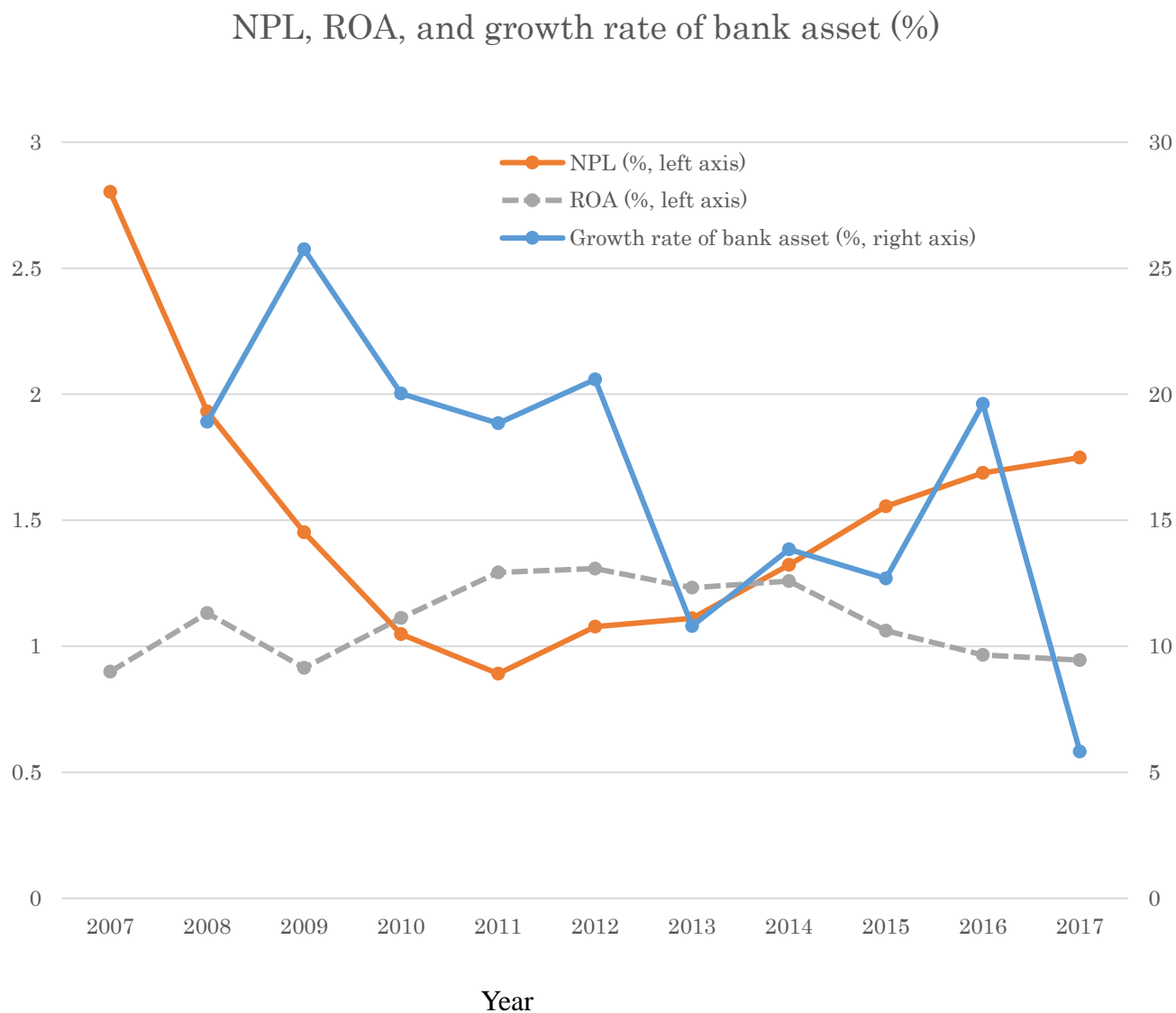
(Ordinary Least Squares with robust standard errors, cross section for year=2017)

<i>Dependent</i>							
	<i>employee</i>	<i>deposit</i>	<i>loan</i>	<i>profit</i>	<i>roa</i>	<i>roe</i>	<i>npl</i>
<i>Variables</i>							
(Independent Variables)							
asset	0.303*** (0.0547)	0.880*** (0.0712)	0.888*** (0.0979)	0.924*** (0.181)	-0.256 (0.224)	0.616 (1.064)	-0.143 (0.196)
branch	0.717*** (0.0713)	0.119 (0.0874)	0.244*** (0.0904)	0.126 (0.212)	0.293 (0.269)	0.0551 (1.390)	0.243 (0.240)
big4	-0.0338 (0.131)	0.175 (0.143)	-0.329* (0.192)	0.119 (0.285)	0.0143 (0.304)	-1.226 (2.404)	-0.480 (0.404)
rural	-0.252*** (0.0770)	0.337* (0.188)	0.242* (0.123)	0.240 (0.201)	0.0791 (0.215)	-2.331 (1.717)	0.282 (0.200)
foreign	0.564*** (0.119)	0.0134 (0.164)	0.0928 (0.235)	-0.964** (0.430)	0.288 (0.617)	-6.568*** (1.802)	-1.337*** (0.450)
Constant	0.840** (0.359)	0.400 (0.486)	-0.761 (0.830)	-4.441*** (1.251)	2.571* (1.470)	4.264 (7.094)	-3.620*** (1.361)
Observations	169	170	170	169	168	85	168
R-squared	0.965	0.873	0.937	0.795	0.058	0.263	0.322

Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

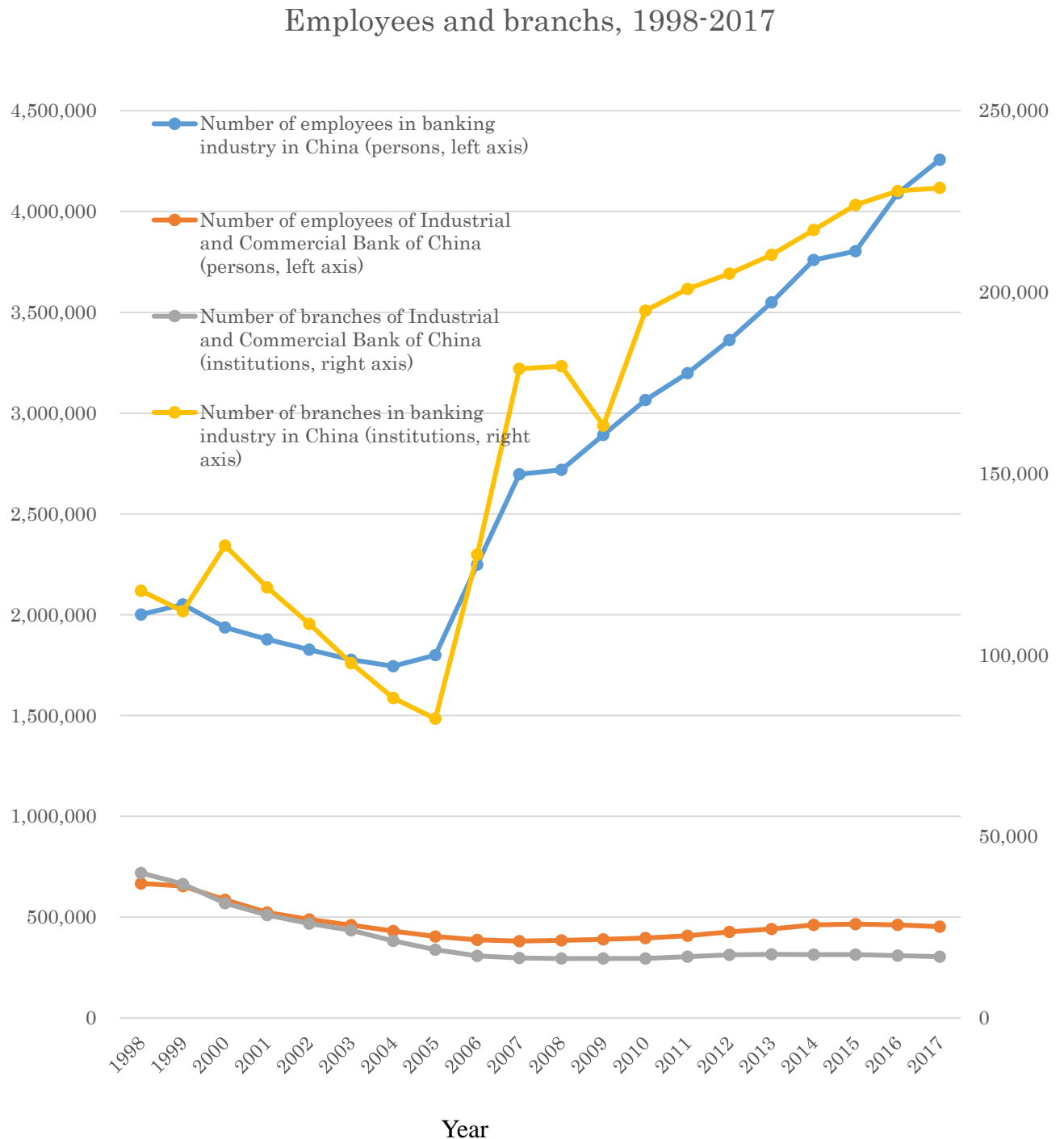
Figure 1: NPL, ROA, and growth rate of bank asset in China, 2007-2017



Source: Author's calculation based on the processed data.

Note: NPL and ROA is from sample, while growth rate of bank asset is from Annual Report of China Banking Regulatory Commission 2007-2017.

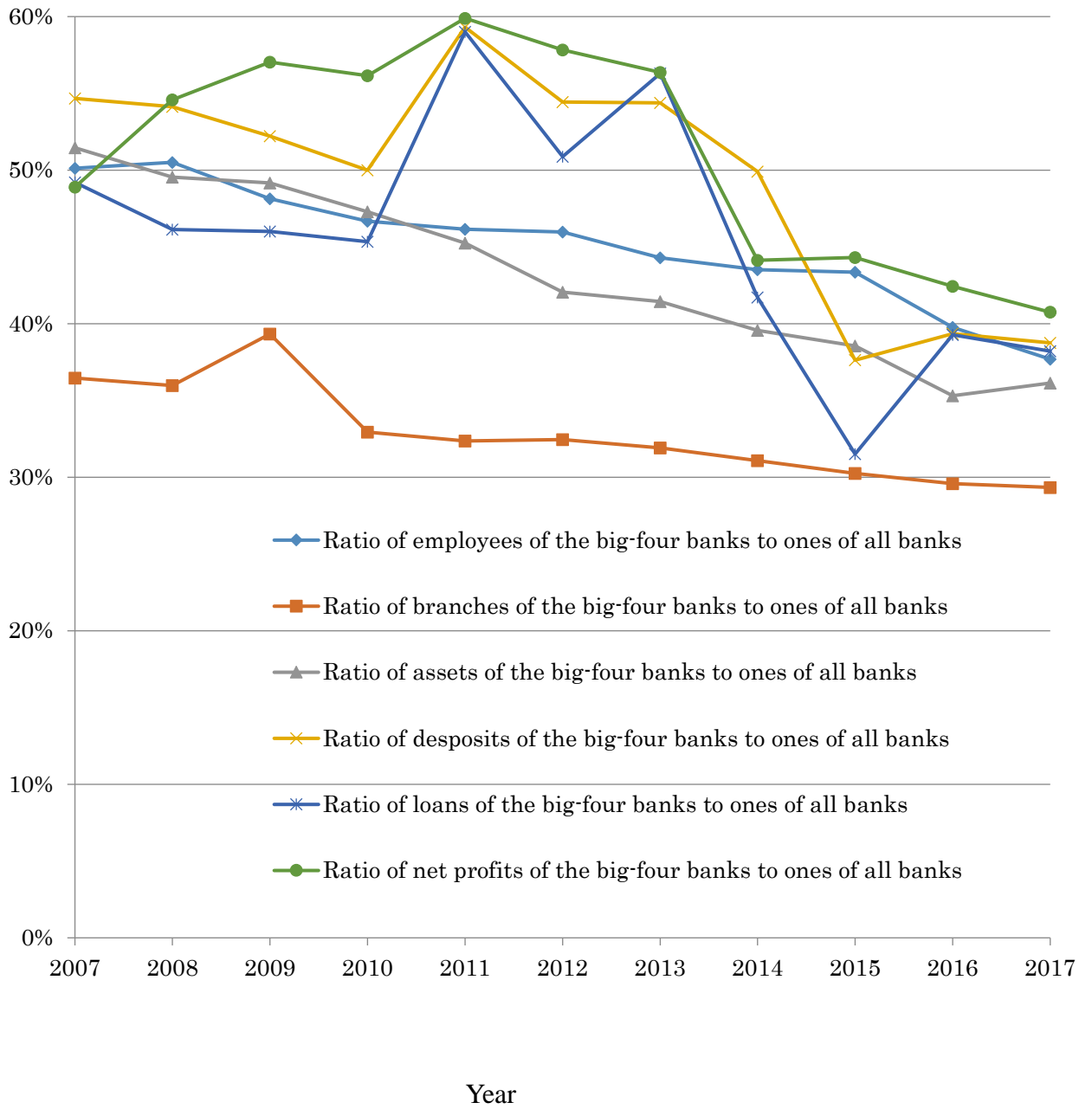
Figure 2: Employees and branches for China banking industry and Industrial and Commercial Bank of China, 1998-2017



Source: Corporate Social Responsibility Report of China Banking Industry, 2007-2017; 30 Years in Data of Industrial and Commercial Bank of China during 1930-2013.



Figure 3: The big-four banks vs. all banks, 2007-2017



Source: Author's calculation based on Annual Report of China Banking Regulatory Commission 2007-2017, and annual report by every bank.

Figure 4: Branch deregulation and credit risk of loan (*npl*)

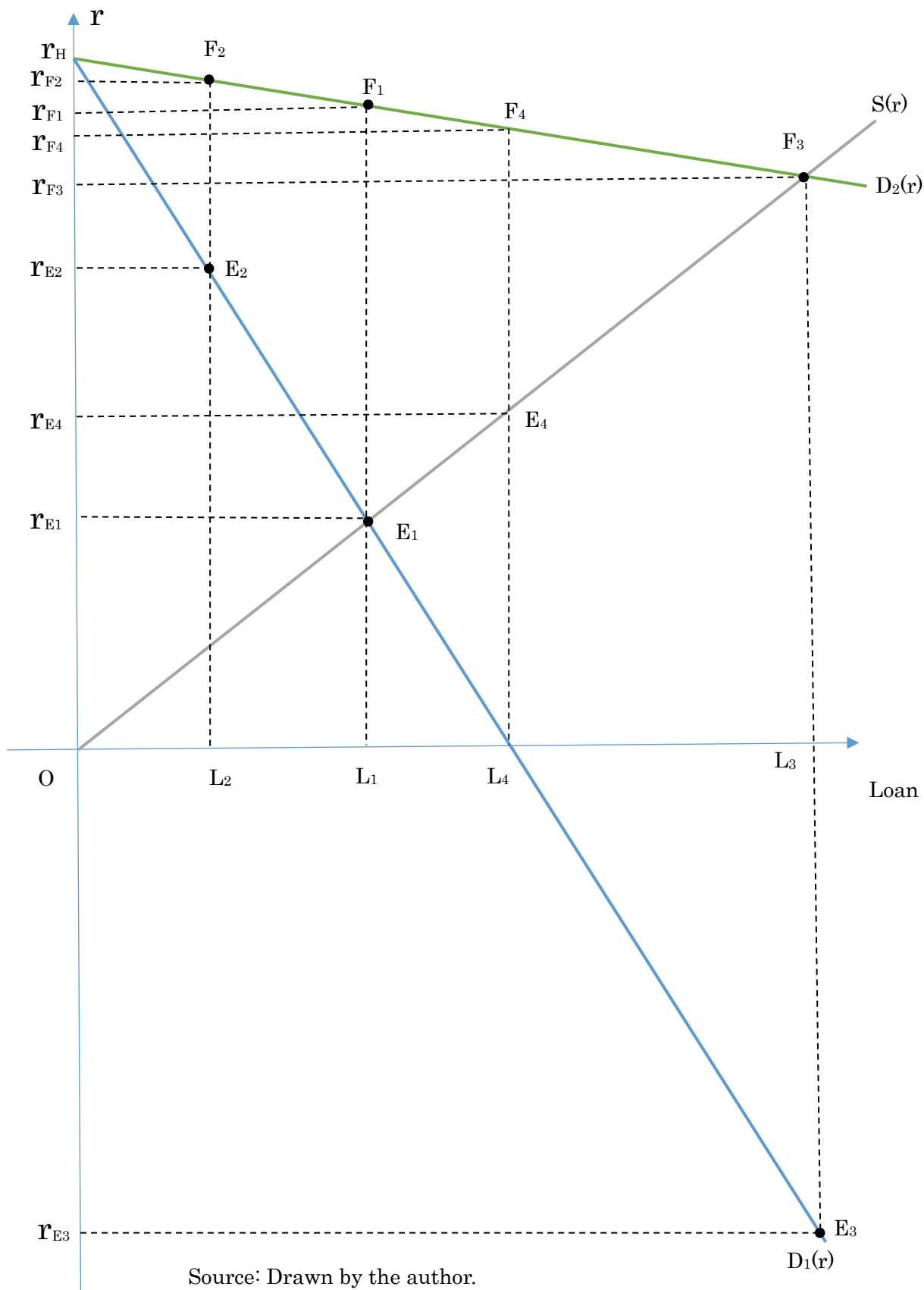
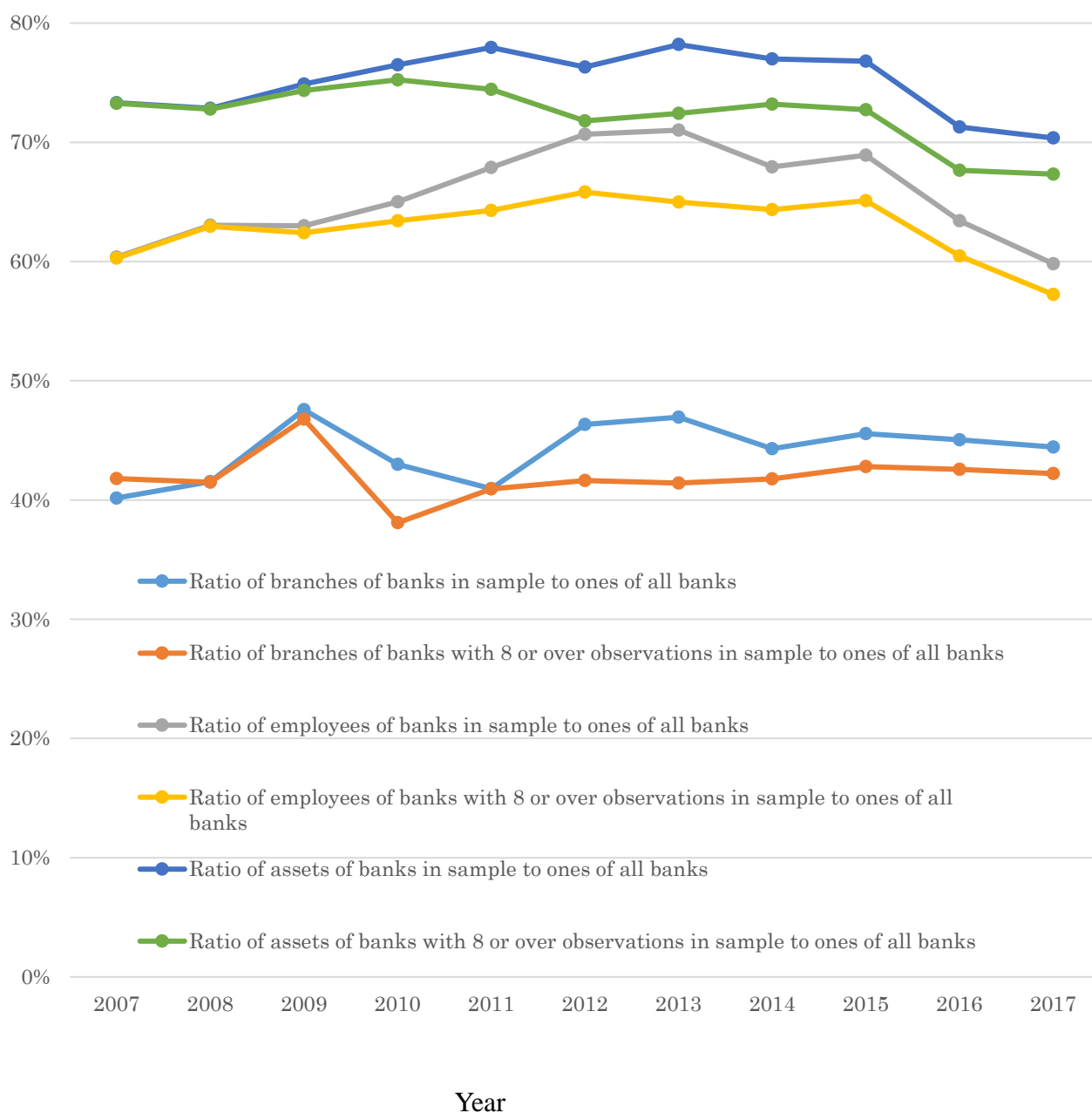
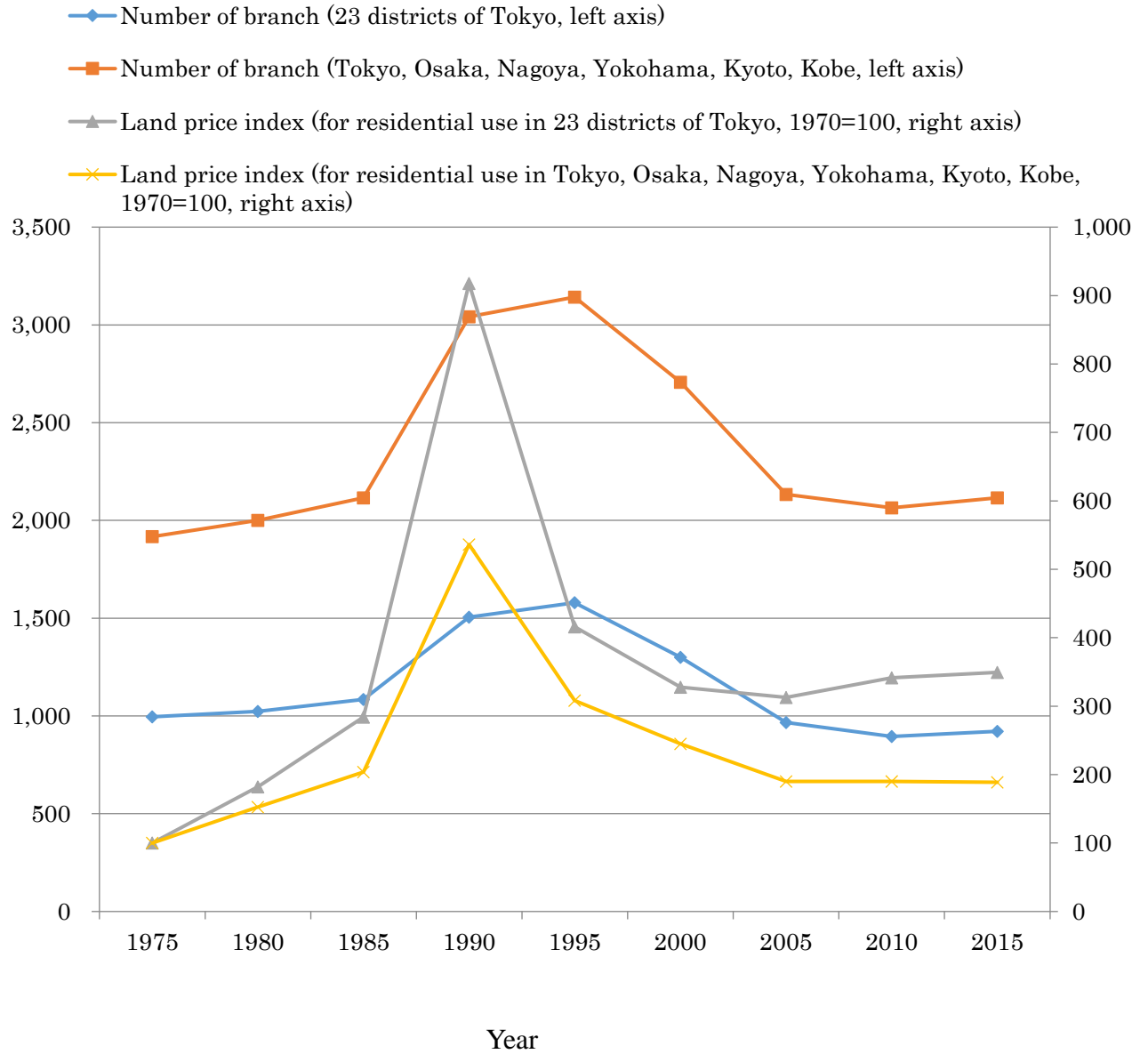


Figure 5: Branches, employees, and assets of banks in sample and banks nationwide, 2007-2017



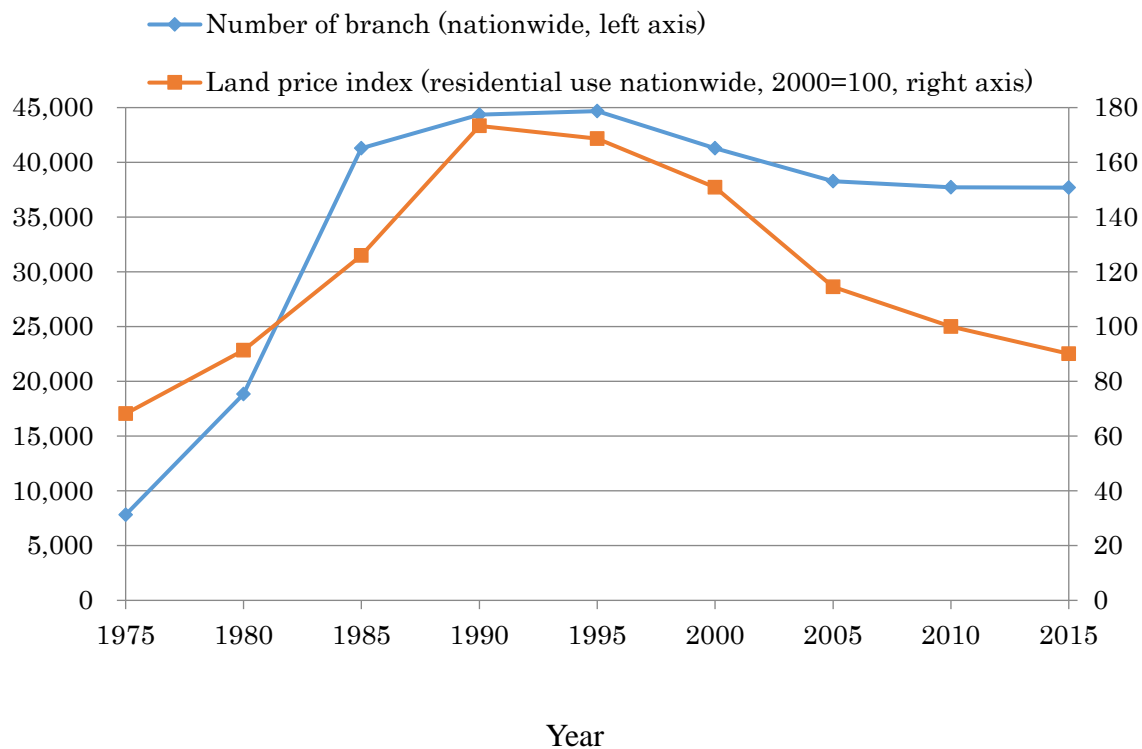
Source: Author's calculation based on the processed data, see text for details.

Figure 6: Number of bank branch vs. land price in Tokyo and the six major cities in Japan, 1975-2015



Source: Author's calculation based on the data from Japan Bank Association and Japan Real Estate Institute.

Figure 7: Number of bank branch vs. land price in Japan, 1975-2015



Source: Author's calculation based on the data from Japan Bank Association and Japan Real Estate Institute.