

Central bank liquidity support, bank lending, and the end of currency competition

Anna Grodecka-Messi and Xin Zhang

Sveriges Riksbank¹

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¹The views expressed in this presentation are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Sveriges Riksbank

Motivation

- Decline in public money: private vs public money

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- Withdrawal of private issuance rights: shock to banks' franchise value
- Equivalence of private and public monetary systems requires central bank transfers (Brunnermeier and Niepelt, 2019)
- Few empirical studies on the topic, most theoretical literature
- **Our paper:** Empirical study of a shift from private to public money in the presence of central bank transfers

Research question

- Does the loss of note issuance rights affect business models of private banks?
- Can central bank transfers mitigate this impact?

Paper in a Nutshell

What do we do?

- Study the effects of the 1897 Riksbank Act
- Gather monthly data for all commercial banks in Sweden 1894M01-1911M12: balance sheet, price and profitability (annual) data
- Two types of commercial banks in 1890s Sweden \Rightarrow DiD setup

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What do we find?

- Returns negatively affected
- Bank intermediation mostly unaffected
- Preferential liquidity support partially offsets the loss of seigniorage
- Shift towards safe collateral

Literature

- **Private vs public money:** Gorton and Zhang (2022), Rolnick and Weber (1983), Selgin (1988), Cavalcanti and Wallace (1999), Monnet and Sanches (2015), Fernandez- Villaverde and Sanches (2019).
- **Swedish writings:** Brave (2005), Ögren (2006), Jonung (2021), Kenny and Ögren (2021),
- **Empirical studies for other countries:** Canada: Grodecka-Messi and Zhang (2023), US: Xu and Yang (2024)
- **CBDC:** Andolfatto (2021), Whited et al. (2022), Chiu et al. (2023), Keister and Sanches (2022), Williamson (2021), Fernandez-Villaverde et al. (2021)
- **Banks' franchise value:** Demsetz et al. (1996); Hellmann et al. (2000), Monnet and Sanches (2015)
- **Central bank liquidity support and collateralized lending:** Bekkum et al. (2018), Hüttl and Kaldorf (2024), Repullo (2005), Brunnermeier and Niepelt (2019), Rieder (2023), Chen and Filippin (2024), Gorton and Metrick (2013), Bordo (2014), Anbil and Vossmeier (2019), Vossmeier (2019)

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Riksbank and commercial banks in 1890s in SE

Sveriges Riksbank



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1701: first banknotes (transport bills)



1874: first SEK notes printed

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Commercial banks

Enskilda banker

Unlimited liability banks (ULBs)

- Emerged in 1831
- Right to print notes



Riksbank and commercial banks in Sweden, 1890s

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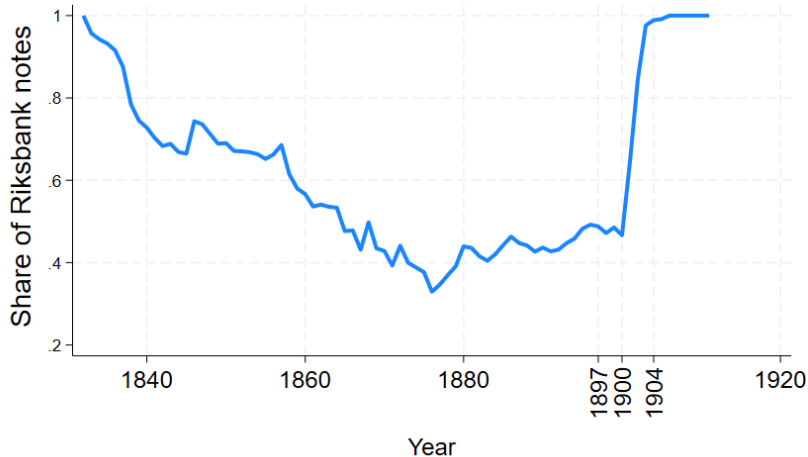


Kreditaktiebolag

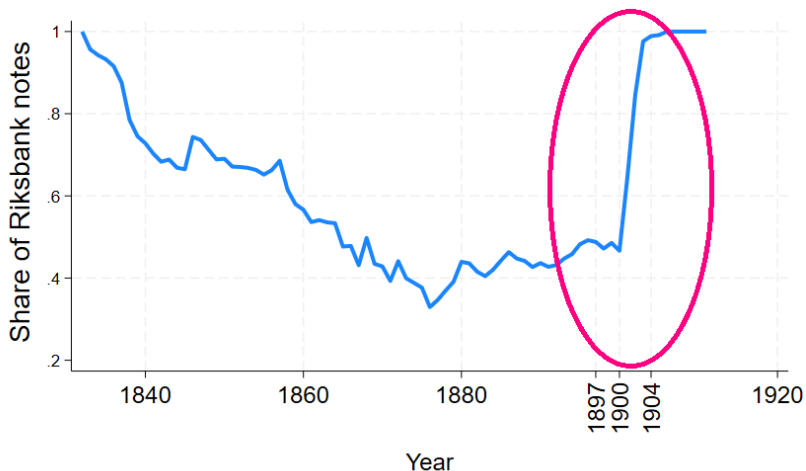
Limited liability banks (LLBs)

- Emerged in 1864
- NO right to print notes

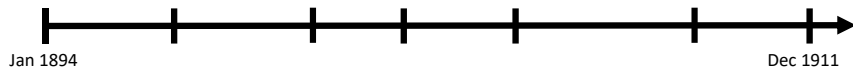
Riksbank's note share in public bank note circulation, 1833-1911



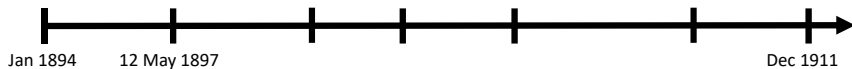
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1897 Law



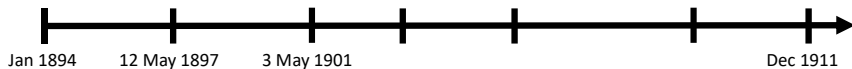
1897 Law



Riksbank law:

- Banknote monopoly
- Collateralized credit from Jan 1899
- Liquidity support a fraction of note issuance in Jan 1896

1897 Law



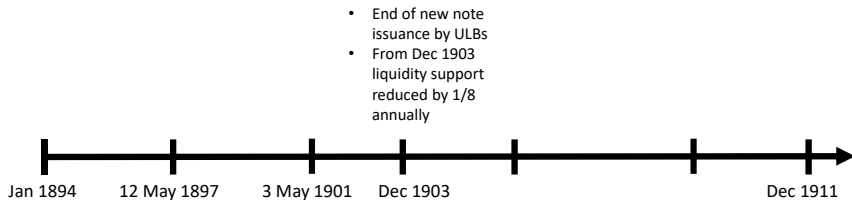
Riksbank law:

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Update of the law

- Collateralized and uncollateralized credit
- Liquidity support a fraction of note issuance in Jan 1901

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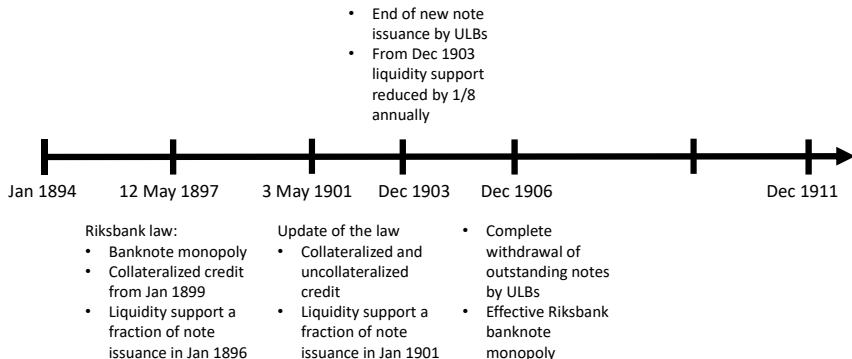
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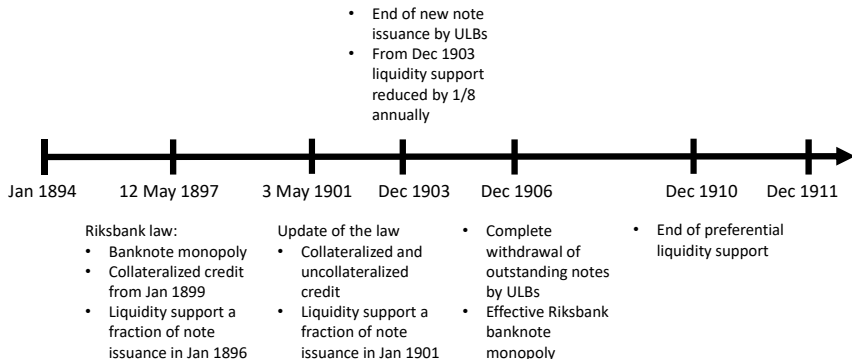
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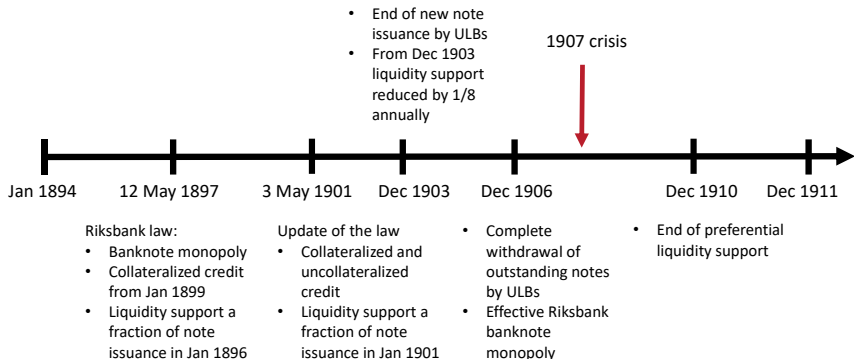
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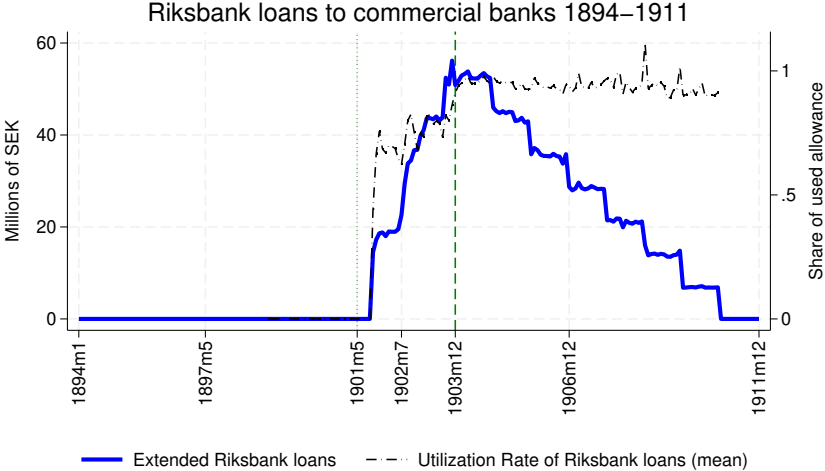
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Liquidity support by the Riksbank



▶ Details

Impact on banks' business model

Stylized ULB balance sheet before 1897

| Assets | Liabilities |
|---------------------|-----------------|
| Gold G_t | Banknotes N_t |
| Private loans L_t | Deposits D_t |
| | Equity E_t |

Stylized ULB balance sheet after 1906

| Assets | Liabilities |
|-------------------------|--|
| Riksbank notes Rb_t | Deposits D_t |
| Private loans $L_{n,t}$ | Equity E_t |
| | Loans from the Riksbank $Rb_{loans,t}$ |

- Lower share of interest-free liabilities \Rightarrow lower profits, cet. par.

$$\Pi_{t,o} = i_{p,t}L_t - i_{d,t} * D_t \equiv i_{p,t}L_t - i_{d,t} * (G_t + L_t - N_t - E_t) \quad (1)$$

$$\Pi_{t,n} = i_{p,t}L_t - i_{d,t} * D_t - i_{rb_t}0.5Rb_{loans,t} \quad (2)$$

- Bank wishing to keep its profit levels has three choices.

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- Bank wishing to keep its profit levels has three choices.
- Alternatively, profits go down.
- Results can depend on the degree of competition.

Our hypotheses

Hypothesis 1

Affected banks experience a decrease in profitability and/or they reduce lending to diminish the size of the balance sheet. In competitive areas, we expect the banks to suffer a loss in order not to lose the market share. Bank disintermediation is more likely for banks operating in remote areas.

Hypothesis 2

Loans from the Riksbank should have a mitigating effect on the fall in profitability and/or bank disintermediation.

Hypothesis 3

Affected banks increase their risk-taking, but the extent thereof is limited due to their unlimited liability status. Treated ULBs that change their status to LLB exert more risky behavior. Lending interest rates and interest margins increase to safeguard declining returns.

Data

- Sammandrag av de solidariska bankbolagens och bankaktiebolagens uppgifter 1894M01-1911M12
- High quality, audited and publicly available even in 1890s

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- 118 commercial banks, 14 433 organizations

2

Januari 1904.

| | Förtäppter. | | Inventarier: | | K o s t a s | | | | | | | | | | Aktier. | | | |
|---|-------------|--------|--------------|--------|---|-------------|---------------------------------|-------------|--|-------------|---|-------------|---|-------------|---------|--|---|-------------|
| | | | | | a) Lågpris i öfrige guldvalda förtäppter. | | b) Årslut guldvalda förtäppter. | | c) Öfrigt nytt, riksbankens förtäppter och till guldvalda på guldvalda på riksbankens. | | d) Riksbankens förtäppter och till guldvalda på guldvalda på riksbankens. | | e) Riksbankens förtäppter och till guldvalda på guldvalda på riksbankens. | | | | f) Riksbankens förtäppter och till guldvalda på guldvalda på riksbankens. | |
| | | | | | Kronor. | Skillingar. | Kronor. | Skillingar. | Kronor. | Skillingar. | Kronor. | Skillingar. | Kronor. | Skillingar. | | | Kronor. | Skillingar. |
| 1. Sjörens enskilda bank..... | 3,744,000 | 33,087 | 6,390 | 39,093 | 5,837,742 | 1,300,000 | 2,307,421 | 1,021,045 | 14,947,349 | 200,200 | | | | | | | | |
| 2. Värmlands enskilda bank..... | 229,000 | 14,711 | 9,850 | 372 | 221,701 | 1,975,143 | 41,263 | 356,770 | 5,219,642 | 277 | | | | | | | | |
| 3. Kopparbergs enskilda bank..... | 178,000 | 18,247 | 5,541 | | 167,259 | 2,641,338 | | 176,789 | 3,015,469 | | | | | | | | | |
| 4. Östergötlands enskilda bank..... | 325,000 | 39 | 1,005 | | 334,036 | 175,355 | 479,801 | 51,264 | 6,021,529 | 14 | 13,369 | | | | | | | |
| 5. Smålands enskilda bank..... | 354,177 | 54,723 | 4,450 | | 378,705 | 674,811 | 448,414 | 45,005 | 4,899,434 | | | | | | | | | |
| 6. Örebro enskilda bank..... | 7,165 | 4 | 605 | | 391,945 | 41,850 | | 60,333 | 2,314,264 | 67 | 68,506 | | | | | | | |
| 7. Stockholms enskilda bank..... | 100,000 | 10,000 | 17,285 | 89,296 | 2,096,000 | 3,640,133 | 23,404,908 | 115,722 | 11,237,134 | 14 | | | | | | | | |
| 8. Norrbygdens enskilda bank..... | 800,000 | 25,000 | 2,330 | 2,087 | 197,067 | 443,574 | 94,712 | 1,000 | 3,848,978 | | 5 | | | | | | | |
| 9. Hallands enskilda bank..... | 73,895 | 4,502 | 2,719 | 2,405 | 217,229 | 346,503 | 175,769 | 36,259 | 854,112 | | | | | | | | | |
| 10. Söderålands enskilda bank..... | 1,729,500 | 30,000 | 17,285 | | 1,565,169 | 408,745 | 1,040,503 | 145,854 | 5,613,459 | | 70,100 | | | | | | | |
| 11. Enskilda banken i Västerberg..... | 34,400 | 11,600 | 620 | 17 | 342,780 | 115,630 | 70,260 | 50,021 | 1,333,302 | | | | | | | | | |
| 12. Skaraborgs länns enskilda bank..... | 145,000 | 15,000 | 1,260 | | 180,859 | 391,707 | 34,245 | 88,861 | 3,941,743 | | | | | | | | | |
| 13. Gyldebores enskilda bank..... | 125,000 | 15,100 | 3,585 | 30 | 119,040 | 354,200 | 31,867 | 2,289 | 3,222,713 | | | | | | | | | |
| 14. Uppsålands enskilda bank..... | 110,000 | 30,976 | 13,510 | | 742,319 | 243,677 | 42,429 | 711 | 4,144,993 | | 16,170 | | | | | | | |
| 15. Kristinehamns enskilda bank..... | 157,500 | 31,208 | 4,150 | | 407,863 | 389,150 | 180,281 | 7,123 | 2,807,203 | | | | | | | | | |
| 16. Sjöns enskilda bank..... | 30,000 | 10,753 | 1,270 | | 274,720 | 50,000 | 29,714 | 7,424 | 775,664 | | | | | | | | | |

Solidariska bankbolag.

Tillgångar.

| Deltagande och böpta värden. | | | | | | | | | | U t s t a t t e n d a r | | | | | | | | | |
|------------------------------|------------|---------|-----------|---|------------|---|-----------|---------------------------|------------|---|-----------|----------------|-----------|----------------|-----------|----------------|-----------|-----------|--|
| Länna. | | Urtien. | | med hypotek af in- teckning i fast egenhet. | | med hypotek af rotationsvärde efterlånen. | | med hypotek af aktier. | | med hypotek af värn eller annan, här ej speciellt uttryckt realstaten. | | med aktier. | | med aktier. | | med aktier. | | | |
| Antal. | Summa. | Antal. | Summa. | Antal. | Summa. | Antal. | Summa. | Antal. | Summa. | Antal. | Summa. | Antal. | Summa. | Antal. | Summa. | Antal. | Summa. | | |
| 31,671 | 90,510,415 | 653 | 2,165,255 | 567 | 14,094,567 | 56 | 1,113,300 | 566 | 10,981,285 | 141 | 1,611,271 | 67 | 1,000,000 | 67 | 1,000,000 | 67 | 1,000,000 | | |
| 9,549 | 7,899,156 | 34 | 130,304 | 869 | 6,950,916 | 19 | 138,600 | 187 | 4,569,900 | 73 | 1,508,200 | 83 | 1,508,200 | 83 | 1,508,200 | 83 | 1,508,200 | | |
| 4,274 | 4,077,289 | 6 | 30,246 | 229 | 4,933,100 | 9 | 30,700 | 98 | 1,000,750 | 68 | 306,000 | 70 | 306,000 | 70 | 306,000 | 70 | 306,000 | | |
| 9,281 | 5,947,219 | 70 | 489,261 | 645 | 4,109,600 | 43 | 75,300 | 116 | 1,208,700 | 118 | 577,200 | 129 | 577,200 | 129 | 577,200 | 129 | 577,200 | | |
| 19,673 | 13,693,834 | 11 | 55 | 347,249 | 11,290 | 7,284,205 | 15 | 43,290 | 185 | 3,789,750 | 116 | 383,000 | 117 | 383,000 | 117 | 383,000 | 117 | 383,000 | |
| 4,367 | 4,989,154 | 90 | 3,000 | 100 | 3,840,000 | 1 | 30,000 | 98 | 891,000 | 98 | 915,000 | 98 | 915,000 | 98 | 915,000 | 98 | 915,000 | | |
| 4,274 | 13,786,790 | 802 | 4,677,429 | 143 | 6,784,575 | 48 | 4,872,270 | 177 | 19,089,000 | 38 | 479,000 | 38 | 479,000 | 38 | 479,000 | 38 | 479,000 | | |
| 2,204 | 4,504,104 | 47 | 41,219 | 142 | 2,473,100 | 6 | 39,800 | 80 | 3,603,000 | 114 | 2,673,000 | 114 | 2,673,000 | 114 | 2,673,000 | 114 | 2,673,000 | | |
| 10,459 | 7,800,829 | 41 | 170,704 | 619 | 3,772,944 | 4 | 32,400 | 8 | 5,674,300 | 5 | 674,300 | 1,000 | 1,000,000 | 1,000 | 1,000,000 | 1,000 | 1,000,000 | | |
| 8,061 | 12,337,234 | 135 | 2,229,528 | 312 | 7,441,540 | 26 | 443,000 | 308 | 7,308,500 | 26 | 1,790,000 | 312 | 1,790,000 | 312 | 1,790,000 | 312 | 1,790,000 | | |
| 6,013 | 3,973,156 | 16 | 100,129 | 219 | 3,024,175 | 7 | 130,900 | 46 | 1,307,200 | 17 | 96,390 | 43 | 96,390 | 43 | 96,390 | 43 | 96,390 | | |
| 90,204 | 10,124,486 | 16 | 860 | 5,609,000 | 20 | 754,235 | 116 | 5,476,270 | 94 | 96 | 319,215 | 1,000 | 1,000,000 | 1,000 | 1,000,000 | 1,000 | 1,000,000 | | |
| 5,613 | 5,140,345 | 10 | 299,709 | 331 | 3,295,800 | 10 | 50,295 | 131 | 3,241,700 | 9 | 65,130 | 129 | 65,130 | 129 | 65,130 | 129 | 65,130 | | |
| 9,763 | 6,807,307 | 48 | 773 | 5,278,000 | 64 | 139,150 | 185 | 3,411,000 | 46 | 818,200 | 2,400 | 2,400,000 | 2,400 | 2,400,000 | 2,400 | 2,400,000 | 2,400 | 2,400,000 | |
| 7,405 | 6,408,750 | 18 | 18,001 | 242 | 3,173,000 | 15 | 131,100 | 79 | 1,185,000 | 56 | 475,000 | 44 | 475,000 | 44 | 475,000 | 44 | 475,000 | | |
| 8,906 | 6,414,151 | 8 | 9,900 | 290 | 3,029,200 | 1 | 2,000 | 22 | 203,970 | 27 | 116,200 | 30 | 116,200 | 30 | 116,200 | 30 | 116,200 | | |

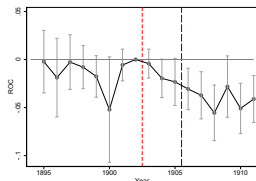
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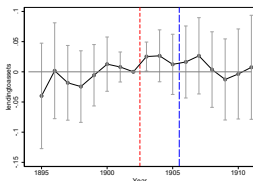
| | Upplånings-ranta: | | | | | | |
|--|-----------------------|---------------------------------|--------------------------------------|----------|----------|----------|----------|
| | I spar-kasse-räkning. | I upp- och afkrifnings-räkning. | I depositioner med uppsägningstid af | | | | |
| | | | 1 mån. | 2 mån. | 3 mån. | 4 mån. | 6 mån. |
| | | | Procent. | Procent. | Procent. | Procent. | Procent. |
| Riksbanken | — | — | — | — | — | — | — |
| 1 Skånes enskilda bank | — | 2½ | 3 | 3½ | 4 | 5 | 5 |
| 2 Vermlands do | — | 3 | 3 | 3½ | 4 | 4½ | 5 |
| 3 Kopparbergs do | — | 3 | 3½ | 4 | 4½ | 4½ | 5 |
| 4 Östergötlands do | — | 5 | 3½ | 3½ | 4 | 4½ | 5 |
| 5 Smålands do | 4 & 5 | 2½ | 3 | 3 | 3½ | 4 | 4½ |
| 6 Örebro do | — | 5 | 3 | 3½ | 4 | 4½ | 5 |
| 7 Mälareprovinsernas do | 4½ & 5 | 3 | 3 | 3½ | 4 | 4½ | 5 |
| 8 Göteborgs do | — | 5 | 3 | 3½ | 4 | 4½ | 5 |
| 9 Stockholms do | — | 5 | 3 | 3½ | 4 | 4½ | 5 |
| 10 Norrköpings do | — | 5 | 3 | 3½ | 4 | 4½ | 5 |
| 11 Hallands do | — | 5 | 2½ | 3 | 3½ | 4 | 5 |
| 12 Sundsvalds do | — | 5 | 3 | 3½ | 3½ & 4 | 4 & 4½ | 4½ & 5 |
| 13 Christianstads do | — | 5 | 2½ & 3 | 3 | 3½ | 4 | 5 |
| 14 Enskilda banken i Venersborg | — | — | — | 3 | 3 | 4 | 5 |
| 15 Skaraborgs läns enskilda bank | — | — | 2½ | 3 | 3½ | 4 | 4½ |
| 16 Gefleborgs enskilda bank | — | — | 4½ | 3 | 3½ | 4 | 4½ |
| 17 Uplands do | — | — | — | 3 | — | 4 | 4½ |
| 18 Christinas do | — | — | 4½ & 5 | 3 | — | 4 | 4½ |
| 19 Borås do | — | — | 5 | 3 | 3½ | 4 | 4½ |
| 20 Södermanlands do | — | — | — | 4½ | 3 | 4 | 4½ |
| 21 Kalmar do | — | — | — | 4½ | 3 | 4 | 4½ |
| 22 Gotlands do | — | — | — | — | 2½ | 4 | 4½ |
| 23 Bohus läns do | — | — | — | — | — | 4 | 4½ |
| 24 Hernösands do | — | — | — | — | — | 3 & 3 | 4 |
| 25 Helsinglands do | — | — | — | — | — | — | 2½ & 4 |
| 26 Norrbottens do | — | — | — | — | — | — | — |

Parallel trends assumption

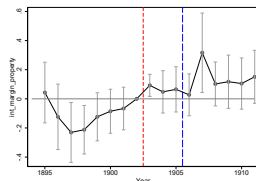
$$y_{i,t} = \alpha + \sum_{\tau=1894}^{1911} \delta_{\tau} \text{Treat}_i \times \text{After}_{\tau,t} + \gamma X_{i,t} + \eta \text{RB Loan}_{i,t-j} + \delta_i + \eta_t + \epsilon_{i,t}, \quad (3)$$



(a) Returns



(b) Lending to Assets



(c) Interest Rates

Figure: Returns and lending activities of banks over the period 1894-1911

Difference-in-differences

$$y_{i,t} = \alpha + \beta \text{Treat}_i \times \text{After}_t + \gamma X_{i,t} + \eta \text{RB Loan}_{i,t-j} + \delta_i + \eta_t + \epsilon_{i,t}. \quad (4)$$

- Treated banks (Treat) are banks that were ULBs in May 1897.
- Treatment time (After); May 1897, January 1899, August 1903, April 1906.
- Bank-level control variables include the logarithm of total asset, the dummy variable of unlimited liability banks, the cash ratio, the lending ratio, equity ratio, non-performing loans ratio, RB Loan ratio.

▶ Summary statistics

Effects on bank profitability

Table: Effects on banks' profitability

| | (1) | (2) | (3) | (4) |
|------------------------------|-----------|---------|-----------|---------|
| | ROE | ROA | ROC | Div% |
| Panel A: 1903 treatment date | | | | |
| Treat x After | -0.011** | -0.001 | -0.025*** | -0.018 |
| | (0.004) | (0.001) | (0.008) | (0.019) |
| Lagged RB Loan | 0.111** | 0.019* | 0.216** | 0.756 |
| | (0.051) | (0.011) | (0.084) | (0.726) |
| adj. R^2 | 0.243 | 0.382 | 0.429 | 0.074 |
| Panel B: 1906 treatment date | | | | |
| Treat x After | -0.011*** | -0.001 | -0.027*** | 0.003 |
| | (0.004) | (0.001) | (0.007) | (0.009) |
| Lagged RB Loan | 0.008 | 0.008 | -0.028 | 0.706 |
| | (0.042) | (0.009) | (0.079) | (0.693) |
| adj. R^2 | 0.245 | 0.382 | 0.432 | 0.074 |
| Add. Controls | YES | YES | YES | YES |
| N | 1099 | 1099 | 1099 | 1098 |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES |
| Std. Err. | BANK | BANK | BANK | BANK |

Effects on bank profitability

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| | (1) ROE | (2) ROA | (3) ROC | (4) Div% |
|------------------------------|----------------------|-------------------|----------------------|-------------------|
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| Std. Err. | BANK | BANK | BANK | BANK |

Effects on portfolio allocation

Table: Effects on banks' business activities

| | (1) | (2) | (3) | (4) |
|------------------------------|-------------------|---------------------|-------------------|------------------|
| | Lending/Assets | Prop. L. Ratio | Share L. Ratio | Deposit Ratio |
| Panel A: 1903 treatment date | | | | |
| Treat x After | -0.011 (0.031) | -0.017 (0.025) | 0.012 (0.013) | 0.010 (0.022) |
| Lagged RB Loan | 0.456* (0.268) | 0.601*** (0.145) | -0.016 (0.156) | 0.057 (0.256) |
| adj. R^2 | 0.705 | 0.734 | 0.683 | 0.760 |
| Panel B: 1906 treatment date | | | | |
| Treat x After | -0.019 (0.027) | -0.024 (0.020) | 0.013 (0.013) | 0.014 (0.020) |
| Lagged RB Loan | 0.276 (0.244) | 0.382** (0.167) | 0.106 (0.151) | 0.185 (0.234) |
| adj. R^2 | 0.705 | 0.735 | 0.683 | 0.760 |
| Add. Controls | YES | YES | YES | YES |
| N | 14328 | 14328 | 14328 | 14328 |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES |
| Std. Err. | BANK | BANK | BANK | BANK |

Effects on interest rates

Table: Effects on banks' interest rates and margins

| | (1) | (2) | (3) | (4) |
|------------------------------|---------------------------|----------------------------|-------------------------|---------------------------|
| | Prop. Loan Int. Margin | ST Discount Int. Margin | Prop. Loan Int. Rate | 3-Month Dep. Int. Rate |
| Panel A: 1903 treatment date | | | | |
| Treat x After | 0.110** (0.050) | 0.015 (0.067) | 0.152*** (0.049) | 0.063 (0.051) |
| Lagged RB Loan | -1.529** (0.752) | -1.292 (0.853) | -1.854*** (0.690) | -0.728 (0.550) |
| adj. R^2 | 0.688 | 0.698 | 0.879 | 0.895 |
| Panel B: 1906 treatment date | | | | |
| Treat x After | 0.093* (0.050) | 0.096 (0.064) | 0.138*** (0.048) | 0.029 (0.040) |
| Lagged RB Loan | -0.700 (0.727) | -0.396 (0.809) | -0.607 (0.729) | -0.479 (0.658) |
| adj. R^2 | 0.688 | 0.699 | 0.879 | 0.895 |
| Add. Controls | YES | YES | YES | YES |
| N | 13733 | 13794 | 14316 | 13798 |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES |
| Std. Err. | BANK | BANK | BANK | BANK |

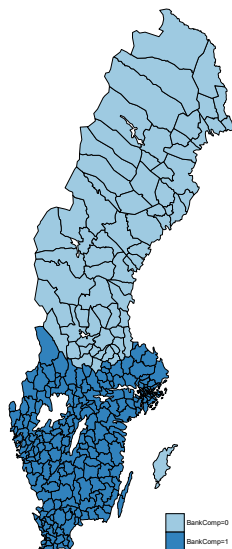
Effects on interest rates

Table: Effects on banks' interest rates and margins

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| Std. Err. | BANK | BANK | BANK | BANK |

The effect of competition

- Close-to-natural monopolies in the North due to geographical division of Sweden
- High Competition = 1 in highly populated southern regions of Sweden
- Match banks' headquarters with region



The effect of competition

Table: The role of competition for the results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|--------------------|---------------------|---------------------|--------------------|---------------------|--------------------|
| | ROE | ROC | Lending/Assets | Prop. Loan | Property Int.Margin | Property Int.Rate |
| Panel A: 1903 treatment date, high competition | | | | | | |
| Treat x After | -0.010* (0.005) | -0.021** (0.009) | 0.006 (0.041) | -0.017 (0.036) | 0.094* (0.055) | 0.103** (0.048) |
| <i>N</i> | 764 | 764 | 9902 | 9902 | 9330 | 9898 |
| adj. R^2 | 0.353 | 0.617 | 0.673 | 0.673 | 0.487 | 0.898 |
| Panel B: 1903 treatment date, low competition | | | | | | |
| Treat x After | -0.006 (0.016) | -0.019 (0.022) | -0.091** (0.034) | -0.053* (0.027) | 0.028 (0.167) | 0.146 (0.183) |
| <i>N</i> | 335 | 335 | 4419 | 4419 | 4403 | 4418 |
| adj. R^2 | 0.179 | 0.249 | 0.866 | 0.889 | 0.630 | 0.841 |
| Add. Controls | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES | YES | YES |
| Std. Err. | BANK | BANK | BANK | BANK | BANK | BANK |

The effect of competition

Table: The role of competition for the results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|--------------------|---------------------|--------------------|--------------------|---------------------|--------------------|
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| Time FE | YES | YES | YES | YES | YES | YES |
| Std. Err. | BANK | BANK | BANK | BANK | BANK | BANK |

Variations of the model/robustness checks

- Performance during the 1907 crisis
- Bank-specific treatment intensities and treatment dates
- ULBs that became LLBs after the stop of note issuance
- Sample size: banks that existed in Jan 1894, banks that existed in Jan 1897, cutting the sample in April 1907
- Control variables interacted with After
- Multiple treatment dates

Conclusion

- The end of domestic paper currency competition in Sweden

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Lessons for today

- Market power and geographical monopolies matter

Conclusion

- The end of domestic paper currency competition in Sweden
- Banks decrease profits and increase lending rates
- Riksbank loans cushion the losses
- Move towards safer collateral
- No excessive risk-taking and worse performance 1907

Lessons for today

- Market power and geographical monopolies matter
- Central bank transfers mitigate the impact of the shift

Thank you for your attention!

Liquidity support by the Riksbank

Table 1: Details on liquidity support by the Riksbank due to the 1897 law and its 1901 update

| Time period | Available facilities |
|--------------------|--|
| Jan 1899-May 1901 | <ol style="list-style-type: none">1. Open collateralized credit^a for the value up to 50% of banks' notes outstanding on January 1896.^b2. Right to rediscount bills at the Riksbank for the value up to 50% of banks' notes outstanding on January 1896.^c |
| June 1901-Nov 1903 | <ol style="list-style-type: none">1. Open collateralized credit^d for the value up to 10% of banks' notes outstanding on January 1901.^e2. Right to rediscount bills at the Riksbank for the value up to 25% of banks' notes outstanding on January 1901.^f3. Uncollateralized loan for the value up to 65% of banks' notes outstanding on January 1901.^g |
| Dec 1903-Nov 1909 | Liquidity support as specified for November 1903 should be reduced each year starting in December 1903 by one-eight part of its original amount. |
| Dec 1909 onwards | No specific liquidity support. |

Notes. Source: Flux (1910). Details are provided in the laws of May 27, 1897 and May 3, 1901. §41 of the *Sveriges Riksbank Law (1897)* specifies the liquidity support provided to individual note-issuing banks. All liquidity provisions were conditional on banks maintaining their branch offices that were in operation on January 1, 1896.

Figure: Liquidity support by the Riksbank to former note-issuing banks

Table: Summary statistics for treated and control banks in separate periods

| (lr)2-3 (lr)4-5 (lr)6-7 | Control | | Treated | | Differences | |
|---|-----------|------|---------|------|-------------|-----------|
| | mean | sd | mean | sd | diff | t |
| | 1894–1896 | | | | | |
| Return on Equity (ROE) | 0.08 | 0.04 | 0.08 | 0.02 | -0.00 | (-0.01) |
| Return on Assets (ROA) | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | (1.32) |
| Return on Capital (ROC) | 0.10 | 0.05 | 0.11 | 0.04 | -0.01 | (-1.31) |
| Dividend Ratio | 0.06 | 0.02 | 0.06 | 0.01 | -0.00 | (-0.90) |
| log(Assets) | 15.27 | 1.41 | 16.52 | 0.71 | -1.26*** | (-23.71) |
| Cash Ratio | 0.00 | 0.00 | 0.02 | 0.00 | -0.01*** | (-116.02) |
| Notes to Liabilities | 0.00 | 0.00 | 0.13 | 0.03 | -0.13*** | (-160.20) |
| Lending to Assets | 0.39 | 0.18 | 0.27 | 0.09 | 0.12*** | (18.51) |
| Property Lending Ratio | 0.20 | 0.12 | 0.11 | 0.06 | 0.09*** | (18.94) |
| Share Lending Ratio | 0.06 | 0.06 | 0.06 | 0.05 | -0.00 | (-0.61) |
| Deposit Ratio | 0.63 | 0.18 | 0.56 | 0.10 | 0.07*** | (9.95) |
| Equity Ratio | 0.22 | 0.10 | 0.18 | 0.04 | 0.04*** | (12.28) |
| Non-performing Loans to Assets | 0.00 | 0.01 | 0.00 | 0.01 | -0.00** | (-2.91) |
| Riksbank Loan Ratio | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (.) |
| Property Loan Int. Margin | 1.29 | 0.37 | 1.36 | 0.30 | -0.07*** | (-4.32) |
| Long-term Discounted Bills Int. Margin | 1.50 | 0.52 | 1.46 | 0.35 | 0.04 | (1.83) |
| Short-term Discounted Bills Int. Margin | 1.71 | 0.56 | 1.56 | 0.40 | 0.15*** | (6.44) |
| Property Loan Int. Rate | 4.84 | 0.45 | 4.77 | 0.32 | 0.08*** | (4.18) |
| 3 M Discounted Bill Int. Rate | 4.71 | 0.69 | 4.38 | 0.40 | 0.33*** | (12.30) |
| Current Account Int. Rate | 2.04 | 0.27 | 1.88 | 0.21 | 0.16*** | (13.98) |
| 3 Month Deposit Int. Rate | 2.99 | 0.26 | 2.82 | 0.27 | 0.17*** | (13.73) |
| 6 Month Deposit Int. Rate | 3.58 | 0.31 | 3.40 | 0.21 | 0.18*** | (14.25) |