Limited Deposit Insurance Coverage and Bank Competition

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Observations and motivation

- Deposit insurance (DI) schemes place a limit on the covered amount deposited in each bank
- However, there is no limit on the number of accounts held with different banks
- Therefore, some depositors open accounts with different banks to take advantage of full FDIC coverage
- Consequently, a new industry has emerged: The Certificate of Deposit Account Registry Service (CADR) that splits a customer's deposit into several banks (possibly, 3,000 banks)

Deposit insurance: Facts

- 78 countries have explicit DI, 68 of them have limited DI, 10 have unlimited DI [IMF survey, see Garcia (2000)]
- In the U.S. the FDIC established with the Banking Act of 1933
- The "logic" behind the DI limit is to allow protection of small investors, but not to large sophisticated investors who can "impose" market discipline
- *Note*: It is not clear how any investor can impose discipline on banks without knowing their exact investment portfolio
- In addition, depositors can spread their deposits among multiple banks thereby disregarding any risk

Goals and methodology of the paper

1. Document stylized facts on the demand for multiple deposit accounts to achieve higher or full deposit insurance
2. Model of deposit competition
   1. assume an imperfectly-competitive market structure where
   2. banks compete in deposit rates (interest on deposits and CDs)
   3. depositors bear a cost of opening and maintaining a second bank account
   4. We compare 3 regimes of deposit insurance (DI):
      (a) No DI
      (b) Unlimited DI
      (c) Limited DI (observed policy)

   with respect to equilibrium interest rates, depositors' welfare, banks' profit, and total welfare

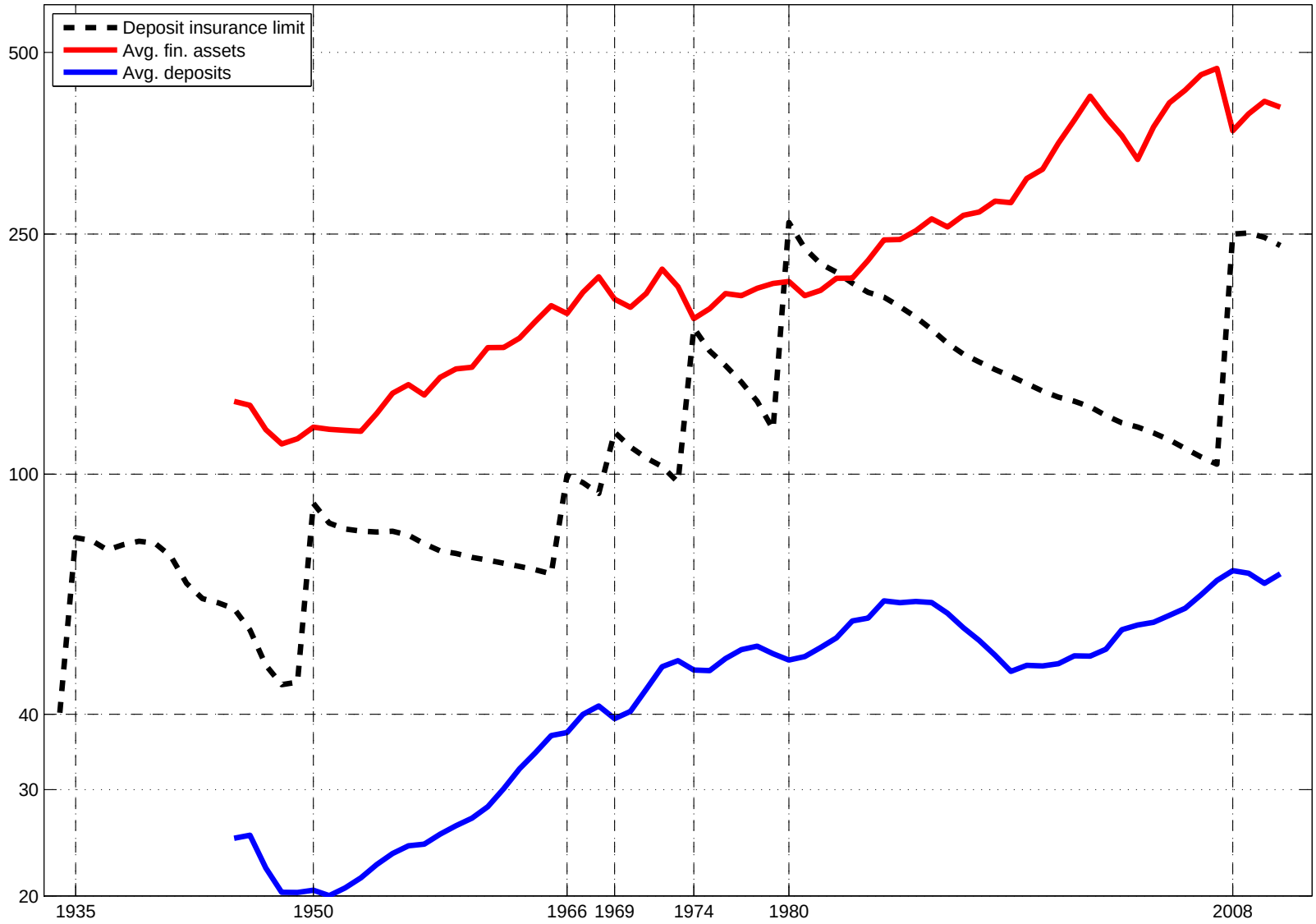
Empirical facts on the demand for multiple deposit accounts under limited deposit insurance

Deposit insurance limits over time (table)

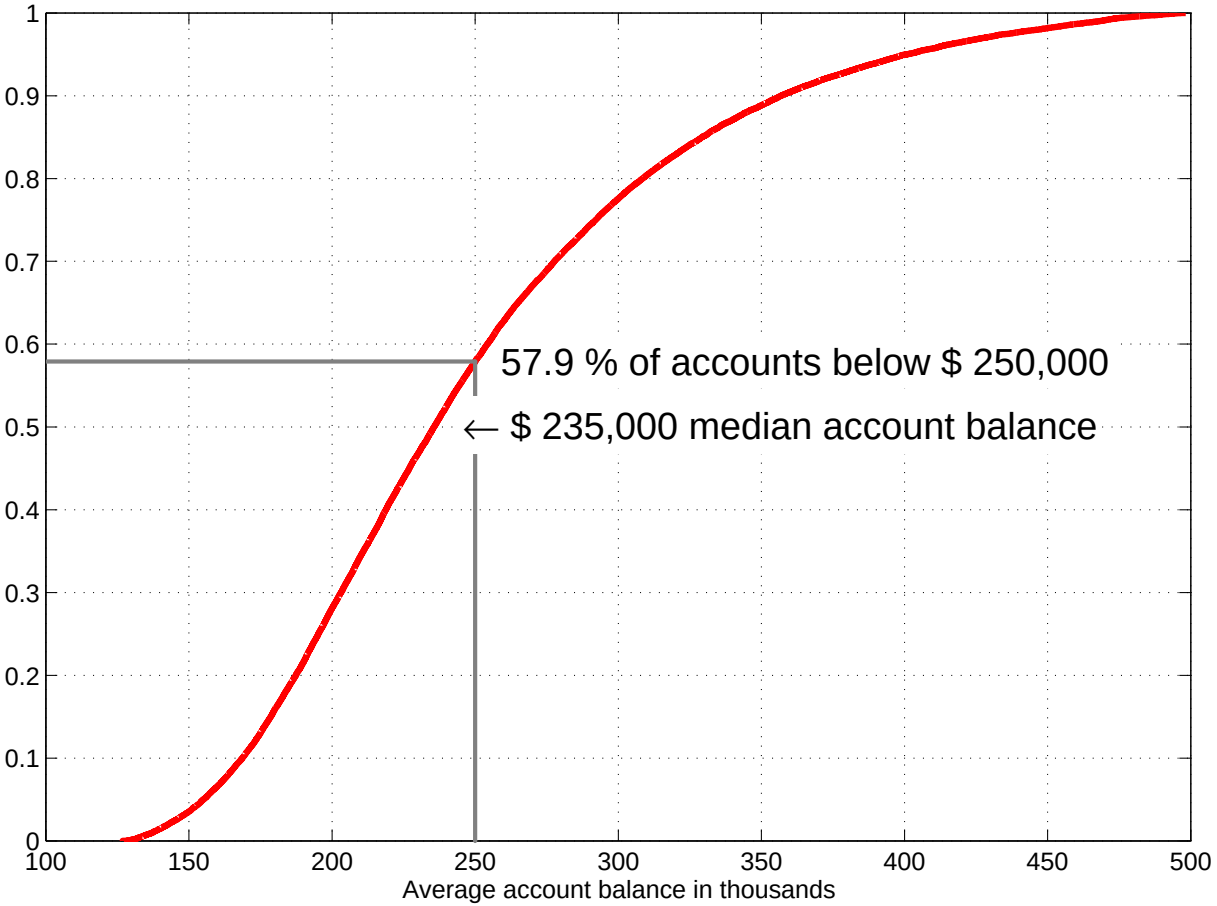
Year	Limit (nominal)	Limit (real)	Fin.wealth (real)	Deposits (real)
1934	2,500	40,218	NaN	NaN
1935	5,000	78,434	NaN	NaN
1950	10,000	89,460	119,581	20,439
1966	15,000	99,497	184,555	37,293
1969	20,000	117,384	194,933	39,321
1974	40,000	174,658	181,028	47,361
1980	100,000	261,263	208,522	49,177
2008	250,000	250,000	370,674	69,176

- Real values are in 2008 USD. Financial wealth and deposits are averages per U.S. household
- Current limit per bank: \$250,000 (single account), \$500,000 (joint), with some additional allowed permutations
- 1980 marks the maximum real coverage

Deposit insurance limits over time (graph)

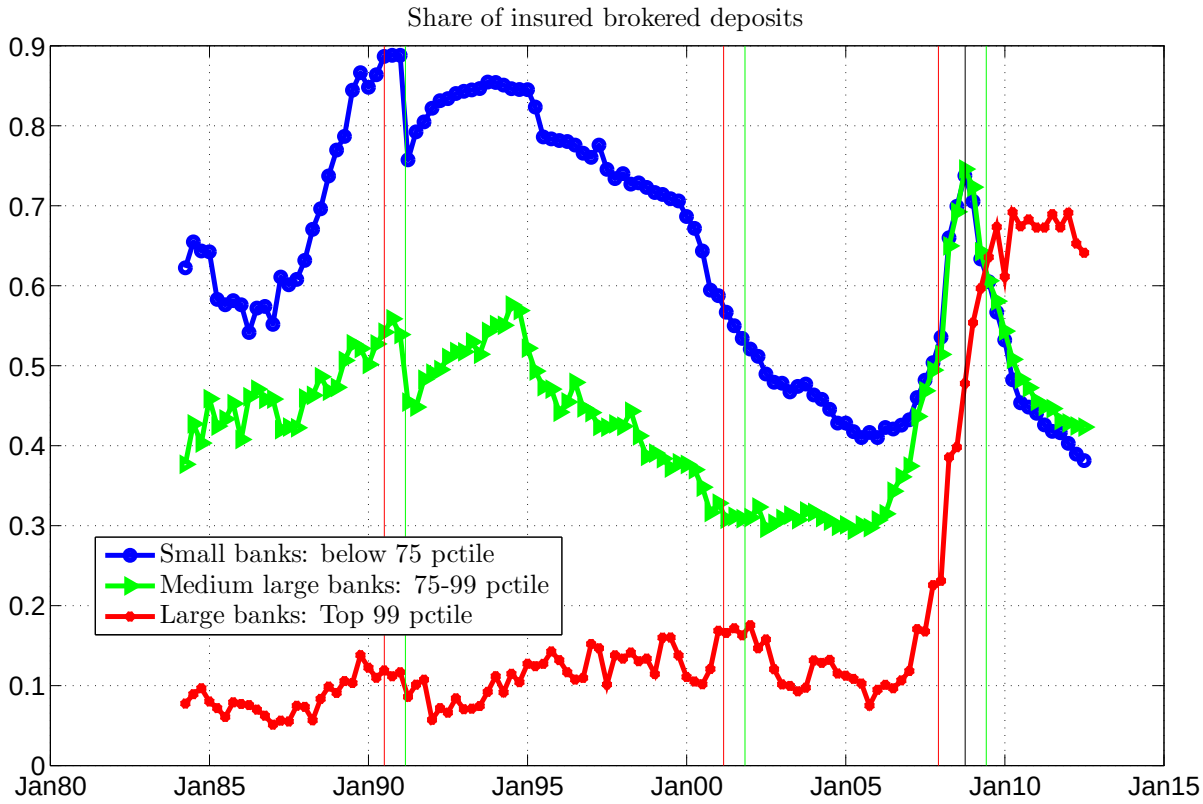


Cumulative density of average balances *exceeding* $100,000 in 2008 (before the limit was raised to $250,000)



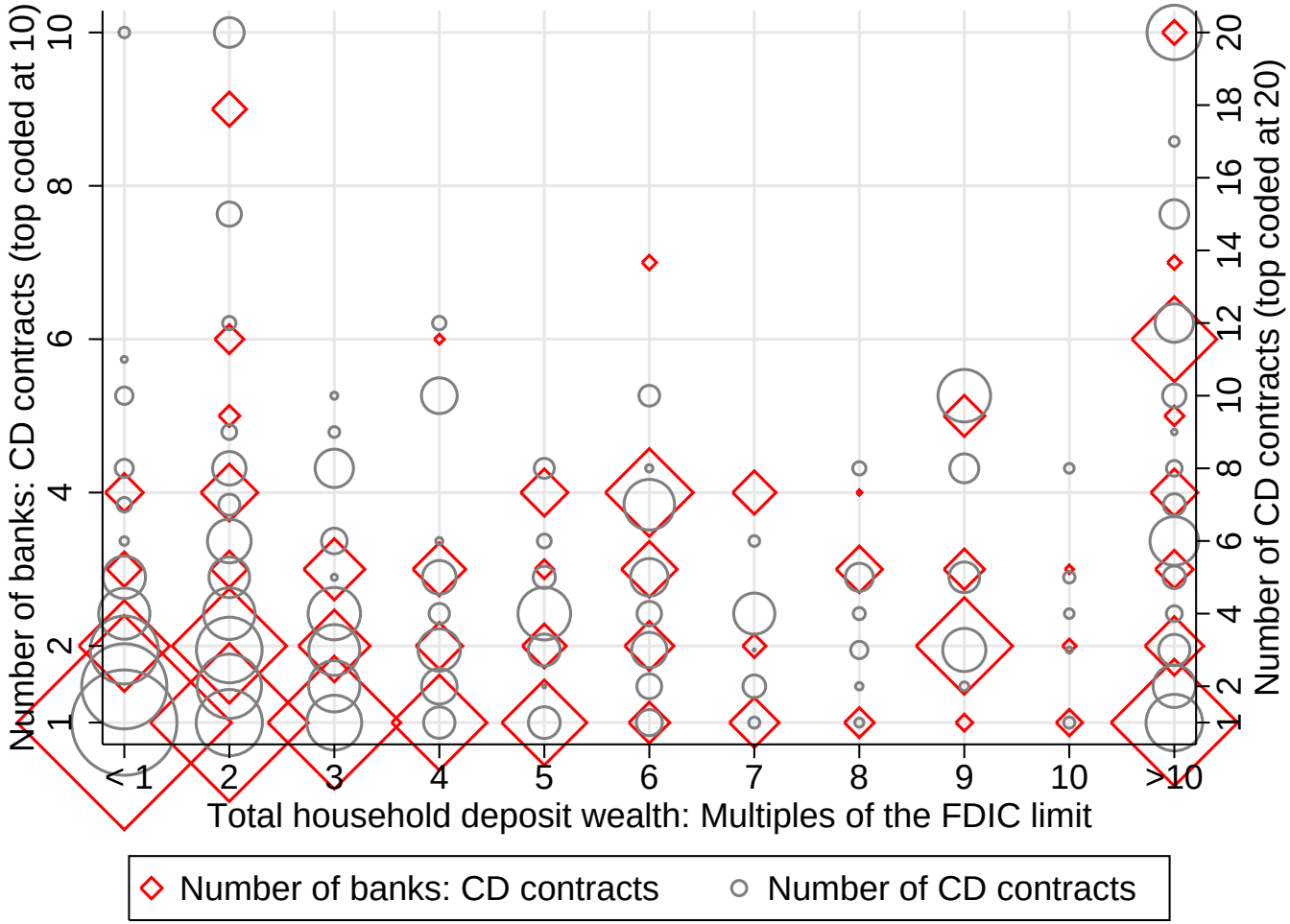
- 60% of these large deposits were below $250,000
- Almost all accounts were below $2 \times \$250,000$

Share of insured brokered deposits



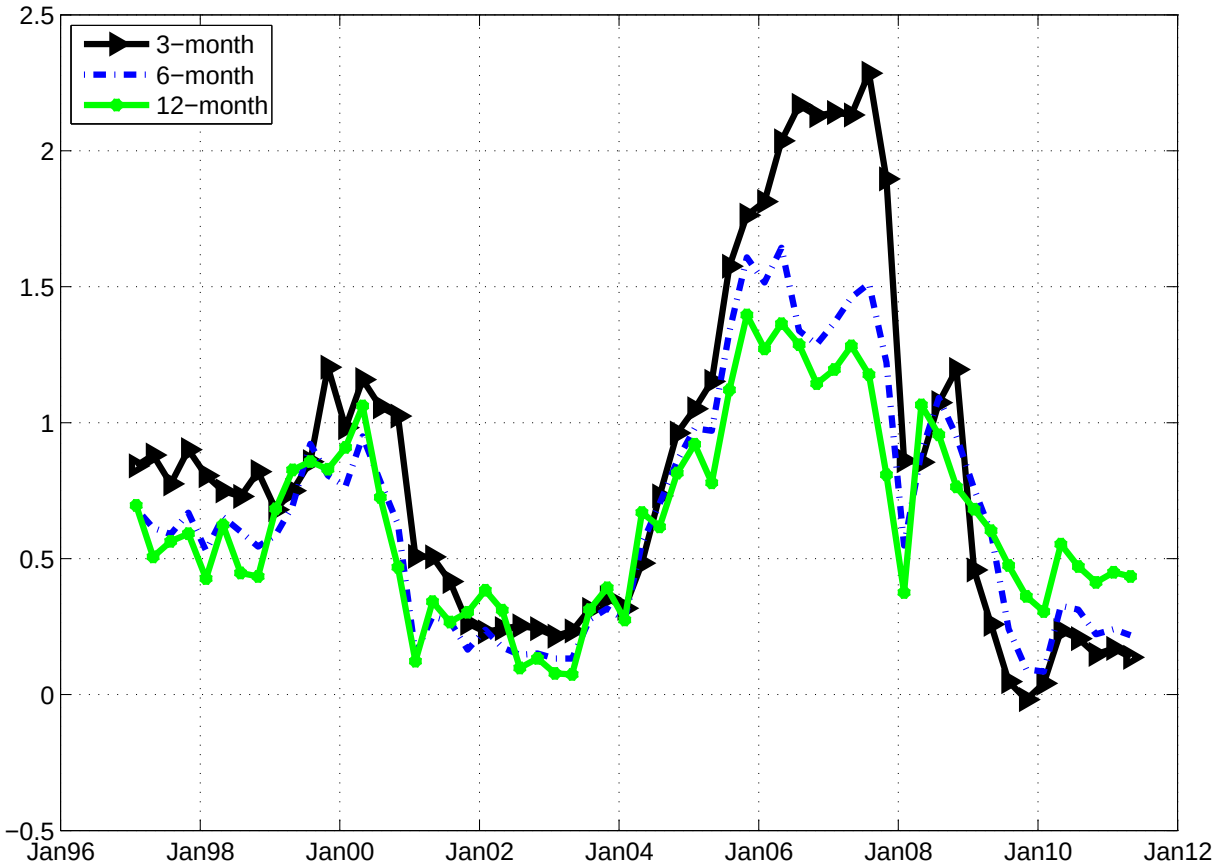
- A substantial increase in the demand for insured brokered deposits at the onset of the Financial Crisis of 2008

Deposit Account Allocations and Household Wealth



- Wealthy households maintained multiple deposit accounts with different banks (SCF, 2007)

Pricing of Large Denomination Jumbo CDs ($\geq$ \$100, 000)



- Spread between matched maturity LIBOR and Jumbo CD rates
- Banks paid significantly lower interest rates on Jumbo CDs with minimum balance of \$ 100,000. (SOURCE: RateWatch)

Summary of facts

Fact 1. For the period 1986–2008, the average balance of most of the large ($> \$100k$) partially insured denomination accounts was within two or three times the deposit insurance limit.

Fact 2. For most of the period 1986–2008, smaller banks attracted a larger share of brokered insured deposits compared with medium and large size banks.

Fact 3. According to the Survey of Consumer Finances, a large fraction of wealthy households maintain multiple deposit accounts with multiple deposit institutions.

Fact 4. There is a strong positive correlation between the average number of CD accounts, the average amount deposited, and the number of banks these accounts are held with.

Fact 5. Banks charged a large monopoly mark-up on retail Jumbo CDs over the period 1997-2011

A Model of Bank Competition for Deposits

Banks' Asset Returns

- There are two competing banks: bank A and bank B
- Each bank invests in a risky project

$$\tilde{\rho} = \begin{cases} \rho & (1-\phi) \\ 0 & \phi \end{cases}$$

- Banks fund their investments with deposits (no equity)
- For each bank $i \in \{A, B\}$, \$ 1 of deposits earns $(1-\phi)(\rho - r_i)$ in expected profits if a bank promises to pay a deposit rate of r_i
- Bank defaults are perfectly correlated and occur with probability ϕ (we will relax this assumption)

Depositors

- Initially, each depositor has \$2 deposited in either bank A or B
- We call them type A depositors and type B depositors ($i = A, B$)
- $\sigma \cdot s =$ cost of opening a 2^{nd} account (with the competing bank)
- where, $0 \leq s \leq n$, and "n" measures the # depositors of each type
- Depositors with "low" s may open a 2^{nd} account. "High" s will not

- s_A and s_B are depositors who are indifferent between sticking to their original bank and opening a 2^{nd} bank account

Note: $\sigma \cdot s$ is the cost of opening a 2^{nd} account which is *independent* of how much money is transferred to the new account

Deposit Insurance Design: Limited Deposit Insurance

Limited Deposit Insurance Design

- Deposit insurance is limited to $ 1 per bank (half of depositors' wealth)
- Deposit insurance covers both the principal and promised interest payment
- Deposit insurance fund is funded through non-distortionary taxes (on either banks or depositors)

Limited Deposit Insurance: Depositors

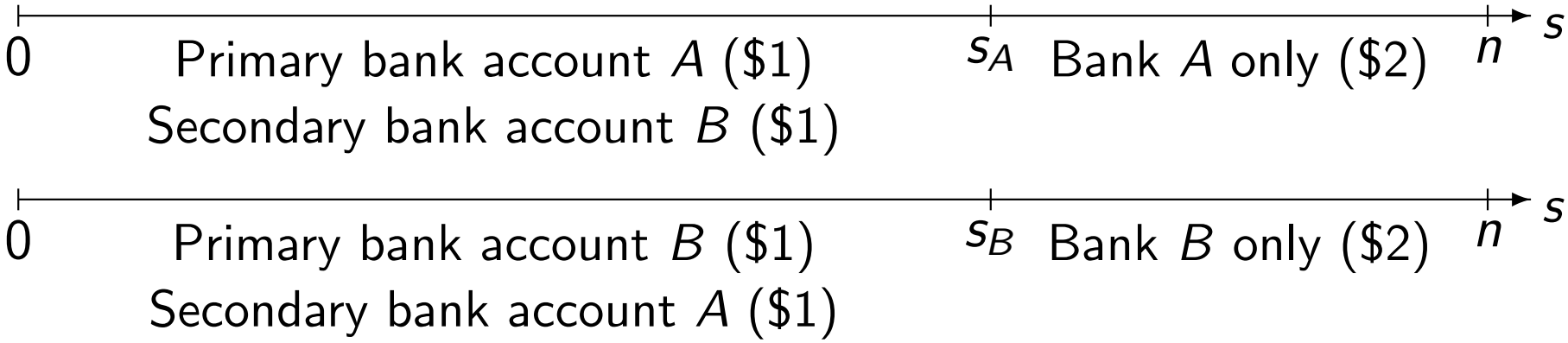
- Depositors are insured up to \$1 per bank
- The expected utility of a type $i \in \{A, B\}$ depositor $s \in [0, n]$: $u_i(s) =$

$$\begin{cases} \overbrace{1\, r_i}^{\text{insured}} + \overbrace{(1-\phi)1\, r_i - \phi\, 1}^{\text{uninsured}} & \text{does not open a } 2^{\text{nd}} \text{ bank account} \\ 1\, r_i + 1\, r_{-i} - \sigma s & \text{opens } 2^{\text{nd}} \text{ account and transfers \$1 to } -i \\ 1\, r_{-i} + (1-\phi)1\, r_{-i} - \phi\, 1 - \sigma s & \text{opens } 2^{\text{nd}} \text{ account and transfers \$2 to } -i \end{cases}$$

- Given deposit rates r_A, r_B, type $i \in \{A, B\}$ depositors with switching costs lower than a threshold s_i open a second account:

$$s_i \overset{\text{def}}{=} \begin{cases} 0 & \text{if } r_i \geq \frac{r_{-i}+\phi}{1-\phi} \\ \dfrac{r_{-i} - (1-\phi) r_i + \phi}{\sigma} & \text{if } \frac{r_{-i}+\phi-\sigma n}{1-\phi} < r_i < \frac{r_{-i}+\phi}{1-\phi} \\ n & \text{if } r_i \leq \frac{r_{-i}+\phi-\sigma n}{1-\phi} \end{cases}$$

Limited Deposit Insurance: Deposit market segmentation



Limited deposit insurance: Banks

Banks compete for deposits by posting deposit interest rate offers

$$r_A^L = argmax_{r_A|r_B} \left\{ (1-\phi)(\rho - r_A) \underbrace{(2(n-s_A)+s_A+s_B)}_{\text{Deposit demand of bank A}} \right\}$$

$$r_B^L = argmax_{r_B|r_A} \left\{ (1-\phi)(\rho - r_B) \underbrace{(2(n-s_B)+s_B+s_A)}_{\text{Deposit demand of bank B}} \right\}$$

Limited insurance: Equilibrium

- Equilibrium interest rates, banks' profit, and # of new accounts are:

$$r_A^L = r_B^L = \rho - \frac{2\sigma n}{2-\phi} \quad \text{and} \quad \pi_A^L = \pi_B^L = \frac{4(1-\phi)\sigma n^2}{2-\phi}$$

$$s_A^L = s_B^L = s^L \equiv \frac{\phi}{\sigma}\left(1+\rho-\frac{2\sigma n}{2-\phi}\right)$$

- Consumer welfare

$$cw^L = \frac{\phi^2}{\sigma}\left(1+\rho-\frac{2n\sigma}{2-\phi}\right)^2 + 2n(2-\phi)\left(1+\rho-\frac{2n\sigma}{2-\phi}\right) - 4n$$

- Expected cost to the deposit insurance fund

$$di^L = \phi \underbrace{(s_A^L + s_B^L)(2 + r_A^L + r_B^L)}_{\text{Depositors with two accounts}} + \phi \underbrace{\left((n - s_A^L)(1 + r_A^L) + (n - s_B^L)(1 + r_B^L)\right)}_{\text{Depositors with one accounts}}$$

$$= 2\frac{\phi^2}{\sigma}\left(1+\rho-\frac{2\sigma n}{2-\phi}\right)^2 + 2\phi n\left(1+\rho-\frac{2\sigma n}{2-\phi}\right). \quad (1)$$

Limited insurance: Equilibrium welfare

- Equilibrium welfare:

$$\begin{aligned} w^L =& cw^L + \pi_A^L + \pi_B^L - di^L = \\ =& 4n((1-\phi)\rho - \phi) - \underbrace{\frac{\phi^2}{\sigma}\left(1+\rho-\frac{2\sigma n}{2-\phi}\right)^2}_{S^L} \end{aligned}$$

- Aggregate cost of maintaining multiple accounts

$$S^L = \int_0^{s_A^L} \sigma s \, ds + \int_0^{s_B^L} \sigma s \, ds = \frac{\phi^2}{\sigma}\left(1+\rho-\frac{2\sigma n}{2-\phi}\right)^2$$

Deposit Insurance Design: No Deposit Insurance

No deposit insurance: Depositors

- The expected utility of a type i depositor $s \in [0, n]$ initially invested in bank $i \in \{A, B\}$ is given by:

$$u_i(s) = \begin{cases} (1-\phi)\,2\,r_i - \phi\,2 & \text{if does not open a second bank account} \\ (1-\phi)\,2\,r_{-i} - \phi\,2 - \sigma s & \text{opens a second account and transfers \$2 to } B. \end{cases}$$

- Switching thresholds:

$$s_i \overset{\text{def}}{=} \begin{cases} 0 & \text{if } r_i \geq r_{-i} \\ \dfrac{2(1-\phi)(r_{-i} - r_i)}{\sigma} & \text{if } r_{-i} - \dfrac{\sigma n}{2(1-\phi)} < r_i < r_{-i} \\ n & \text{if } r_i \leq r_{-i} - \dfrac{\sigma n}{2(1-\phi)}. \end{cases}$$

- No incentives for multiple accounts - either $(s_A > 0, s_B = 0)$ or $(s_A = 0, s_B > 0)$

Deposit Insurance Design: Unlimited Deposit Insurance

Unlimited Deposit Insurance: Depositors

- All deposit accounts insured in full
- The expected utility of a type i depositor $s \in [0, n]$ initially invested in bank $i \in \{A, B\}$ is given by:

$$u_i(s) = \begin{cases} 2r_i & \text{if does not open a second bank account} \\ 2\,r_{-i} - \sigma s & \text{opens a second account and transfers \$2 to } B. \end{cases}$$

- Switching thresholds:

$$s_i \overset{\text{def}}{=} \begin{cases} 0 & \text{if } r_i \geq r_{-i} \\ \dfrac{2(r_{-i} - r_i)}{\sigma} & \text{if } r_{-i} - \dfrac{\sigma n}{2} < r_i < r_{-i} \\ n & \text{if } r_i \leq r_{-i} - \dfrac{\sigma n}{2}. \end{cases}$$

- No incentives for multiple accounts - either $(s_A > 0, s_B = 0)$ or $(s_A = 0, s_B > 0)$

Comparing the three regimes of deposit insurance

Equilibrium Summary

- Equilibrium interest rates, segmentation thresholds, profits, consumer welfare (cw), aggregate switching costs (S), expected deposit insurance costs (di)

	No DI	Unlimited DI	Limited DI
(r_A, r_B)	$\rho - \frac{\sigma n}{2(1-\phi)}$	$\rho - \frac{\sigma n}{2}$	$\rho - \frac{2\sigma n}{2-\phi}$
(s_A, s_B)	0	0	$\frac{\phi}{\sigma}(1+\rho-\frac{2\sigma n}{2-\phi})$
(π_A, π_B)	σn^2	$(1-\phi)\sigma n^2$	$\frac{4(1-\phi)\sigma n^2}{2-\phi}$
cw	$4n((1-\phi)\rho - \frac{\sigma n}{2} - \phi)$	$4n(\rho - \frac{\sigma n}{2})$	$\frac{\phi^2}{\sigma}\left(1+\rho-\frac{2n\sigma}{2-\phi}\right)^2 + 2n(2-\phi)\left(1+\rho-\frac{2n\sigma}{2-\phi}\right)$
S	0	0	$\frac{\phi^2}{\sigma}(1+\rho-\frac{2n\sigma}{2-\phi})^2$
di	0	$4n\phi(1+\rho-\frac{\sigma n}{2})$	$2\frac{\phi^2}{\sigma}\left(1+\rho-\frac{2\sigma n}{2-\phi}\right)^2 + 2\phi n\left(1+\rho-\frac{2\sigma n}{2-\phi}\right)$
w	$4n((1-\phi)\rho-\phi)$	$4n((1-\phi)\rho-\phi)$	$4n((1-\phi)\rho-\phi) - \frac{\phi^2}{\sigma}(1+\rho-\frac{2n\sigma}{2-\phi})^2$

- A mean-preserving spread comparative statics analysis shows that higher credit risk leads to higher equilibrium deposit rates and non-increasing profits. No risk-shifting incentives of banks even in the presence of limited or unlimited deposit insurance

Limited Deposit Insurance and Bank Competition

A system with limited DI coverage *weakens* competition among banks:

- Banks pay lower interest, formally $r_k^L < r_k^N < r_k^U$, $k = A, B$
- Banks earn higher profit, formally $\pi_k^L > \pi_k^N > \pi_k^U$, $k = A, B$

Why is that? Because under limited insurance (relative to no or unlimited insurance),

1. banks gain some monopoly power over depositors with low cost of opening a 2nd bank account (low "s"), therefore
2. able to extract some of depositors' surplus gain from obtaining 100% coverage via a 2nd account

A limited deposit insurance design is equivalent to a tax on depositors and a subsidy to banks

Limited Deposit Insurance and Welfare

A system with limited DI coverage *lowers* total welfare:

- Under the assumption on the funding of deposit insurance, *limited deposit insurance* redistributes surplus from depositors to banks by softening competition for deposits
- Total welfare is lowest under limited deposit insurance due to the aggregate switching costs which are a deadweight loss:

$$w^L + S^L = w^N = w^U \tag{2}$$

Independent Bank Failures

Extension: Independent Bank Failures

Dependent failures

	B fails	B not
A fails	θ	0
A not	0	$1-\theta$

Independent failures

	B fails	B not
A fails	θ^2	$\theta(1-\theta)$
A not	$(1-\theta)\theta$	$(1-\theta)^2$

Expected benefit to a type A depositors: $u_A(s) =$

$$\begin{cases} (1-\phi)\,2\,r_A - 2\phi & \text{if does not open a } 2^{\text{nd}} \text{ account;} \\ \overbrace{(1-\phi)^2(r_A+r_B)}^{\text{no defaults}} + \overbrace{(1-\phi)\phi(r_A-1)}^{B \text{ fails}} & \text{if opens a second bank account} \\ \quad + \underbrace{\phi(1-\phi)(r_B-1)}_{A \text{ fails}} + \underbrace{\phi^2(-2)}_{\text{both fail}} - \sigma s & \text{and transfers \$1 to bank } B. \end{cases}$$

Reworking all the computations yields *no* change in results

Conclusion

- Limited DI coverage may have emerged as a *tradeoff* between:
  1. Stability via elimination of a bank run equilibrium (Diamond & Dybvig)
  2. Increased risk-taking by banks (moral hazard)
- Our model analyzes a 3rd factor (associated with *limited* DI): The competition-softening effect
- In addition, we identify some social loss caused by opening and maintaining multiple bank accounts
- Next step: Estimating total welfare effects associated with all the above 3 factors