

Financial Integration, Specialisation, and Systemic Risk

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Motivation:

- Sluggish general financial integration in the Euro area; only fully integrated financial market is the interbank market (Baele et al. (2004) and Barros et al. (2005))
- ⇒ What are the costs and benefits of having only an integrated interbank market?
- Benefits from integration: improved options for diversification of liquidity risk
Costs from integration: increased risk of interbank contagion
- ⇒ Interbank market integration beneficial if expected benefits overcompensate expected costs (→ Allen/Gale (JPE 2000))
- In the literature the distribution of regional shocks is exogenous
Actually distribution depends on banks' portfolio decision (→ Diamond/Rajan (JF 2005))

Main results and their basic intuition:

- Improved diversification over interbank market
- ⇒ Reduced need for diversification in loan portfolio
- ⇒ Banks specialize in lending to different sectors
- ⇒ Benefits from diversification endogenously increase

- But also exposure to the interbank market increases
- ⇒ Risk of contagion endogenously rises

Assumptions:

- Three dates $t = 0, 1, 2$ and regions $j \in \{A; B\}$
- In each region a continuum of households with ex-ante utility:

$$U(c_1, c_2) = \begin{cases} Xc_1 + c_2 & \text{with prob. } q > \frac{1}{2} \text{ and } X > 1 \\ c_1 + c_2 & \text{with prob. } 1 - q \end{cases}$$

→ Intertemporal preference shocks unobservable

- Investment technologies:
 1. Liquidity generating return 1 for each unit invested
 2. Technology S generating S_j with $X > S_A > S_B > 1$
 3. Technology R generating R_j with $X > R_B > R_A > 1$

Assumptions (cont.):

- Liquidity shocks: *Sectoral and regional liquidity shocks*

		$(R_A; S_A)$	Region A $(S_A; R_A)$	$(0; S_A + R_A)$
	$(R_B; S_B)$	e	0	f
Region B	$(S_B; R_B)$	0	e	f
	$(0; S_B + R_B)$	f	f	0

- Liquidation return = 0; $2e + 4f = 1$
- One regional bank - but contestable regional banking markets
 \Rightarrow Banks offer deposit contracts $\{d_1; d_2\}$ that maximize regional HHs utility
- Cross-regional reallocation only through interbank market

Assumptions (cont.):

t=0: Banks offer $\{d_1; d_2\}$

Households invest in deposits at local bank

Banks can invest in liquidity and in technologies S and R

Banks can observe each others investment portfolio

t=1: Cash flow and preference shocks realized

Bank might borrow/lend IB from/to other bank

Households can demand d_1

If liquidity in t=1 sufficient to serve withdrawals \Rightarrow bank repays

If liquidity insufficient \Rightarrow bank is liquidated, *all* depositors treated equally

t=2: Cash flow from late projects realized

Bank repays/receives IB to/from other bank

Banks pay d_2 on not yet withdrawn deposits from households

Equilibrium in Autarky:

Diversified Banks:

- Portfolio diversifying sectoral cash flow shocks:

$$R_A \hat{x}_A = S_A (1 - \hat{x}_A) \quad \Rightarrow \quad \hat{x}_A = \frac{S_A}{R_A + S_A} > \frac{1}{2}$$

- Deterministic cash-flow given no regional shock:

$$\Phi = R_A \hat{x}_A = S_A (1 - \hat{x}_A) = \frac{R_A S_A}{R_A + S_A} = \frac{S_A}{1 + \frac{S_A}{R_A}}$$

\Rightarrow Benefits from specialization $\uparrow \Rightarrow \Phi \downarrow$

Equilibrium in Autarky (cont.):

Diversified Banks (cont.):

- The optimization problem

$$(P1) \begin{cases} \max_{d_1; d_2; l_0} & (2e + 2f) (qXd_1 + (1 - q) d_2) + 2f (qX + (1 - q)) l_0 \\ \text{s.t.} & qd_1 \leq \Phi (1 - l_0) + l_0 & (BC1) \\ & (1 - q) d_2 \leq \Phi (1 - l_0) & (BC2) \\ & d_1 \leq d_2 & (IC) \end{cases}$$

- Optimal contract:

$$d_D^* = \frac{1}{(2q - 1) + (1 - q) \Phi^{-1}}$$

$$l_0^D = \frac{(2q - 1)}{(2q - 1) + (1 - q) \Phi^{-1}}$$

Equilibrium with complete interbank market:

- Regional and sectoral shocks and each banks' portfolio decision are verifiable
- Interbank market allows banks to fully diversify sectoral risk
- Banks trade liquidity in $t = 1$ that amounts to

$$IB = \frac{(1 - l_0^{IB})S_A}{2} = \frac{(1 - l_0^{IB})R_B}{2}$$

against repayment in $t = 2$

⇒ This reallocation enables banks to sustain adverse sectoral liquidity shocks *even if they are fully specialized*

Equilibrium with complete interbank market (cont.):

- Optimal contract

$$d_{IB}^* = \frac{1}{(2q - 1) + 2(1 - q)(S_A/2)^{-1}} > \frac{1}{(2q - 1) + 2(1 - q)\Phi^{-1}} = d_D^*$$

$$\text{because } S_A/2 > \Phi = \frac{S_A R_A}{S_A + R_A} \text{ for } S_A > R_A$$

⇒ Complete interbank market allows to fully capture specialization benefit and generate higher utility given no regional shocks

Equilibrium with complete interbank market (cont.):

- BUT: It creates the risk of contagion of regional shocks

		$(0; S_A)$	Region A $(S_A; 0)$	$(0; S_A)$
	$(R_B; 0)$	e	0	f
Region B	$(0; R_B)$	0	e	f
	$(0; R_B)$	f	f	0

⇒ Bank A unable to sustain sectoral shock to S
if bank B is at the same time hit by a regional shock

Equilibrium with complete interbank market (cont.):

- BUT: Specialization and interbank exposure only chosen if expected benefits from specialization outweigh expected costs of contagion, i.e. if $EU^I > EU^D$
- Given assumed stochastic structure contagion risk exactly offset by reduced exposure to regional risk:

		$(0; S_A)$	Region A $(S_A; 0)$	$(0; S_A)$
	$(R_B; 0)$	e	0	f
Region B	$(0; R_B)$	0	e	f
	$(0; R_B)$	f	f	0

$\Rightarrow EU^I > EU^D$ holds since $(2e + 2f)d_I^* + 2fl_0^I > (2e + 2f)d_D^* + 2fl_0^D$

\Rightarrow Specialization and integration given complete interbank market always preferable

Conclusions:

- Increased interbank integration fosters banks' specialization
- This increases both actual benefits from diversification and risk of contagion
- Assessing welfare effect of integration taking correlations as given is misleading
- While individual banks' default probability might be unaffected financial integration increases the risk of wide-spread banking crisis increases
- However, taken the model at face value integration is always welfare improving
- There are negative externalities of large scale banking crisis on the real economy
- Taking those into account exp. costs due to increased risk of systemic crisis outweigh exp. specialization benefits