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Nobel Symposium: Liquidity Creation by Financial Intermediaries

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Creating Liquidity with short-term debt in the financial sector

- Private financial crises are everywhere and always due to problems of short-term debt (and to the reasons why short-term debt is needed).
- Financial Intermediaries create liabilities to give households access to more liquid claims than available when holding the underlying assets directly.

Demand for Liquidity

- Uncertain and uninsurable timing of need for consumption or investment opportunities: Diamond-Dybvig (1983), Holmström-Tirole (1998).

Liquidity Creation by Financial Intermediaries

- Borrowing (from “depositors”) more than the (short-term) collateral value of assets
- Closely related to issuing short-term debt

Contrast to Collateral View

- Hart - Moore (1994) / Kiyotaki - Moore (1997)
- **Incomplete Contracting model**
- The largest incentive-compatible repayment what the lender can achieve by foreclosure and sale of assets
- This imposes a realistic and quite strong borrowing constraint.

Two parts to understanding how banks “create liquidity”

- Why are bank loans illiquid?
 - Why is L (the liquidation value) less than R (the hold to maturity value)
- How do banks arrange to credibly pay depositors more than L , the liquidation value of assets at date 1? (**Apparently violating the collateral constraint**).

Why are assets illiquid? (low short-term collateral value, L)

1. **Physical technology** (irreversibility and limited resale): Diamond-Dybvig (1983)
2. Bank monitoring/ Loan collection ability/ Financial asset owner specificity:
Diamond (1984), Shleifer-Vishny (1992), Hart-Moore (1994), Diamond-Rajan (2001)
3. Imperfect secondary markets for Assets (**not discussed today**).
 - Limited Participation: Wallace (1988), Allen-Gale (1994, 2004, 2005), Diamond (1997), Andolfatto-Berentsen-Martin (2017)
 - Private Information or Search (Akerlof (1970), Gorton-Pennecchi (1990) and too many others to describe).

1. Simplest Answer DD(83): Illiquidity from **physical technology**

- Banks offer demand claims (**short-term debt**) with payments made from liquidation of a proportion of bank assets for L . Can't sell asset (or L is sale price).
- If a fraction, f , of deposits withdraw, liquidate a larger fraction of assets to pay each $r_1 > L$. (**satisfies collateral constraint**).
- Bank **Short-term debt** shares risk of uncertain need for liquidity.
- Is subject to runs on its short-term promises.

Diamond-Dybvig (1983) Bank Assets: Illiquid "Loan" ($L < R$)

T=0	T=1	T=2
-1	or $\left\{ \begin{array}{l} L = 1 \\ R > 1 \end{array} \right.$	(liquidate early)
		(hold to maturity)

Issues Bank Deposits (short-term debt)

T=0	T=1	T=2
-1	or $\left\{ \begin{array}{l} r_1 > L \\ r_2 < R \end{array} \right.$	(liquidate early)
		(hold to maturity)

2. Bank has monitoring/ loan collection ability on loans to its borrowers

- Loans are illiquid because:
- Bank has monitoring/ loan collection ability (delegated to it to avoid duplication).
- Banks can borrow more and lend more *than the short-term collateral value of borrower's assets*.
- If the bank sells a loan, it receives only the amount others could collect without monitoring.

Specific Loan Collection Skill Makes Asset Sales Illiquid (Sells for L)

- *Micro foundation for the Illiquid Asset from DD(83):*
It sells for L at date 1 due to loss of collection skills
- | <u>T=0</u> | <u>T=1</u> | <u>T=2</u> |
|------------|------------|----------------------------|
| -1 | (keep) | R>1 (collected by monitor) |
| | (sell) | L<1 (collected by others) |
- Monitor (bank) can collect R from an entrepreneur at date 2, but anyone else can collect only L at date 2. The loan will be illiquid (sell for only L at T=1).

Bank can *borrow and lend* more than depositors

- In a **complete contracts model**, bank can commit at date 2 to collect loans for R when non-monitors can collect only $L < R$ and **pay R to them**.
- Commit to liquidate bank for L (collect without bank) whenever it pays deposits less than R .
- If uncertainty and private information were removed from Diamond (1984), this would commit bank to monitor the **entrepreneur** on behalf of depositors.

Diamond (1984, 1996)

- Entrepreneur's cash flows ("bonds") are risky and information is private to entrepreneur.
Commitment to liquidate for low payments means costly liquidation when borrower has bad luck.
- Bank monitors realized entrepreneur cash to renegotiate "loan" with the threat of costly liquidation.
- Recovers more than with commitment to costly liquidation for small payments on "bonds."

Diamond (84,96): Banks commit to use monitoring by issuing debt deposits

- Diversify loans (pooling) and issue debt (senior claims) less exposed to low outcomes (tranching). Diversifies away banks private information.
Depositors use complete contract, committing to liquidate (bank failure) after low bank payments and thus depositors need not monitor the information of the monitor (banker).
- **Banks have much higher leverage than firms.**
- **About debt, but not short-term debt (yet).**

Financial Asset owner specificity:

Diamond-Rajan (2001)

- Relationship/Monitored Lending (needing intermediary expertise)
 - Demandable bank debt commits a bank to pay more than depositors' liquidation value **with incomplete contracts**.
- Threat of bank runs as feature not bug: best way for bank to finance assets illiquid due to monitoring/relationship.

Financial Asset owner specificity:

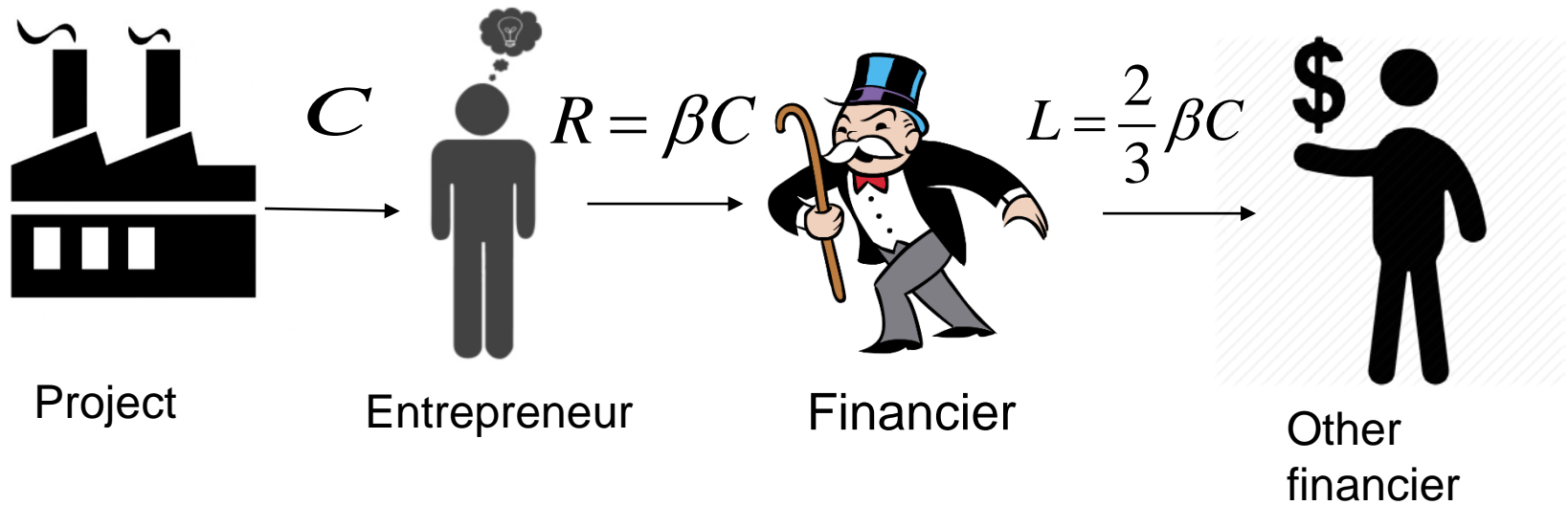
Diamond-Rajan (2001)

- Threat of a runs produces the same outcome as a complete contract with commitment to foreclose whenever debt is not fully repaid (even if foreclose hurts debtholders).

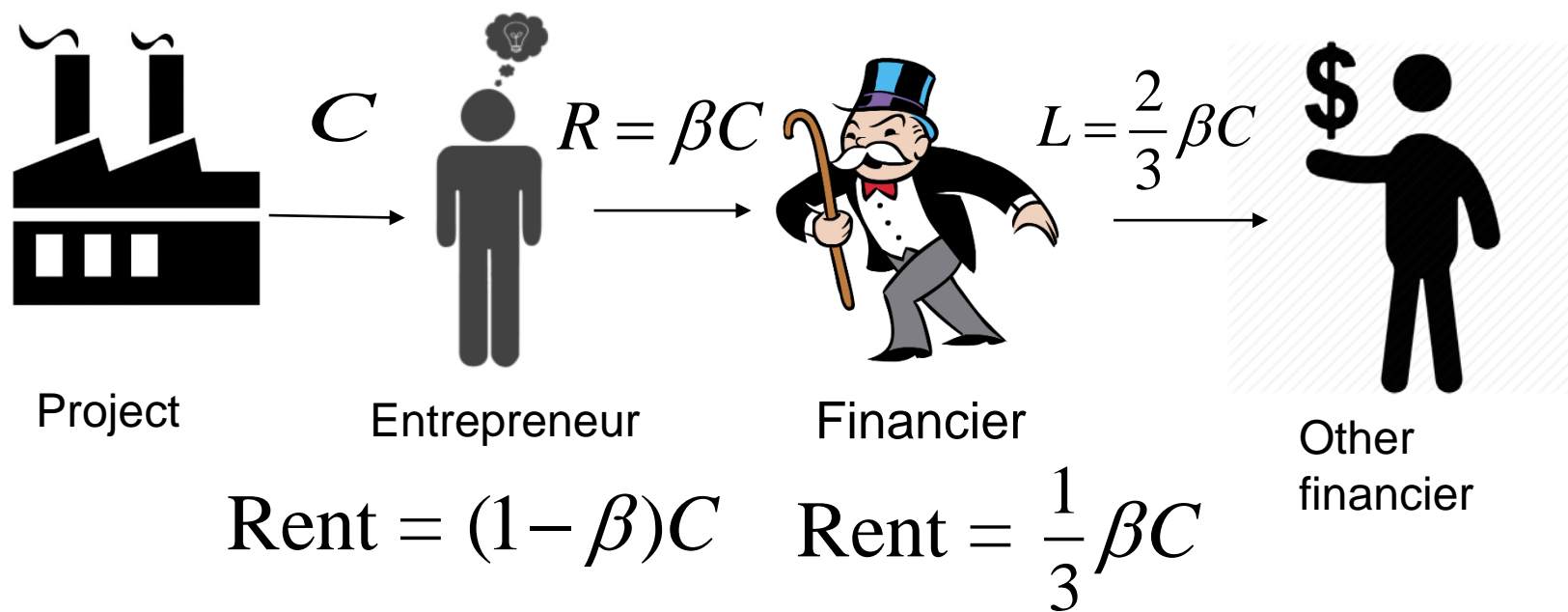
Short-term debt has a higher commitment to repay than long

- **Simplest**: If debt payoffs are first-come-first-served, a run is a dominant strategy when facing a loss: **all foreclose whenever full payment is not forthcoming.**
- **More nuanced**: If banker or entrepreneur still can be hired after foreclosure then **short-term debt runs disciplines banks (who do transfers) but not entrepreneurs (who add value to production).**

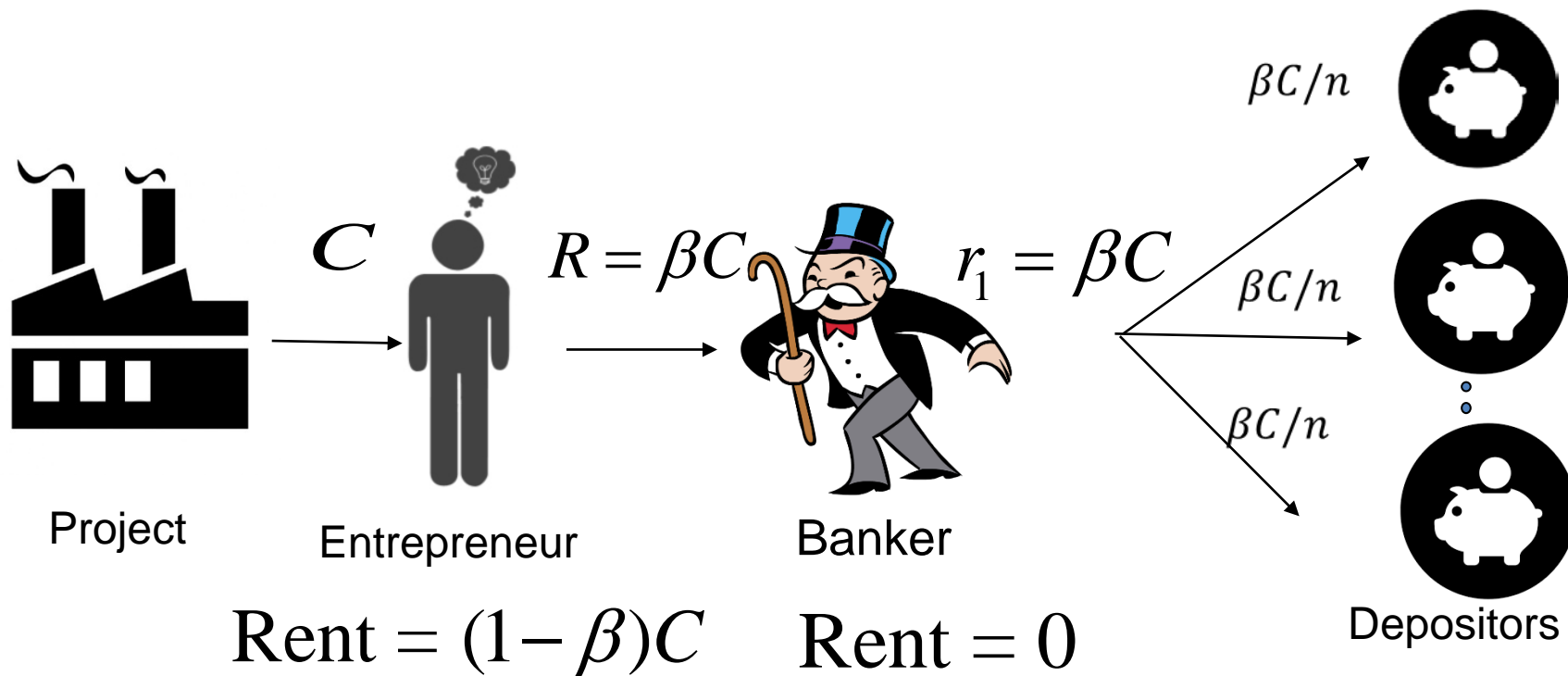
Rents due to human capital



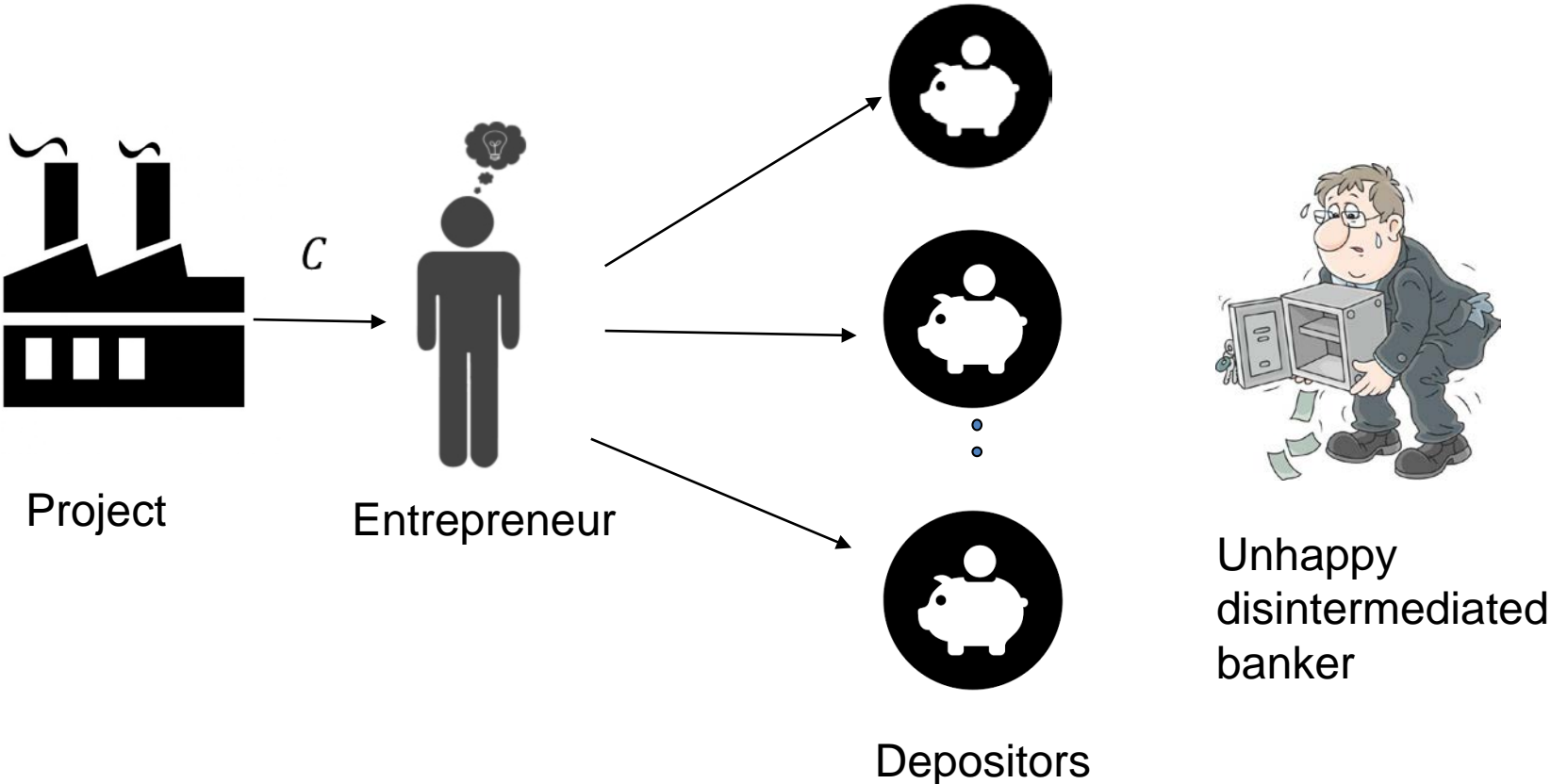
Illiquidity from rents with incomplete contract (not short-term)



Bank creates liquidity through demand deposits (commits to liquidate)



The aftermath of a run: An unhappy disintermediated banker



The difference between bankers and entrepreneurs: the cost of failure



Unhappy banker:
Dick Fuld of Lehman



Happy entrepreneur

Financial intermediaries and commitment from **short-term debt**

- Liquidity creation due to commitment to run if any loss is likely: when problems leading to possible default arise, the end is Immediate.
- Commits intermediary to pay when possible.
- A run threat would not prevent Lehman from taking risk, but causes immediate “death penalty” when risks/losses are revealed.
- Dynamically, maturity shortens as equity falls.
- Differs from Calomiris-Kahn (1991).
- Related to Acharya-Gale-Yorulmazer (2011), He-Xiong (2012), Brunnermeier-Oehmke (2013), Diamond-He (2014).

Financial Crises involve short-term debt and illiquid assets

- Understanding financial crises needs to focus on runs, the **amount of short-term debt**, and appropriate **levels of liquidity** (not **too high**, not **too low**).
- Not too low: Allen-Gale (2004), Diamond-Rajan (2005, 2011), Diamond-Kashyap (2016).
- Not too high: Diamond-Rajan(2012), Diamond-Hu-Rajan (2017).
- Best macro on this so far: Gertler-Kiyotaki (2015,16).