

Financial Fragility and Bank Runs: Diamond-Dybvig Model and Deposit Insurance Design

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ABSTRACT

Bank runs—episodes in which depositors rush to withdraw funds from a bank, potentially causing it to fail even if it would have been solvent in the absence of the run—represent one of financial economics’ most important and enduring phenomena. Diamond and Dybvig’s (1983) Nobel Prize-winning model formalized the economics of bank fragility and bank runs, demonstrating that the maturity transformation function of banking—funding illiquid long-term loans with liquid short-term deposits—creates an inherently fragile structure susceptible to self-fulfilling runs. Deposit insurance, introduced in the U.S. through the Federal Deposit Insurance Corporation (FDIC) in 1933 following the 1930–1933 banking panics that destroyed one-third of U.S. banks, breaks the bank run equilibrium by guaranteeing deposits regardless of bank solvency—eliminating the incentive to run. The 2023 failures of Silicon Valley Bank, Signature Bank, and First Republic demonstrated that bank fragility remains a live concern even for well-capitalized banks when depositor coordination via social media enables near-instantaneous runs on uninsured deposits. This paper reviews the Diamond-Dybvig model, deposit insurance design, historical bank run episodes, and the evolving challenge of digital-age bank fragility.

Keywords: Bank Runs; Diamond-Dybvig; Deposit Insurance; FDIC; Maturity Transformation; Financial Fragility; SVB; Lender of Last Resort

1. INTRODUCTION

Bank runs are among the oldest and most destructive financial phenomena. The Panic of 1907, which led to the creation of the Federal Reserve, was triggered by a sequential run through New York’s trust companies. The banking panics of 1930–1933 destroyed thousands of banks, contracted the money supply by one-third, and transformed a severe recession into the Great Depression. Walter Bagehot’s (1873) ‘Lombard Street’ provided the classic analysis: in a financial panic, the central bank should lend freely to solvent institutions against good collateral at penalty rates—the ‘Bagehot rule’ that remains the theoretical basis for lender-of-last-resort policy.

Diamond and Dybvig (1983) in the *Journal of Political Economy* formalized bank fragility through a sequential service constraint model: depositors are served in the order they arrive, so patient depositors rationally rush to withdraw when they believe others will—converting a solvent bank into an insolvent one through coordinated withdrawal. Their model demonstrates two Nash equilibria: (1) no-run equilibrium (patient depositors wait; the bank operates normally); (2) run equilibrium (all depositors withdraw; the bank liquidates assets at fire sale prices and cannot repay all depositors). Deposit insurance eliminates the run equilibrium by making the sequential service constraint financially irrelevant: if deposits are fully guaranteed, there is no reason to run regardless of what others do.

2. DIAMOND-DYBVIG MODEL STRUCTURE

2.1 The Liquidity Transformation Problem

Banks borrow short (demand deposits, withdrawable at par on demand) and lend long (term loans, illiquid, not immediately convertible to cash at full value). When all depositors demand immediate redemption simultaneously—a run—the bank must liquidate assets at distressed prices that may not cover the face value of deposits, causing insolvency even for a bank that would be solvent under a normal withdrawal pattern. The fundamental fragility is not bank insolvency but bank illiquidity: the same assets that are worth more than the deposit liability under normal conditions are worth less in a forced liquidation.

2.2 Deposit Insurance as Equilibrium Selector

Deposit insurance operates by making the run equilibrium payoff-equivalent to the no-run equilibrium for individual depositors: whether or not others run, each depositor receives the full deposit value (up to the insurance limit). This eliminates the strategic incentive to run, collapsing the two-equilibrium game to a single no-run equilibrium. The FDIC's standard deposit insurance limit (\$250,000 per depositor per institution in the U.S.) protects most retail depositors but leaves institutional depositors with uninsured balances—a design that proved consequential in the 2023 SVB failure, where approximately 89% of deposits exceeded the insurance limit.

3. HISTORICAL BANK RUN EPISODES

Table 1. Major bank run episodes and policy responses.

Episode	Trigger	Scale	Policy Response
U.S. Panics 1930–33	Cascading runs; no FDIC; information contagion	~9,000 bank failures; 33% money supply contraction	Federal Reserve failure to act as LOLR; FDIC created 1933
UK Northern Rock 2007	First UK bank run in 140 years; subprime exposure disclosure	~£2B withdrawn in days; nationalized Feb 2008	Deposits guaranteed; nationalization; regulatory reform
SVB 2023	Unrealized bond losses disclosed; VC depositors coordinated withdrawal via Twitter	\$42B withdrawal attempt in 24 hours; FDIC receivership	Systemic risk exception: all deposits guaranteed; Fed BTFP

4. DIGITAL-AGE BANK FRAGILITY

The SVB failure in March 2023 revealed new dimensions of bank fragility in the digital age. SVB's depositor base was concentrated in venture capital firms and technology startups—a community with high connectivity, shared information networks (group chats, Twitter), and coordination capacity. When concerns about SVB's unrealized bond losses spread through these networks, depositors could coordinate withdrawal decisions and initiate transfers digitally within hours—dramatically faster than historical bank runs that required physical presence at bank branches. The speed of the SVB run—\$42 billion attempted in 24 hours—exceeded the FDIC's ability to manage an orderly resolution, triggering the systemic risk exception that guaranteed all deposits regardless of the \$250,000 limit. Future bank fragility policy must account for the social media-accelerated run dynamics that make traditional run response timelines inadequate.

5. CONCLUSION

Diamond-Dybvig's formal model of bank fragility remains one of financial economics' most important theoretical contributions, explaining the fundamental economics of bank runs, deposit insurance, and lender-of-last-resort policy. The 2023 U.S. regional bank failures demonstrated that bank fragility is not a historical curiosity but a live operational risk, even for banks that appeared well-capitalized under regulatory standards. Digital communication and coordination via social media have accelerated run dynamics beyond historical experience, requiring updated policy frameworks for bank supervision, deposit insurance limits, and central bank backstop facilities. Future research should examine optimal deposit insurance coverage levels given concentrated uninsured deposit bases, the role of social media in run coordination, and whether 24/7 digital money transfers require 24/7 deposit insurance resolution mechanisms.

REFERENCES

- [1] Bagehot, W. (1873). *Lombard Street: A description of the money market*. Henry S. King.
- [2] Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of Political Economy*, 91(3), 401–419.
- [3] Gorton, G. B. (2012). *Misunderstanding financial crises: Why we don't see them coming*. Oxford University Press.