Banks, Taxes, and Nonbank Competition

George Pennacchi

Department of Finance
University of Illinois

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Liquidity Provision and Public Policy

▶ A variety of financial institutions "provide liquidity," which I define as the creation of instruments that are useful for transactions because they can be traded or converted to currency at low cost.

▶ This paper explores how public policy and market structure influence which financial institutions provide liquidity and lending services.

▶ It starts by considering a financial system with only banks and asks whether high leverage (low bank capital) is necessary for the provision of liquidity services.

▶ It also examines how public policy in the form government safety net support affects banks' capital structures and who bears the burden of corporate taxes paid by banks.

Banks versus Nonbanks (Shadow Banks)

- ► There is a growing literature examining nonbank financial institutions that provide bank-like services (e.g., lending and liquidity creation).

- ► This paper also presents a positive, rather than normative, analysis of the market shares of banks versus nonbanks.

- ► Banks and nonbanks often face differences in government support, regulation, economies of scope, and taxation.

- ► The paper's model takes an industrial organization approach by focusing on differences in banks' and nonbanks' costs of funding, which are endogenous to their capital structure decisions.

Outline of Talk

1. Model of financial services with only banks.

2. Model's explanation of the evolution of the banking industry prior to the 1970s.

3. Extension of the model to include nonbank competition in savings (liquidity) provision and lending (securitization).

4. Model's explanation of bank and nonbank market shares after the 1970s.

5. Related research on how corporate taxes and safety-net support affect banks' capital structure and securitization incentives.

Basic Model Assumptions

- ► Extension of the Salop (1979) circular city model where two continua of retail customers are located around a unit circle:*
  1. Savers (depositors) with total amount of savings = D.
  2. Borrowers with total amount of desired loans = L.

- ► n banks are located uniformly around the circle, and retail customers incur linear "traveling" costs to a bank.

- ► A bank's marginal cost of making retail loans is declining in its issuance of retail deposits (an economy of scope).**

- ► A bank can issue wholesale deposits or invest in wholesale debt (securities) at a constant, competitive, certainty equivalent rate.

* c.f., Chiappori, Perez-Castrillo, and Verdier (1995) *European Economic Review* and Park and Pennacchi (2009), *Review of Financial Studies*.
**Due to a lower cost of credit screening or monitoring loans. See Mester, Nakamura, and Renault (2007) *Review of Financial Studies*.

Market with n = Six Banks
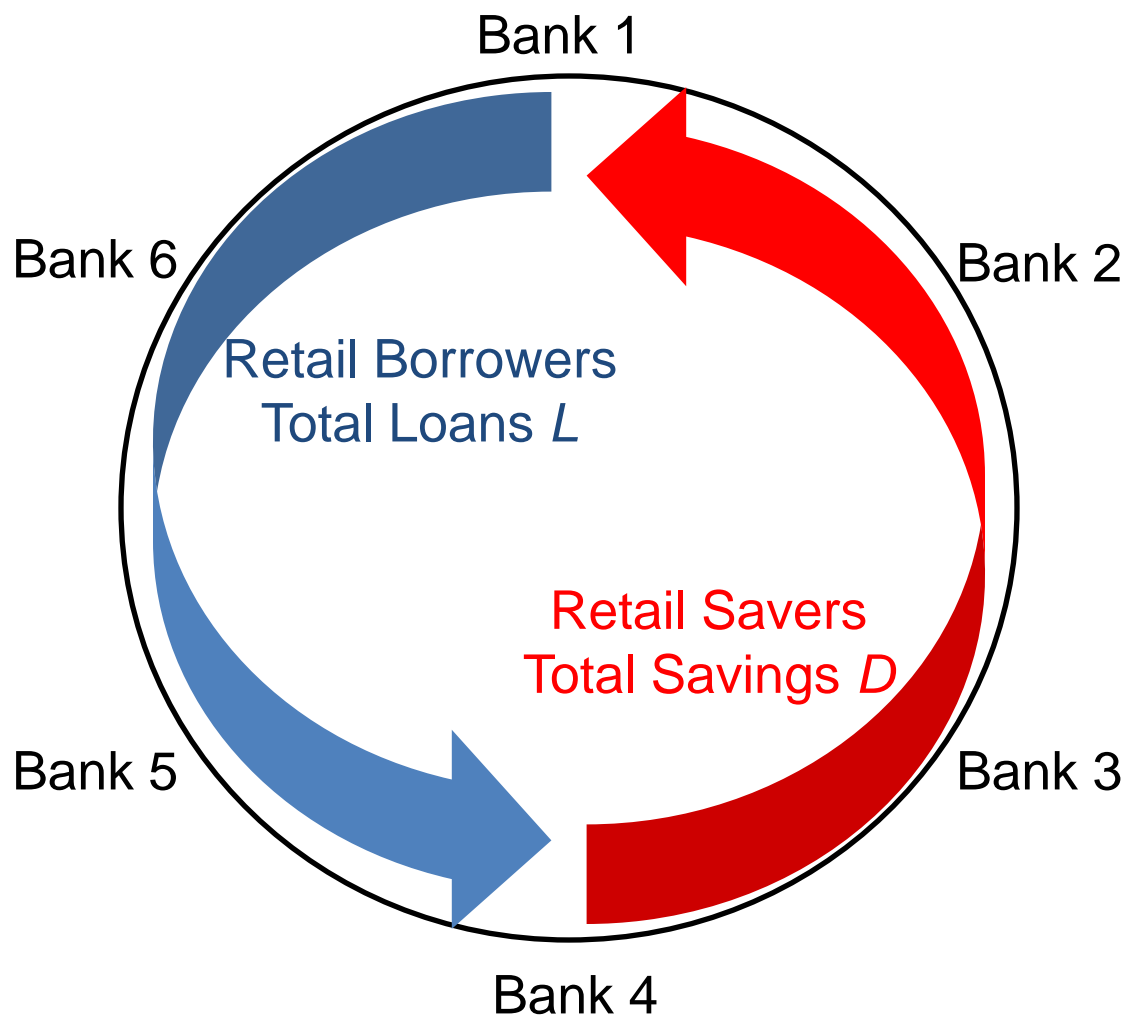
More Assumptions

► Banks can issue shareholders' equity at a constant, competitive certainty equivalent rate.

► If Bank i makes L_i in retail loans, the loans' minimum return at maturity is $L_i (1-\rho_{low})$.

► If, due to a depositor run, loans are liquidated prior to maturity, they return $L_i (1-\rho_{run})$ where $\rho_{run} > \rho_{low}$.

► The incentive for runs is removed when initial shareholders' equity exceeds $L_i \rho_{run}$.

► Runs are sufficiently costly such that the bank meets this minimum equity capital constraint and, hence, its deposits are default-free.

Equilibrium Behavior

► Each bank sets its retail loan and retail deposit interest rates and chooses its wholesale debt, equity, and securities to maximize the return on its shareholders' equity.

► There are two qualitatively different types of symmetric Bertrand-Nash equilibria:

1. When $L(1-\rho_{run}) < D$ so that the market is "**loan poor and deposit rich**," banks invest excess retail deposits in securities and their equity capital constraint binds.

2. When $L(1-\rho_{run}) > D$ so that the market is "**loan rich and deposit poor**," banks fund excess loans by issuing wholesale deposits (debt) and equity, and their equity capital is unconstrained.

► The greater the decline in loan screening/monitoring costs from issuing retail deposits, the higher the equilibrium deposit rate.

Is High Leverage Optimal for Banks?

► DeAngelo and Stulz *JFE* (2015) argue that if banks are special in providing liquid, safe retail debt, then it is optimal for banks to operate with high leverage.

► Such behavior is consistent with the "loan poor and deposit rich" equilibrium but ***not*** the "loan rich and deposit poor" equilibrium.

► Why? Banks are also special in providing retail loans due to more efficient credit screening and monitoring.*

► If the demand for loans exceeds that of liquidity (savings) provision, the cost of issuing retail deposits rises to the wholesale debt and equity funding rate.

► At the margin, wholesale debt and equity fund excess loans.

* E.g., Diamond (1984) *Review of Economic Studies*.

# Nineteenth Century U.S. Banking

► A "loan rich and deposit poor" equilibrium may have characterized the U.S. "Free Banking" era prior to the 1860s.

► The investment needs of the U.S. emerging market economy led to retail loan demand that exceeded retail savings, and excess funding for loans was provided by shareholders' equity.

► Consistent with this loan rich and deposit poor equilibrium, banks funded over 40% of their assets with equity and invested relatively little in cash and securities.

► Later, the 1863-1864 National Banking Acts required banks to hold federal and state bonds to back their issuance of national bank notes, thereby artificially raising banks' demand for securities.

Equity Capital to Assets Ratio of All U.S. Commercial Banks
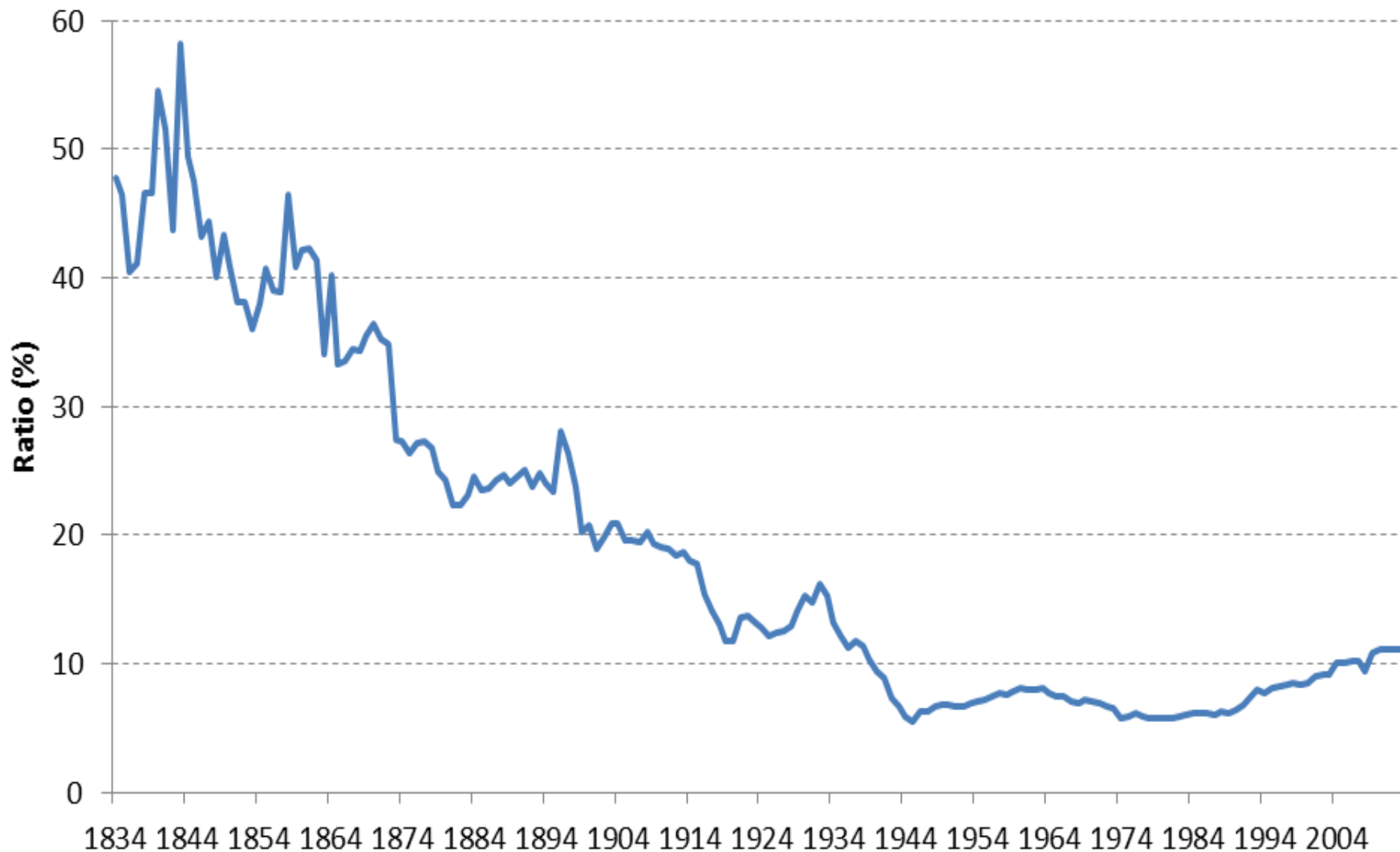
Source: U.S. Statistical Abstract and FDIC

Cash, Securities, and Loans per Commercial Bank Assets
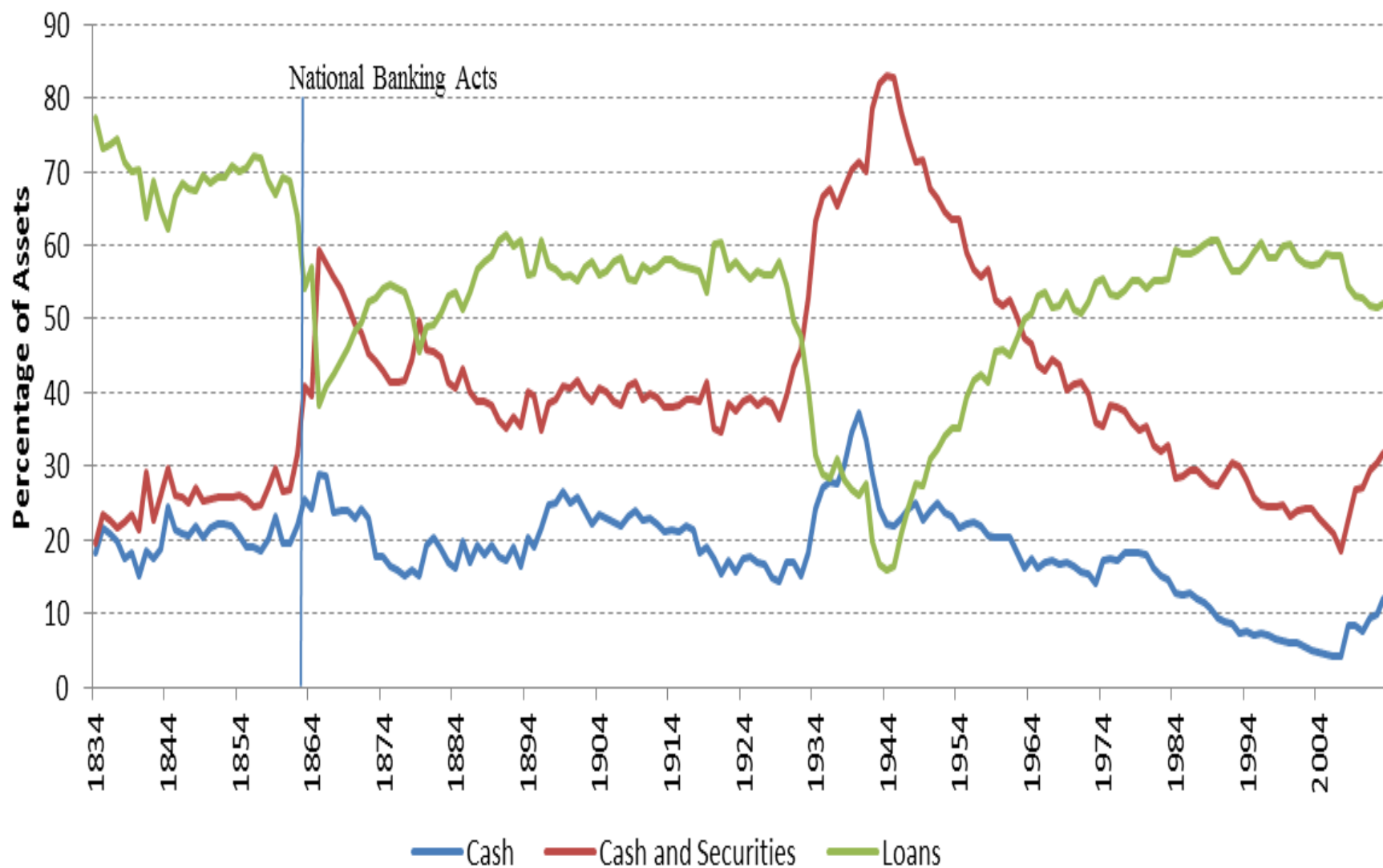
Source: U.S. Statistical Abstract and FDIC

Aside: Liquidity Provision via Maturity Transformation?

► Prior to the Federal Reserve and federal deposit insurance, bank lending was typically short-term and took the form of:

1. Bills of exchange financing trade and collateralized by goods in transit.
2. Promissory notes backed by a borrower's and any cosigner's personal wealth.

► Following the Scottish banking tradition that banks should lend at maturities of no more than 60 days, "prudent" banks backed their notes and deposits by short-term "self-liquidating" loans.*

► Prior to the 1930s, banks with little loan demand invested in commercial paper and held the vast majority of this short-term debt (compared to less than 1% today).**

► Liquidity creation involved very limited maturity transformation.

* Bodenhorn (2000) *A History of Banking in Antebellum America*.
** Foulke (1931) *The Commercial Paper Market.*

Extending the Model to Include Taxes

► Currently, most countries require that bank pay corporate income taxes. U.S. banks were first subject to taxes in 1913.

► Because debt and deposit interest expense is tax-deductible while equity returns are not, financing with bank equity is corporate tax-disadvantaged.

► Empirical evidence finds that the total burden of both corporate and personal taxes is greater for equity compared to debt.*

► Extending the model to include corporate taxes shows that the **equity capital constraint** needed to avoid runs **is always binding**, even in the "loan rich and deposit poor" equilibrium.

* Graham (2000) *Journal of Finance*.

The Burden of Corporate Taxes

▶ For a fixed number of banks in the market:

1. When the market is "**loan poor and deposit rich**," retail **depositors** bear the burden of corporate taxes via a lower equilibrium deposit rate.

2. When the market is "**loan rich and deposit poor**," retail **borrowers** bear the burden of corporate taxes via a higher equilibrium loan rate.

▶ If the number of banks is endogenous and banks pay a fixed cost to enter, then higher corporate taxes increase market concentration, leading to higher (*lower*) loan (*deposit*) rates.

▶ Thus, both retail borrowers and depositors bear the burden corporate taxes when entry is endogenous.

Lender of Last Resort and Deposit Insurance

► U.S. bank capital ratios declined significantly after the Federal Reserve was established as a lender of last resort (LOLR).

► A LOLR would reduces ρ_{run} and, given corporate taxes, a bank's minimum equity capital constraint is reduced.

► U.S. bank capital ratios declined even further after FDIC deposit insurance eliminated almost all incentives for runs.

► This is particularly true in a "loan poor, deposit rich" equilibrium where banks invest in securities rather than issue wholesale deposits.

► Total loans fell by 46% from 1929 to 1940. Total deposits rose by 70% from 1933 to 1940.

Equity Capital to Assets Ratio of All U.S. Commercial Banks
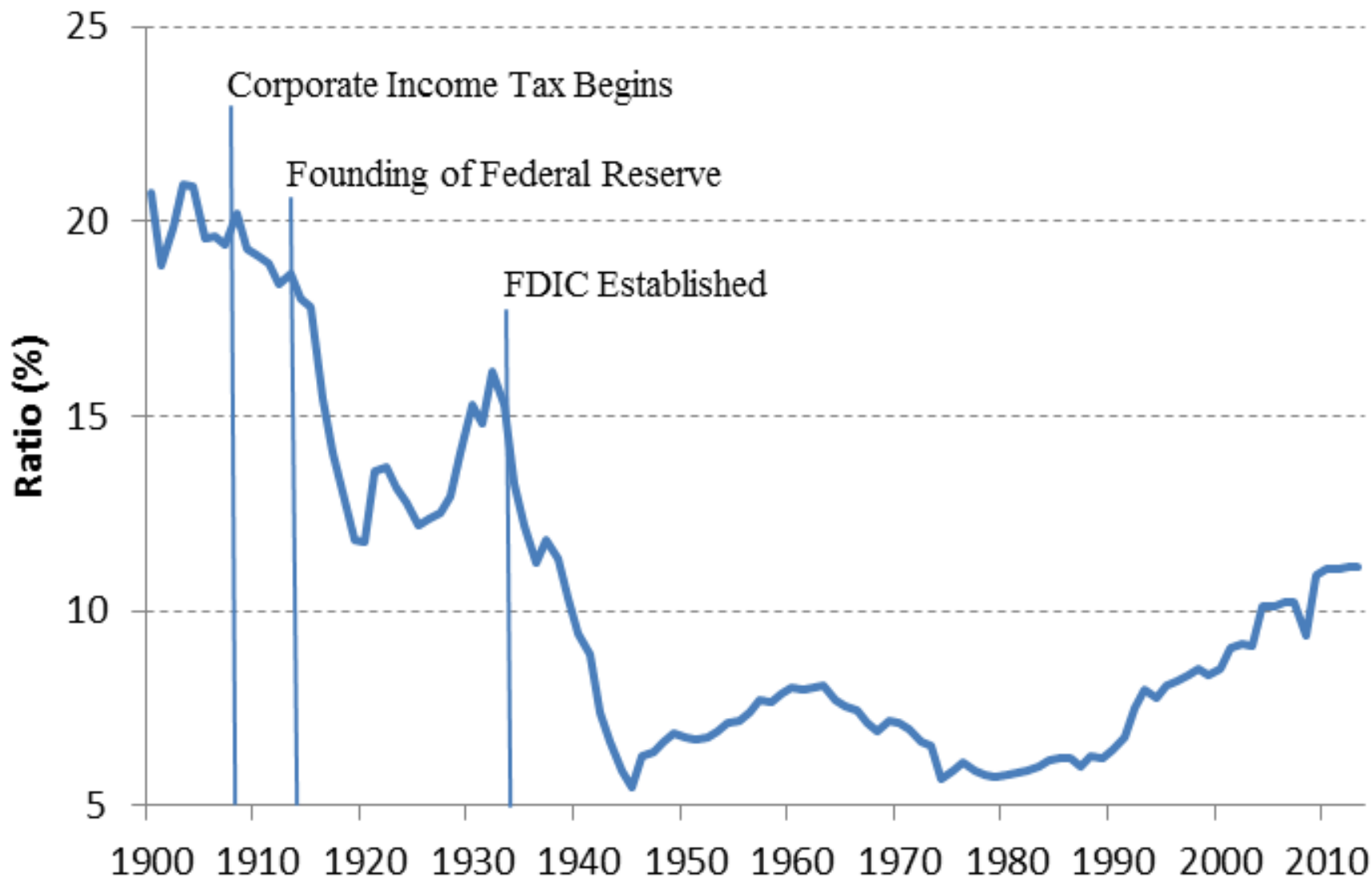
Cash, Securities, and Loans per Commercial Bank Assets
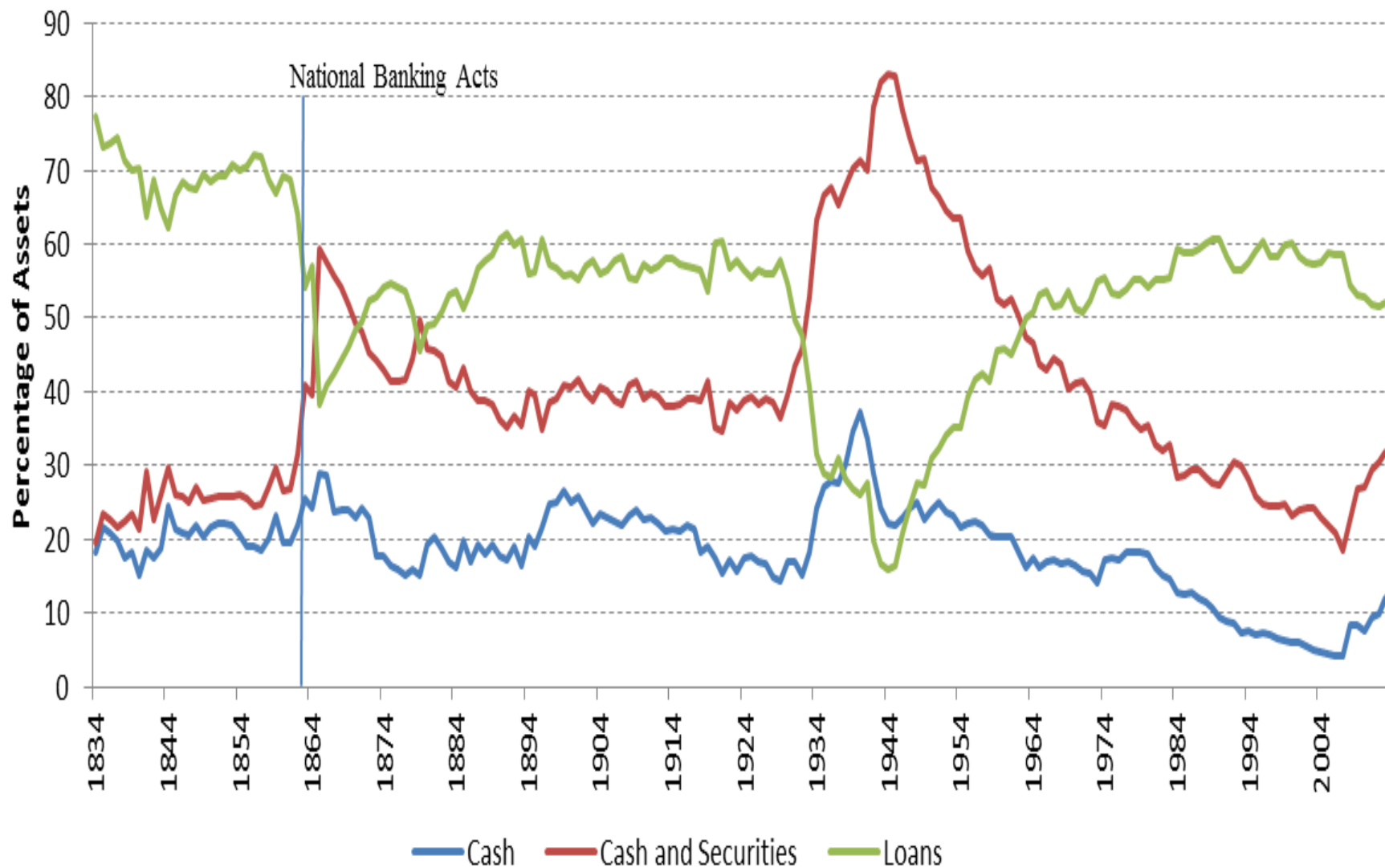
Aside: Loan Commitments

► Bank loan commitments are similar to deposits: they commit a bank to provide liquidity on demand.*

► Currently, around 70% of business loans result from loan commitment drawdowns, but prior to the 1930s long-term loans and formal loan commitments (revolving credits) were rare.**

► Nineteenth century banks established long-term relationships with particular borrowers via repeated short-term loans with no formal commitment that the loans be renewed.***

► Thus, both maturity transformation and loan commitments become popular following federal deposit insurance.

* Kashyap, Rajan, and Stein (2002) *Journal of Finance*.
** Summers (1975) *Federal Reserve Bank of Richmond Economic Review*.
***Bodenhorn (2003) *Journal of Money, Credit and Banking*.

A Capital Ratio Requirement

- ▶ Aggregate equity capital to asset ratios began declining in the 1960s and stayed below 6% from 1977 to 1982.

- ▶ U.S. bank regulators implemented the first formal numerical capital requirements in 1981.

- ▶ If regulators impose an equity capital to asset requirement of ρ_{reg}, the model's equilibrium deposit and loan rates are similar to before except ρ_{reg} replaces ρ_{run}.

- ▶ A bank's corporate tax burden increases with a rise in its regulatory capital requirement, thereby either raising equilibrium loan rates or reducing equilibrium deposit rates.

Nonbank Competition

► Next, consider two sets of nonbank financial service providers:
  1. Savings/transactions account (liquidity) providers.
  2. Lenders/loan investors.

► Nonbank transactions account providers are modeled as money market mutual funds (MMFs).

► MMFs can invest only in securities that pay the competitive wholesale debt rate.

► Their corporate tax-exempt mutual fund structure requires that they pass through all security returns less a constant marginal operating cost assumed to equal that for bank deposits.

Nonbank Loan Investors (Lenders)

- ► Nonbank lenders are corporate tax-exempt special purpose vehicles (SPVs), mutual funds that invest in loans, or business development companies (BDCs).

- ► They fund loan purchases by issuing wholesale debt and equity such as MBS, ABS, CLOs, and mutual fund equity shares.

- ► Since they do not issue retail deposits, they have a higher marginal operating cost of making loans relative to banks due to less efficient credit screening/monitoring.

A Market with Banks and Nonbanks

- ▶ Suppose the retail loan and deposit markets have k nonbank financial service providers, so that $n - k$ are banks.

- ▶ The model results are easily extended to allow for different numbers of nonbanks in the loan versus the deposit market.

- ▶ The equilibrium is assumed to be one where nonbanks and banks can set different rates, but banks equidistant from nonbanks set the same rates.

- ▶ The following is an example of $n = 8$, $k = 2$, so there are 6 banks and 2 nonbanks.

A Market with Six Banks and Two Nonbanks
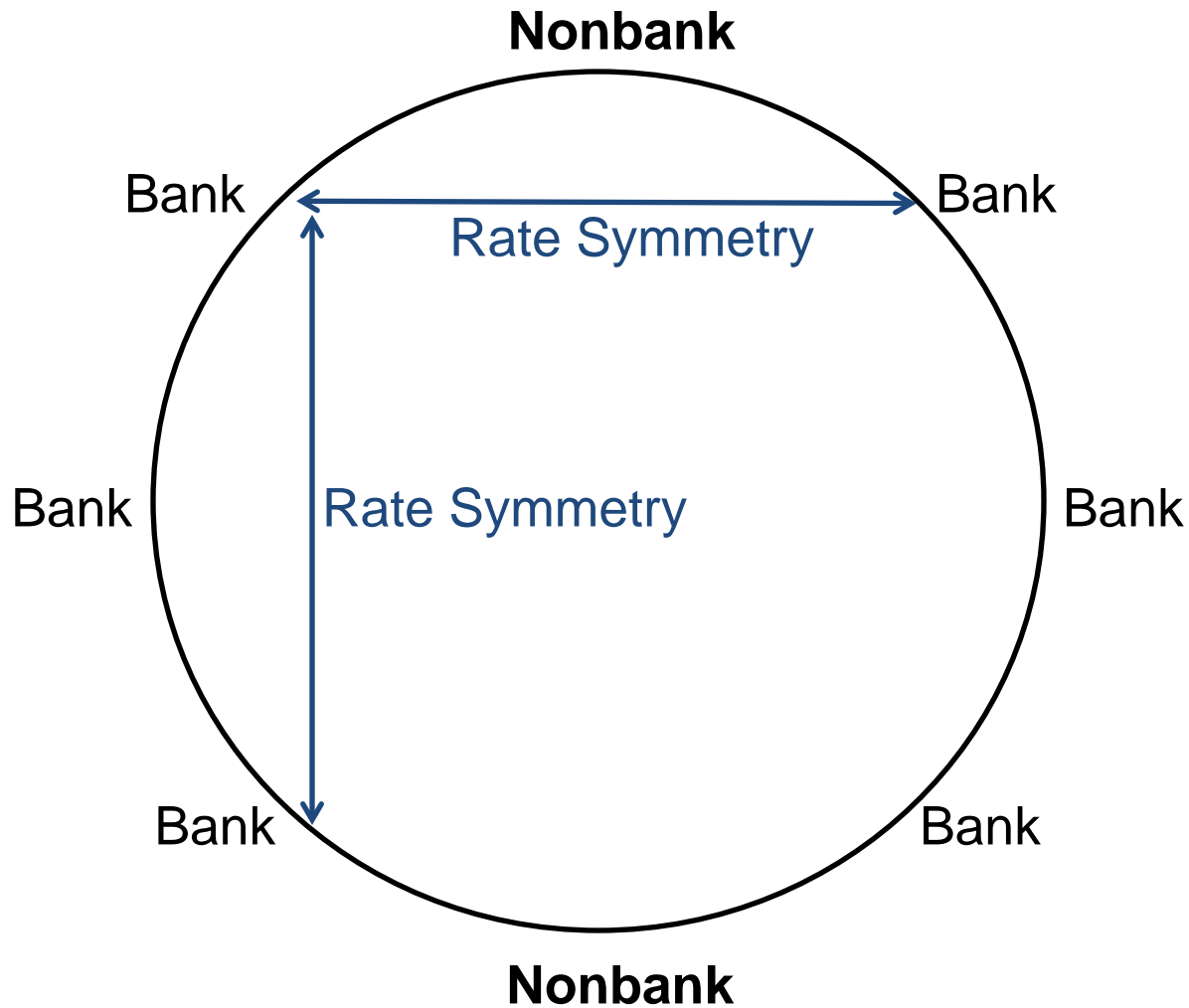
Rate Setting by Nonbanks and Banks

► Nonbank transactions account providers (MMFs) simply pass through security returns less operating expenses, but they provide greater competition to banks in the deposit market.

► Each nonbank lender sets loan rates to maximize profits given the loan rates of its neighboring banks.

► Similarly, each bank maximizes profits given the loan and deposit rates of its neighboring bank or nonbank.

► In equilibrium, neighboring banks/nonbank rates are not the same but satisfy a second order difference equation.

Nature of the Equilibria

▶ As the market's relative proportion of nonbank savings providers (MMFs) to banks increases, banks' equilibrium deposit rates rise.

▶ As the market's relative proportion of nonbank lenders to banks increases, banks' equilibrium loan rates:

1. rise if $L << D$ so that the market is "loan poor and deposit rich."

2. decline if banks' credit screening/monitoring cost advantage is small and $L >> D$ so that the market is "loan rich and deposit poor."

▶ Intuition: More MMFs always increase deposit competition but nonbank lenders can have a competitive advantage only when retail deposits are scarce and, at the margin, banks fund loans with wholesale debt and tax-disadvantaged equity.

Nonbank Incentives to Enter

- ▶ In a loan poor and deposit rich market, nonbank lenders would need to set higher loan rates compared to banks, and there would be no incentive for them to enter (securitize).

- ▶ However, in the loan poor, deposit rich case, nonbank savings account providers (MMFs) would pay rates higher than what banks pay on retail deposits.

- ▶ Thus, there would be incentives for nonbank MMFs to enter.

- ▶ Such a situation might describe the U.S. right after WWII as banks held many securities and made few loans.

Cash, Securities, and Loans per Commercial Bank Assets
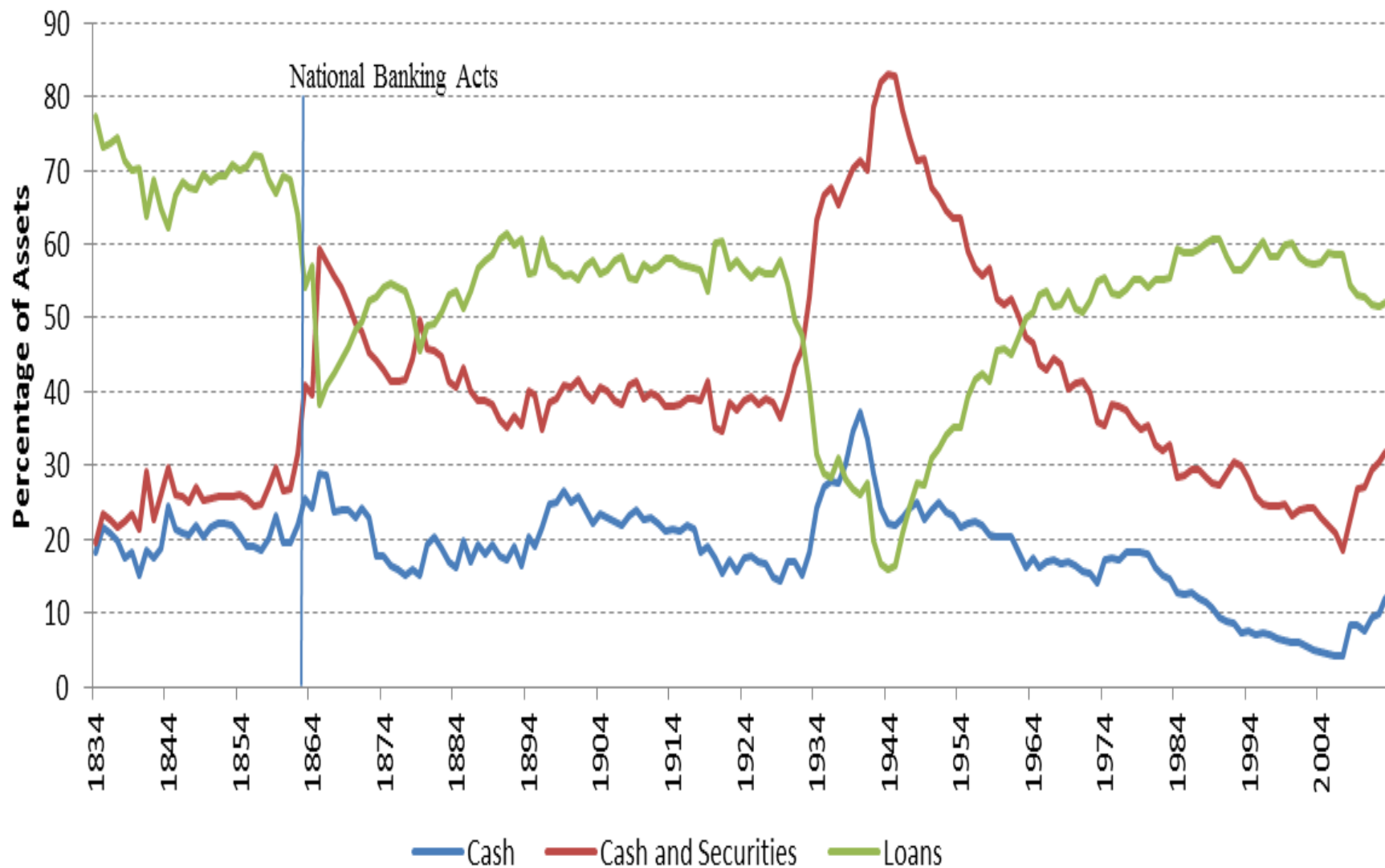
Entry by MMFs

▶ A loan poor, deposit rich U.S. market following WWII would create incentives for MMFs to enter.

▶ Additional incentives during the 1970's were that Regulation Q deposit interest rate ceilings were binding as market rates rose.

▶ The following figure charts the MMF share, defined as the ratio of MMF assets to the sum of bank deposits plus MMF assets.

MMF Share of Savings/Transactions Accounts
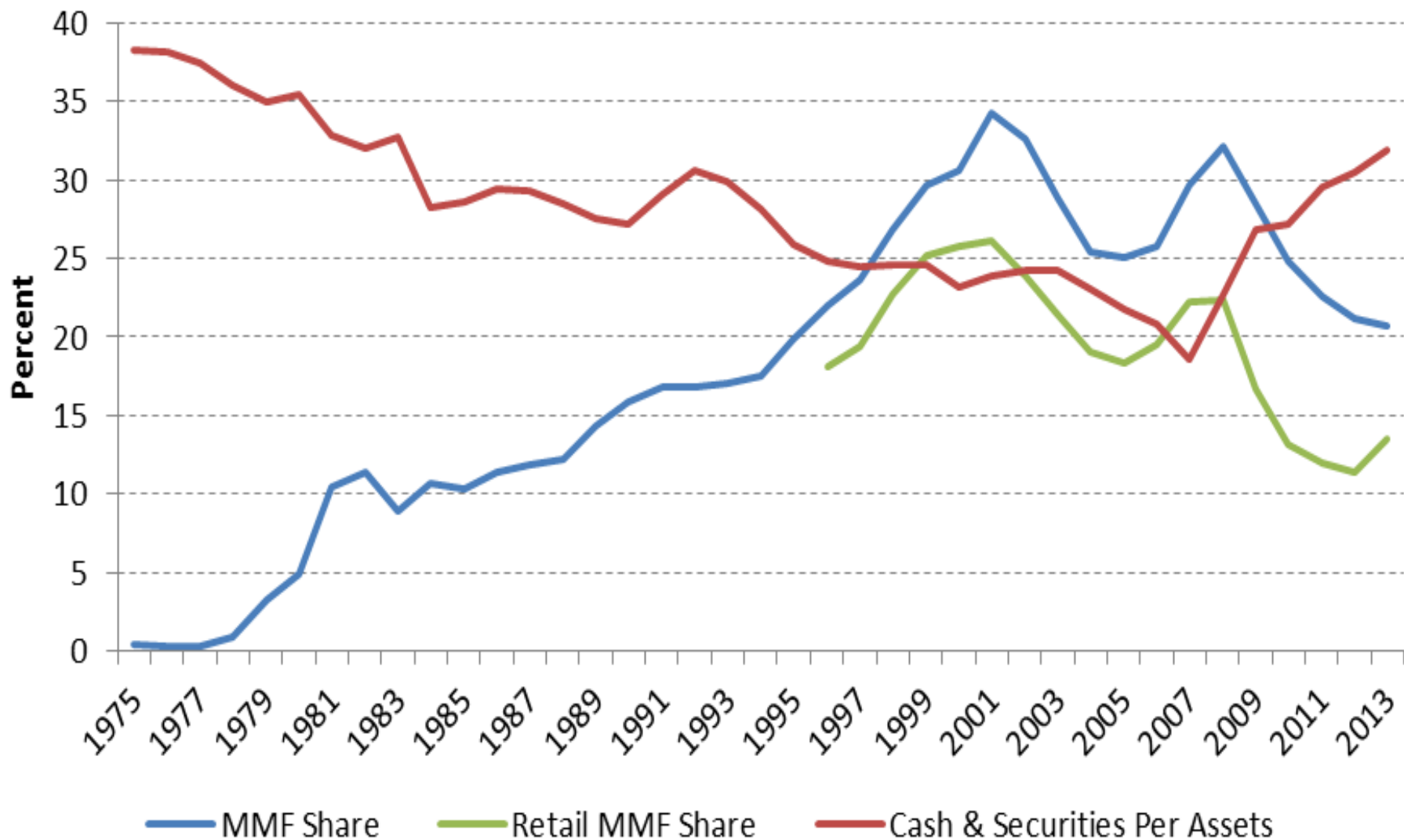
Source: Investment Company Institute and FDIC

MMF Entry Creates Incentives for Nonbank Lender Entry

► As MMFs entered paying higher rates and taking deposit market share from banks (disintermediation), banks would experience a shift from a "loan poor and deposit rich" situation to a "loan rich and deposit poor" environment.

► When this occurs and banks need to fund loans by issuing, rather than investing in, wholesale debt, their equilibrium lending rates would rise.

► But then it becomes profitable for nonbank lenders to enter as their corporate tax-exempt funding advantage allows them to set lower loan rates compared to banks.

MBS and ABS Share of All Loans
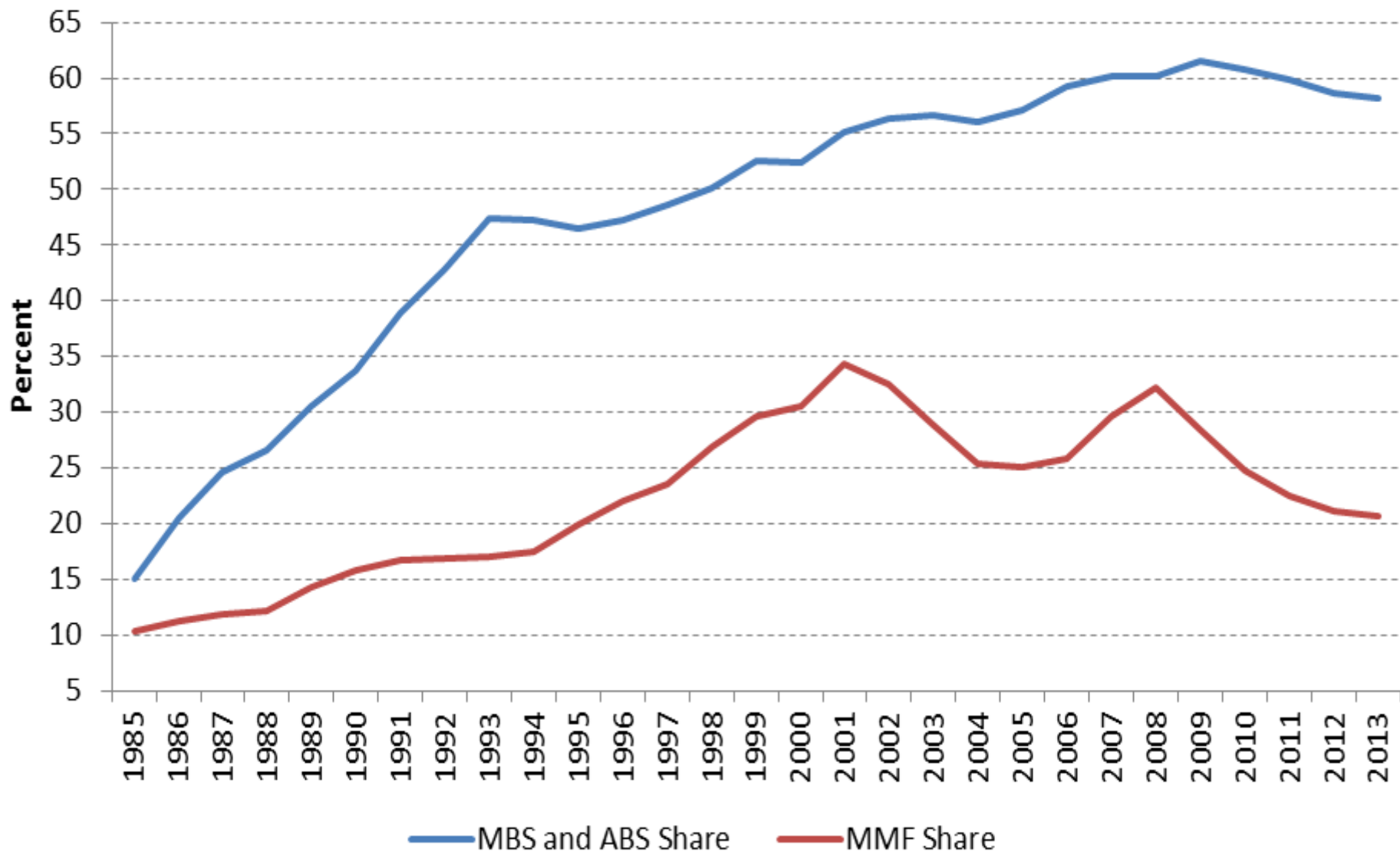
Source: Securities Industry and Financial Markets Association and FDIC

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Rise in Securitization

► There may be risk management reasons for banks to securitize loans.

► However, in a loan rich and deposit poor environment, loan rates reflect banks' corporate tax disadvantage.

► For many secured consumer loans (mortgages, auto loans) and syndicated corporate loans, banks' cost advantage in credit screening and monitoring may be small.

► For these loans, the model predicts it is more profitable for them to be held by tax-exempt SPVs and mutual funds.

Prior Evidence on Corporate Taxes and Bank Capital Ratios

► Ashcraft (2008) *JFI* finds that U.S. banks satisfy capital requirements with more subordinated debt and less equity when they face a higher state corporate income tax rate.

► Schandlbauer (2014) finds that U.S. banks increase their non-deposit debt by 5.9% in the year before a corporate tax increase is enacted in their state.

► In 2006, Belgium allowed a notional interest deduction for equity equal to the 10-year government bond rate.

► Schepens (2014) finds that following this policy change Belgium banks' equity ratios rose by 14% on average.

► Interesting aside: Deferred tax assets account for 50% or more of the equity capital of the largest Greek banks.*

* Reported in the *Financial Times*, 20/21 June 2015.

Prior Evidence on Corporate Taxes and Securitization

▶ Han, Park, and Pennacchi (2015) *JF* analyze U.S. banks' sales of mortgages based on their state corporate tax rate and the market (MSA) where they operate.

▶ For a one standard deviation increase in the tax rate, banks sell 24.6% more mortgages, but only if they operate in a loan rich and deposit poor MSA.

▶ Gong and Ligthart (2014) examine securitization activities of banks in 19 OECD countries.

▶ A one standard deviation increase in a country's tax rate increases securitization by its banks by 1.12%, but only if the banks had relatively high ratios of loans to deposits.

Government Support and Liquidity Provision

► Prior to deposit insurance, bank liquidity provision arguably was closer to that of today's MMFs than to modern banks.

► Hanson, Shleifer, Stein, and Vishny *JFE* (forthcoming) emphasize that deposit insurance allows banks to be "patient" investors which is their main distinction from nonbanks (MMFs).

► Indeed, prior to deposit insurance, bank deposits were not a stable source of funding during periods of market stress.*

► But liquidity provision by any institution is limited: investors, who previously viewed large banks and MMFs as "safe havens" in times of market stress, deserted them during the severe financial crisis of 2008.**

* Gatev and Strahan (2006) *Journal of Finance* and Pennacchi (2006) *Journal of Monetary Economics*.
** Cornett, McNutt, Strahan, and Tehranian (2011) *Journal of Financial Economics*.

Conclusions

► This paper takes a cost of funding-based approach to analyze banks' equilibrium retail loan and retail deposit rates.

► With an equity capital to assets requirement, depositors bear a corporate income tax burden in a loan poor, deposit rich market.

► In contrast, retail borrowers bear a corporate income tax burden in a loan rich, deposit poor market.

► The model also examines competition between tax-exempt nonbanks and banks in the provision of lending and liquidity.

► The model's predictions are consistent with broad banking industry trends where the rise in nonbank deposit (liquidity) competition led to greater nonbank loan competition.