NBER WORKING PAPER SERIES

FLORIDA (UN)CHAINED

Charles W. Calomiris
Matthew S. Jaremski

Working Paper 30914
http://www.nber.org/papers/w30914

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 2023

Florida (Un)Chained
Charles W. Calomiris and Matthew S. Jaremski
NBER Working Paper No. 30914
February 2023
JEL No. E30,G21,N22

ABSTRACT

To understand a price boom, it is helpful to take account of: (1) observable indicators of changes in ex ante risk tolerance, (2) what information exists and when, and (3) the incentives lenders face. This paper takes such an approach to the Florida land boom of the mid-1920s, the U.S.' first housing boom in which buyers from around the nation participated. Estimates suggest that an astounding 20 million lots were offered for sale in Florida at that time. Our detailed narrative and empirical evidence suggest that the facts do not require the assumption of irrational behavior, but rather can be explained with all actors behaving with "bounded rationality." We find that most Florida banks that failed were associated with the Manley-Anthony chain and did not exhibit increases in observable indicators of risk during the boom. Instead, their increases in risk mainly reflected hidden choices either to lend to bank insiders on a preferential basis or to fund other banks that were engaged in such risky and often fraudulent activities. Given bank regulators seem complicit in the risk-taking, even informed investors would have been left in the dark as to the amount of risk that was growing Florida.

Charles W. Calomiris
Columbia Business School
Kravis 1101
665 W 130th St.
New York, NY 10027
and NBER
cc374@columbia.edu

Matthew S. Jaremski
Utah State University
Department of Economics and Finance
3565 Old Main Hill
Logan, UT 84322
and NBER
matthew.jaremski@usu.edu

"Across the state abandoned subdivisions also became graveyards of dreams."
-Gary Mormino (2005 p. 45)

1. Introduction

History contains many examples of asset price "booms and busts" – times when prices rose dramatically over a short period of time and collapsed just as suddenly. To some researchers this pattern suggests a common behavioral phenomenon in which investors extrapolate past returns excessively, which is sometimes referred to as a cycle of greed and fear (e.g., Minsky 1975; Kindleberger and Aliber 2011; Barberis et al. 2018). Greenwood et al. (2019) find that large cumulative positive stock market returns imply a substantially raised probability of a future crash. Recent research (e.g., Bekaert et al. 2013) has shown there are significant changes in the market pricing of risk over time, which may be related to such a cycle, or alternatively, explicable by other macroeconomic factors. If there are such ex-ante changes, asset price booms should be related to observable ex ante market indicators of a greater willingness to bear risk.

Alternatively, research studying particular unsustained price booms often points to distinctive aspects that suggest fundamental causal mechanisms related to changes in expected future cash flows sometimes reflecting reasonable expectations of fundamental changes. Garber (1989; 2000) shows that biological facts particular to rare tulips explain their market price volatility during the "Tulipmania." Temin and Voth (2013) show that an informed dealer during the South Sea Bubble reduced his positions before the crash but continued to execute purchases for clients, suggesting that the price boom reflected beliefs of uninformed traders. In the 1920s stock boom, Nicholas (2008) finds that the market correctly priced differences in technological prospects of individual firms, and Kabiri (2015) shows that the valuation models of professionals were consistent with market prices. In the 1980s land booms, Carey (1990) finds that risk subsidization by the Farm Credit System fueled agriculture land purchases by optimistic buyers, and Horvitz (1990) argues that deposit insurance led financially weak Texas banks to undertake risky real estate lending.

These various studies show that particulars matter for understanding price booms and busts. Booms sometimes reflect reductions in market pricing discounts for risk, and sometimes fundamental influences on expected future cash flows. Three possible drivers of a price boom seem crucial to track: (1) changes in ex ante risk tolerance, (2) what information exists, who has it, and when do they see it, and (3) the incentives lenders face when deciding whether to fuel price booms with greater credit supply. This paper takes such an approach to the Florida land boom of the 1920s to provide clarity to a much discussed but rarely studied boom.

The excesses of the 1920s Florida land boom are referenced as a cautionary tale of how psychological and economic factors can align to blur the lines of reality. Galbraith (1955, p. 11) proclaimed that “the Florida land boom was the first indication of the mood of the Twenties, the conviction that God intended the American class to be rich.” Florida’s land boom represents the crescendo of the first nation-wide housing boom (e.g., White 2014), which has been credited with creating an overhang of debt and other persisting problems that amplified the Great Depression (e.g., Gordon 1951; Bolch et al. 1971; Field 1992; Brocker and Hanes 2014). However, most studies of the Florida-specific boom have focused on sensational anecdotes or aggregate analysis of how land was being sold and how quickly prices rose rather than providing a comprehensive micro-level analysis of how it formed or how finance fueled it.

What makes the Florida land boom and bust so interesting, and so challenging to explain, is the combination of two facts: (1) its colossal size and (2) the enormous costs incurred by would-be homeowners and depositors as well as by sophisticated bankers and developers. Most obviously, there were upwards of 20 million lots being developed for sale in Florida over the boom (Knowlton 2021, p. Xiv). The idea that half of the entire United States population wanted to move to Florida seems preposterous. Nor is it possible to say that this land bubble was perpetrated solely on relatively ignorant investors. The Florida land boom took the nation by storm. Vast financial resources from sophisticated investors were expended in the form of developers' investments, New York City syndicates' funds, interbank deposits, and bank loans. But neither do these facts necessarily mean that scholars of this crisis (or any other) should simply attribute the boom and bust to irrationality. Indeed, our narrative and empirical evidence suggest that the facts do not require the assumption of irrational behavior, but rather can be explained with actors behaving with bounded rationality. That is, they do reasonable things with the information that is available to them, but they do not invest in all useful (costly) information. The lack of important information explains why depositors, investors, and even developers, mistakenly invested excessively in Florida.

One of the murkiest aspects of the boom and bust was the role the banking system played. We show that the interconnected nature of Florida's banks, developers, and regulators in the 1920s was particularly relevant for explaining the boom. These connections allowed the members to coordinate responses ex ante in ways that managed their risk, and assisted those same parties to limit losses ex post when the collapse happened. Interestingly, the interconnections linking banks and developers were not a common feature of all Florida banks. The most intense relationships were within the bank chain owned by Wesley Manley and James Anthony. The banks in the chain supposedly allocated their depositors funds to the chain's managers, real estate developers, and other banks in system. Importantly, nearly all of the Florida banks that closed in 1926 were part of the Manley-Anthony bank chain, but not every chain bank failed. Thus, any analysis of how excessive bank risk taking fueled the crisis should focus on what was unusual about the chain's banks, in general, and also what differentiated the chain banks that failed from those that did not.

Our analysis draws upon the few previous studies of banking during the Florida real estate boom. Using examination and liquidation records, Vickers (1994) highlights how real estate companies bought controlling interests in banks, installed friendly directors, and made risky loans. He argues that banks also gave loans to bank regulators in order to buy latitude to expand undiversified lending on real estate developers' stock. Using aggregate data, Frazer and Guthrie Jr. (1995) see the boom and bust as a natural function of nation-wide speculative behavior and the drawbacks of a fractional reserve system. They argue that Florida banks were simply putting the surge of deposits to work as they would in any other period.

While they shed light on the crisis, both studies fail to account adequately for the level of risk taking in the banking system, and cross-sectional differences in banks' risk taking. They do not explain why only a subset of banks failed, nearly all of which were members of the chain, nor do they identify why some chain banks managed risk so imprudently compared to other chain members and non-chain members. Additionally, neither study seems to fully appreciate how unusual the managerial incentives, lending practices, and risk-taking were at Florida banks and how risk was intentionally hidden, especially within the Manley-Anthony chain.

Before deposit insurance, depositors in U.S. banks had a track record of providing credible deposit market discipline to encourage risk management by bankers, (e.g., Calomiris and Carlson 2016, Calomiris and Jaremski 2019). However, we show that if depositors applied the same standards as they had previously, they would have missed the rise of loan risk. During the land boom, we find that Florida banks were decreasing their loans and increasing their reserves on average. The banks that failed during the boom, most of which were associated with the Manley-Anthony chain, did not exhibit increases in observable indicators of risk. Instead, their increases in risk mainly reflected hidden choices either to lend to bank insiders (stockholders who also were developers) on a preferential basis, or to fund other banks that were engaged in such risky and often fraudulent activities.

The unusual and hidden nature of those governance systems and loan practices, along with the way chain structures accentuated the consequences of those choices, are thus at the heart of explaining why depositors and real estate buyers were so misled in their risk assessments of Florida. The depositors who funded the land boom did not exhibit any observable increase in the tolerance for risk. Instead, this unobservable risk taking is best understood within a bounded-rationality framework by analyzing the roles played by limited information (which itself reflects the high cost of information) and conflicts of interest during Florida's first real estate boom.

As part of our contribution to understanding the Florida land boom and the bank distress that accompanied it, we develop several new measures that are useful for gauging observable ex ante bank risk taking and performing an ex post forensic analysis of distressed banks' lending and dividend payment decisions. These measures shed light on unobservable risk taking during the boom, and should also prove useful in analyzing other crises.

2. Modeling Florida's Fundamentals

Before exploring the behavior of actors and market outcomes during Florida's boom, we consider what was fundamentally at stake in determining whether the price boom was sustainable. In this section, we will present two key sets of fundamental facts related to the boom: facts related to long-run land values in Florida, and facts related to risk taking in the banking system. Each of these relates to a series of hypotheses that we will pinpoint within the rest of the paper to test our bounded-rationality explanation of the Florida boom and bust.

2.1 Fundamentals Related to Long-Run Land Values

The core of any analysis of the market for land is a simple supply and demand model based on expectations of how the local environment will evolve (the number of future residents and their non-housing wealth are key determinants). To illustrate how mistaken beliefs about land values can be formed, Figure 1 plots a supply-demand intersection consistent with a "low-value equilibrium" and one consistent with a "high-value equilibrium" for Florida land.

If the average quality of Florida land being developed and advertised was high (i.e., on high ground, with access to transportation and beautiful vistas), if additional good land was limited, and if many people were interested in purchasing such land, then the price would be sustainably high (P*). But if the quality of land being sold was low, if comparable land was abundant, and if demand for such land was low, then the equilibrium price would be lower (P').

This conceptual framework suggests that the key determinants of the long-run sustainable land value were (1) the (average) quality of the land being developed, (2) the elasticity of supply of land and (3) the demand for land. If one could just assume that people (including depositors, bankers, home buyers, and developers) could not have observed these three fundamental characteristics, then it would not be surprising that both informed and uninformed people formed ex ante beliefs that P* was sustainable when in fact the long-run value was P'. However, since we seek to understand not only the possibility of a Florida land pricing error, but also the process that produced that error, we will examine the existing information around each of these variables to explore the extent that the pertinent facts were unknown (or very costly to discover), and discern to the best of our ability how people actually formed beliefs about them.

This leads us to a series of hypotheses about the land market to test through the narrative and empirical data: (H1) information about the quality of land being developed was hard to determine, (H2) information about the quantity of land being developed relative to the potential quantity of developable land was hard to determine, and (H3) information about the long-run demand for land, conditional on its quality, was hard to determine. As we detail in Section 3, a study of how land was bought and sold provides supporting evidence for all three hypotheses.

2.2 Fundamentals Related to Risk-Taking in the Banking System

The second category of relevant fundamentals had to do with risk management practices in the banking system and their connection to the funding of land development. In money markets such as the market for bank deposits, debtholders not only price risk, but also demand a very low level of perceived default risk as a condition for supplying funding. Banks, therefore, are forced by market discipline to target a low level of perceived default risk on their deposits.[1]

To achieve the low perceived default risk required by depositors and thereby prevent deposit outflows, banks could employ several risk-management tools, some of which are observable to depositors and some of which are not. First, banks can limit risk by using loan covenants and collateral requirements to ensure that their loans were senior claims on the assets of borrowers. Second, banks can limit leverage. Because banks fund themselves with equity in addition to deposits, depositors expect to hold a senior claim on the banks' senior claims on loans, and the protection they receive from that seniority increases with the ratio of equity to debt. Third, banks can make depositors' claims less risky by holding more cash assets and less loans. In a bank's liquidation, depositors have first claim on those virtually riskless assets but must wait for loan liquidation, so the greater the amount of a bank's cash and the fewer its loans, the less depositors stand to lose. Fourth, banks can employ corporate governance practices to

[1] There is substantial evidence that banks must observably manage risk to satisfy depositors (e.g., Gorton and Pennacchi 1990; Calomiris and Kahn 1991; Calomiris et al. 1995; Martinez Peria and Schmukler 2001; Calomiris and Powell 2001; Calomiris and Wilson 2004; Calomiris and Carlson 2016; and Calomiris and Jaremski 2019).

ensure that loan portfolios were managed prudently or achieve the same end through high ownership stakes by managers (Calomiris and Carlson 2016). Finally, the fact that regulators examine banks' portfolios to ensure prudent lending practices are maintained (e.g., reliance on collateral, screening out high-risk loans, and limiting insider loans) likely reassures depositors.

From the standpoint of these risk-management practices, although depositors could not observe loan risk directly, deposit market discipline was able to be satisfied by displaying a combination of observable bank characteristics and formal governance practices. The empirical literature on deposit discipline cited above shows that withdrawals were often a predictable consequence of changes in these fundamental observables. It follows that despite asymmetric information, it is reasonable for depositors to believe that if observable measures of risk were similar or better, then their deposits were not facing an unusually high risk, even though the land value equilibrium was uncertain (as illustrated in Figure 1). Assuming depositors act under bounded rationality, this model leads us to three hypotheses about the banking market: (H4) banks on average during the boom maintained apparently similar (or safer) balance sheets as they had before, (H5) any changes to the traditional covenants used by banks would have been unobservable, and (H6) bank regulators and those tasked with observing bank risk-taking must have allowed risk-taking to take place. In Section 5, we use Florida banking data to provide evidence for these hypotheses.

3. Selling Florida's Land Boom

In this section, we support our bounded-rationality narrative by examining evidence from the land market, paying particular attention to the hypotheses laid out in Section 2.1.

While Northern Florida was developed before 1900, the peninsula was devoid of any large cities until the 1910s. This all changed with Henry Flagler's Florida East Coast Railway

(FEC) which stretched from Jacksonville to Miami (and eventually to Key West). Flagler saw the potential attraction of southern Florida to wealthy northeasterners if the right infrastructure could be put in place. He, therefore, financed the railroad and built a series of grand hotels along the route to attract winter vacationers. Products and passengers surged into southern Florida (top panel of Figure 2). By the mid-1920s, the railroad was running several trains year-round between New York and Miami and staged additional trains in the winter. Knowlton (2021, p. xvi) estimates that over 6 million people came to Florida during the peak years of the boom.

Real estate developers jumped on the Flagler bandwagon. They planned communities around lavish hotels, nightclubs, sports clubs, golf courses, etc. and created elaborate themes to attract the attention of the rest of the nation. The developers used flowery language to attract purchasers with names that evoked tropical images, foreign destinations, and fantastical settings (Turner 2015, p. 45). Carl Fisher created Miami Beach, George Merrick created Coral Gables, and Addison Mizner created Boca Raton to name a few. They often referred to their developments as cities to convey additional structure and maintenance, even if they did not have their own governance structure outside other pre-existing cities. Cognizant of potential concerns that low-lying property might be considered less valuable (even non-Floridians knew that swamps were not desirable locations) many properties included the word “heights” in their name.

With relatively little wealth or population native to Florida, developers spent large portions of their budgets on advertising the Florida lifestyle of fun, leisure, and sun nationally. Merrick’s Coral Gables spent nearly 55 percent of revenue on selling and administrative expenses (Knowlton 2021, p. 148). Rather than display photos of finished homes, developers commissioned beautiful drawings to show what their community would look like when finished.

Color, often full-page, advertisements ran in hundreds of national magazines and newspapers.[2] Billboards were installed across the country. One of the more famous billboards ran in Times Square during the winter and highlighting “It’s June in Miami”. Advertising approaches often trumpeted exotic and unique aspects of Florida land developments. Joseph Wesley Young purchased touring buses that traveled the country collecting sales for Hollywood-by-the-Sea, Fisher staged sports events such as boat races and polo tournaments in Miami Beach, and Merrick paid William Jennings Bryan to give Bible lessons at his Coral Gables’ Venetian Pool.

There were often connections between newspapers and developers. For starters, several Florida newspapers were partially owned by the developers themselves. The intricately-designed ads then funneled funds to the newspaper while the positive stories and advertising pushed investors to the developers. The advertising might also have bought goodwill amongst the various newspapers of the country. It is mentioned, including by Harold Keats, a prominent newspaper reporter who vocally eschewed such connections, that developers wined and dined out-of-state reporters in order to reap enthusiastic reviews in their columns. In fact, several newspapers ran special editions and sections focused on Florida events and real estate. These advertisements cost millions of dollars, but the positive press helped Florida developers reach many millions of Americans. Likely as a result of these advertisements and articles, many plots were purchased sight unseen through the mail or at local land offices.

Developers also increased the amount of land available for sale, draining swamps and removing vegetation to allow development further inland. New techniques also could transform the desirability of land. Developers had even created new beachfront property by dredging up soil from waterways, implying that location was no longer an exogenous attribute of land.

[2] During the period, the *Miami Herald* became the largest circulated newspaper in world and even turned down 15+ pages of advertising a day. See Turner (2015) for a discussion of how newspapers and advertising fueled the boom.

The bottom panel of Figure 2 shows the value of building permits in Jacksonville, Tampa, and Miami during the period. While permits were rising in the early 1920s, there was an overwhelming increase as the boom was reaching its crescendo. Monthly building permits peaked at $10 million in September 1925 in Miami, $5 million in August 1925 in Tampa, and $2.7 million in August 1926 in Jacksonville. Even so, these figures are likely lower bounds of the growth as they isolate building costs and do not include the price of the land. Moreover, while these three cities likely had the highest value of construction, no such data exist for the rest of Florida cities preventing a contemporary (or even backwards-looking) total for the boom.

The boom peaked towards the end of 1925. No single event led to the crash. Instead, Florida real estate began to receive negative press throughout the rest of the nation starting in late 1925. For example, a series of syndicated articles by Harold Keats' during October 1925 highlighted how the boom in his view was reaching its end and anyone who was investing was only throwing their money away. Despite being previously favorable towards Florida, Willard Bartlett wrote in *Barron's* that more real estate was being sold on the basis of profits rather than intrinsic values and that many of the lots being developed were in the wilds that "even an experienced hunter could not penetrate" (Quoted in Sessa 1961 p. 51). The growing pessimism caused Florida's politicians and developers to hold a press conference in New York City to counter-act the bad press, but it likely only spread the pessimistic reports farther (Sessa 1961).

Some of the bad press was likely driven by non-Florida real estate companies and banks who were fighting to keep customers from moving their funds to Florida, but some of it was driven by worrisome Florida events. Two events, in particular, increased the cost of development and cast doubt on its sustainability. First, a railroad moratorium was placed on the shipping non-perishable goods in October 1925. The moratorium prevented building materials from reaching southern Florida except through steam ships, which were more expensive and slower. Second, the *Prinz Valdemar* became stuck in the mouth of Miami harbor in January 1926, blocking traffic for nearly a month. Both events reflected a mismatch between the limited transportation infrastructure and the large and growing scale of resource needs to fulfill construction plans. The negative press reduced the demand for real estate and slowed price appreciation. Many gave up their down payment, leaving developers with a liquidity problem and a crash in construction. As Villard (1928, p. 635) conjured, “Dead subdivisions line the highways, their pompous names half-obliterated on crumbling stucco gates. Lonely street lights stand guard over miles of cement sidewalks, where grass and palmetto take the place of homes that were to be.”

Beneath this account lies a puzzle for those who see the land boom as a fraud perpetrated on the public: why did the developers themselves participate in it and end up losing their shirts? Eventually all the so-called kings of Florida real estate ended up penniless. Walter Fuller, a St Petersburg Realtor, explained: “As to why the boom stopped, the answer is very simple. We just ran out of suckers. That’s all. We got their money, then started trading with ourselves…Did I say we ran out of suckers? That isn’t quite correct. We became the suckers.” (Quoted in Knowlton 2021, p. 298). Developers operated locally and, like home buyers, lacked aggregate information about crucial aspects about the nature of supply and demand in the Florida real estate market.

Consistent with the analysis of supply and demand in Section 2.1, we emphasize that the key to understanding overinvestment in housing development is to recognize the lack of market information, not just an asymmetry of information between developers and home buyers. First, the narrative record is quite clear that the average quality of land for sale was very hard for anyone to observe (confirming H1). Of course, the public had even less information than the developers. The fact that a large number of people bought land through the mail and most developments sold land far ahead of construction meant that real estate purchasers did not see the land they were purchasing. If anything, the developers preferred it that way. Often sending people to their sales offices to see drawings rather than taking individuals out to the building sites. Further, the actual salesmanship of the land through their names and pictures sought to convey quality without providing evidence of that quality. One could even argue that this was understandable in cases where quality was endogenous to development effort (such as investments that were capable of converting a swamp into a beachfront estate).

Second, the amount of land under development was hard to determine (confirming H2). The boom included thousands of small local developers, and developers were creating new land by draining swamps and dredging soil from waterways. Data about the scale of construction existed for only a handful of cities and even those figures exclude land price data.

One perspective on the difficulty of observing hard information with which to form accurate beliefs about land values is to examine what pessimists were saying about the boom. For example, Keats' negative opinion of Florida cited no hard facts about developed land quantity, quality or price, presumably because they were not readily available (and are still not readily available). Apparently, he visited Florida, and formed a qualitative impression that the average quality of existing developments was lower than purchasers believed, and that the available supply of additional parcels of similar quality was high. Even this impression would have been nearly impossible for the average investor to form, even after visiting Florida. It took Keats at least multiple trips throughout Florida to arrive at his unsubstantiated opinions. For all these reasons, the narrative and empirical evidence suggests that the market for land did suffer from a lack of information that limited all participants' ability to make informed decisions.

4. Banking Data

To shed light on the role of the banking system in Florida's land boom, we collected microeconomic data for national banks from the Comptroller of the Currency's *Annual Report* and for state banks from the Comptroller of the State of Florida's *Annual Report*.[3] While national bank data span the entire period, Florida's Comptroller did not report state bank data in 1925. Florida had published a December report every year through 1924, but decided in late 1925, to change the publication date to June of each year going forward. Since June 1925 had already passed, the next reporting date was not until June 1926. The Comptroller provided aggregate banking data for 1925 in the June 1927, but never provided bank-level data for 1925. While state and national banks do not report the individual identities of depositors or borrowers, nor complete lists of the members of banks' boards of directors provided, we show that it is possible to extract substantial useful information about the characteristics of these actors from the information that is available.

Because 1925 is a key year of the boom, we collect the value of each state bank's deposits from the *Rand McNally Bankers Directory* in January 1926. The balance sheet data are more highly aggregated than Comptroller's data and are not updated to January 1926 for some smaller banks. However, the *Rand McNally* deposits data when aggregated are close to the aggregates provided by the Comptroller for December 1925. We drop the 20 banks that did not update their balance sheet data over the previous year and instead fill those observations with a linear trend between the Comptroller's data in December 1924 and June 1926.

There is no published membership list of the Manley-Anthony chain. We consulted a number of sources to reconstruct the list. First, we identify banks where Manley, Anthony, or one of Anthony's brothers was an officer. Second, we use Vickers (1994) discussion of banks

[3] We drop banks with extreme values as they are likely due to typos in the source data or non-commercial banks.

that were part of the system and also his list of members whose officials were subpoenaed in the proceedings against Manley and Anthony. Third, we consult a wide variety of newspaper accounts of the period as well as the *Commercial and Financial Chronical* for explicit mentions of members. Finally, in a handful of cases, we use the map of the chain's member locations generated by Federal Reserve's *Committee on Branch, Group, and Chain Banking.* Many of the sources reinforce each other and the combination of the data yields a similar number of members to those cited in accounts of the period. Figure 3 displays the distribution of Manley-Anthony chain banks in Florida. The map shows that the chain was spread throughout the state.

5. Risk-Taking in the Banking System

The rush of deposits into Florida banks funded their loan growth and likely accelerated the land boom. As highlighted in Section 2.1, depositors discipline bank risk taking, and their risk assessments are guided by observable bank characteristics. The threat of depositor withdrawal encourages prudent risk management by banks. But in Florida, a unique constellation of circumstances undermined the informativeness of observable bank characteristics. Here we examine key observable and unobservable factors that can explain both why depositors reasonably believed that banks were acting prudently, and why some banks – particularly a subset of the Manley-Anthony chain – were able to undertake large hidden risks. We begin with an overview of the aggregate banking system, and then move to analyze bank-level information.

5.1 Aggregate View of Florida Banking

The top panel of Figure 4 shows that total deposits at Florida commercial banks rose from $186 million in 1920 to $251 million in 1923, to $830 million in 1925, following a similar pattern to building permits. Figure 5 reports deposit growth by county between 1924 and 1925.

The largest rises in deposits were in the Florida peninsula. Over the year, deposits in the median Florida county grew by nearly $787,000, but grew by $152 million in Dade county (i.e., Miami), $46 million in Palm Beach county, $50 million in Hillsborough county (i.e., Tampa), and $67 million in Duval county (i.e., Jacksonville). The bottom panel of Figure 4 shows that the growth in deposits reflected a mix of interbank and individual deposits. The proportion of interbank liabilities rose over the boom, implying their growing importance in bank funding.

With less than a million people in Florida in 1920, it is clear that the deposit growth had to come from outside of Florida. The *New York Times* pointed to enormous withdrawals from Northern, Midwestern, and Western banks. Dana Sylvester, a manager of the Massachusetts Savings Bank Association, argued that about $20 million had been drawn from the state and cautioned depositors against such investments (Sessa 1961, p. 43). Ohio passed a blue sky law to explicitly prohibit firms from selling Florida real estate in Ohio. Knowlton (2021, p. 175-176) highlights that: “Wall Street was forming syndicates on a near daily basis to pool money for new Florida developments or to take shares in existing ones”. Even Florida’s Comptroller stated in his 1926 *Annual Report* that: “A large portion of swollen deposits consisted of out of State money” (p. 3). Jane Fisher maybe summarized the dynamic best: “All Florida was like a mighty vacuum sucking in all the loose money in the world” (quoted in Knowlton 2021, p. 176).

What were Florida’s banks doing with this incredibly large flow of deposits into the system? Figure 6 examines five key balance sheet ratios for Florida banks: the ratio of loans to assets, the ratio of cash and due from banks to total deposits, the ratio of equity to assets, and the ratio of surplus and retained earnings to total equity.[4] Loan-to-assets slightly declined. Cash-to-

[4] Bank failure studies in other settings, such as the National Banking era (Jaremski 2018), the 1920s (Jaremski and Wheelock 2020), the late 1920s panic in Florida (Carlson et al. 2011), the Great Depression (Calomiris and Mason 2003), 1980s-90s (Wheelock and Wilson 2000), show that these variables are correlated with bank risk.

deposits slightly rose. Equity-to-assets fell, but equity rose as banks retained earnings (adding to surplus). Of these measures, only equity-to-assets would be seen as contributing to default risk.

To overcome the mixed message of these opposing effects, we develop a new composite measure, which we label the "loan-to-buffer" ratio. It captures the combined content of the various ratios. The ratio divides total loans by the sum of total equity and cash-like items. The numerator, therefore, captures the main source of risk while the denominator includes both ways that depositors are protected depositors from loss (less leverage and more cash). The bottom of Figure 6 reports the loan-to-buffer ratio, which declines in the early 1920s.

In the Appendix, we show that this ratio provides a useful (but imperfect) indicator of expected depositor loss for a given distribution of potential loan loss. Further, we show that the risk-reducing effect of the decline in the loan-to-buffer ratio over the boom was partially offset by an increase in the relative growth of cash relative to equity (a dollar of cash has less of a loss-reducing effect than a dollar of equity). Despite this offsetting effect, overall, there was no economically significant increase in depositors' risk of loss in the early 1920s.

5.2 The Manley-Anthony Chain

While Florida banks *in toto* slightly reduced their observable risk profile, aggregate data may mask important dynamics at some of the banks. Using detailed examination and liquidation records, Vickers (1994) highlights how real estate companies bought controlling interests in some banks, installed friendly directors, and extracted loans. Nowhere was this more visible then within the chain of banks owned by Wesley D. Manley and James R. Anthony.

An attraction of chain membership was that each bank exercised a great deal of managerial autonomy. The headquarters of the chain acted as a fiscal agent of the bank for a fee. The chain audited the banks' books, borrowed from them, aided them in obtaining deposits, and assisted them with investing excess reserves. The chain even operated a deposit insurance fund whereby members paid in a small amount of money based on their deposits each year, and the funds would supposedly be used to pay off depositors should one member of the chain close.

Rather than conservatively managing risk conservatively to maintain a stable chain, Manley and Anthony reportedly used the funds of member banks to make loans to their own companies, purchase stocks of other banks, and invest in speculative activities during the 1920s. The years of stable behavior and lack of failures increased people's confidence in the system and most banks took suggested investments without question. During Manley's trial, bankers claimed ignorance of the risks he was pursuing. For instance, one bank president said that the bank "made no investigation of the value of the paper or the security behind it when it was accepted, but that it was accepted upon the confidence they had in W.D. Manley and J.R. Anthony" (Quoted in Vickers 1944, p. 143). While worried about the risk of allowing Manley and Anthony to invest their funds, bankers were not ready to give up the high profits associated with them.[5]

Many developers got into banking by either starting banks with Anthony or buying an interest in them. After spending a few thousand on shares, they then could access the flood of depositors' money to fund their projects. For instance, Telfair Knight was not only the vice-president and general manager of Merrick's Coral Gables Corp., but also president of the Bank of Coral Gables. The Mizner Development Corp. had interlinked directors with the Palm Beach Bank and Trust Co. and the Commercial Bank and Trust Co. of West Palm Beach, and boasted the ability to make bank loans to buyers at the real estate office. Upon their failure, the Palm Beach banks revealed loans of over 200% of the banks' capital to Mizner and his partners. Even during the bust, developers used their control over banks to procure additional loans backed by

[5] According to Vickers (1994, p. 91), "Florida member banks had loaned Manley and related corporations in Georgia $6.2 million. The state banks had also deposited $4.2 million in Manley's Georgia banks."

promissory notes, development company stock, and sometimes personal guarantees.[6] Collateral should create a senior interest for the lender in a company. Stock in a company or personal guarantees of stockholders do not actually secure a senior position through its loan, and instead made depositors *unwitting junior claimants* on land speculation. According to Vickers (1994, p. 64), “Nearly fifty state banks were on the verge of collapse because promoter-bankers had loaned millions of dollars to themselves” by the end of the boom.

Depositors might have expected that banks in the chain were being watched over by the various regulatory agencies, who would have noticed and objected to such practices, but the regulators themselves, unbeknownst to the depositors, seem to have been immersed in the scheme. Ernest Amos was the Florida Comptroller in charge of the state banking system during the boom, yet Vickers shows that he did a lot of business with Anthony and the chain’s banks. Many of the banks made “policy” loans to Amos which went unpaid or were repaid by the bankers themselves once detected. These loans apparently had the effect of allowing the banks to evade ex ante detection of the lack of real loan collateral, and thus allowed banks to increase the risk and concentration of their lending to the developers. Ex post, bankers were able to avoid potential lawsuits as it would be hard to prosecute bankers without Amos’ explicit cooperation.

The evidence suggests that, while most of the stories of bribes were at the state-level (matching the vast majority of chain bank charters), national bank regulators, such as individuals at the Federal Reserve Bank of Atlanta and the Office of the Comptroller of the Currency (OCC), were also influenced. For instance, in January 1926, the Mizner Development Co. asked several Congressmen to intervene with the OCC so that the Palm Beach National Bank could sell more stock. The request was so quickly expedited that the OCC approved the application three weeks

[6] Vickers (1994p. 20, 31) finds that the Coral Gables Corp. received loans from 12 chain banks (p. 20), and that after squandering millions of dollars, Mizner relied on the chain for financing as its officers held personal stakes in the Mizner Development Corp. The chain banks financed development until depositors forced them to lock their doors.

before it was filed. Multiple OCC bank examiners highlighted the irregularities of various Florida national banks, but no charges were filled. In fact, after the Palm Beach National Bank was found to have an unsound condition due to its concentration of loans to Mizner, the Federal Reserve Bank of Atlanta still was willing to loan it almost $45,000 without any requirement to reduce loans to Mizner or other developers. Vickers chalks most of this up to political power as many judges and congressmen (including Vice-President Dawes) were invested in the boom.

The boom in Florida land prices seemed to make these corrupt lending strategies profitable by facilitating a massive flow of new loan funds to the developers, and providing quick profit opportunities for those with connections to banks. However, as the boom peaked, risks became more apparent and banks and developers found it increasingly difficult to maintain the risk subsidies attendant to their fraudulent actions. As things unraveled, the Comptroller of Florida wrote in his 1926 report that state banks in April of 1926 were having trouble getting their money from Bankers Trust Co. While Manley and Anthony promised to repay some funds at the supposed behest of the Comptroller, Manley is seen utilizing last-minute wire transfers to other banks and companies owned by him and his partners before the chain's collapse. Only $6,000 of the $422,000 that member banks had loaned to the chain remained when the Bank of Umatilla petitioned for receivers to be appointed in July 1926 (Vickers 1994, p. 139). Over half of the chain's banks were quickly closed, yet only 8 other Florida banks closed.

Half of the chain's banks that suspended eventually reopened. Moreover, depositors of those banks that were not capable of reopening generally faced large losses. The losses were not simply due to the investments themselves, but rather there was additional tunneling after the fact. Amos had charge over which receivers were appointed for closed banks, and often picked those related to the developers and chain. In many cases, the receiver charged high fees, settled debts of connected parties for cents on the dollar, and dragged out the process. As one example, the Palm Beach Bank and Trust Co. took twelve years to liquidate and depositors only received 4% of their deposits. To add insult to injury, Anthony and other bank stockholders avoided double liability because the bank's receiver failed to file suit. To prevent exposure, Amos unilaterally sealed regulatory and liquidation reports as confidential even from the depositors themselves.

The deposit insurance fund went bust. The evidence shows that Manley and Anthony had used the fund to invest in the same places as the banks' funds. The government argued in court that Manley had misappropriated more than $445,000 from the fund to invest in his personal companies. Manley even wrote a letter directing the approach: "This depositors' guarantee fund money in other banks doesn't help us so let's draw it all out. We might as well make use of it" (Quoted in Vickers 1994, p. 146-147). Therefore, while the original advertising for the fund promised that depositors could not lose, it seems they (and even bankers) were duped.

The narrative and empirical evidence make clear that both H5 and H6 (presented in Section 2.2) were likely true. Specifically, members of the chain seem to have altered their traditional covenants in a way that was hidden from depositors' view. That is not to say that the officers of banks were unknown to depositors, but rather the extent that undiversified insider loans were being made to specific developers on securities rather than solid collateral. These are aspects of the bank that only regulators and directors could see. Moreover, regulators of these banks seem to have ignored any conflicts of interest. All of these aspects imply greatly increased risk of depositing with the chain, but risk that depositors could not possibly have known ex ante.

5.3 Chain vs. Non-Chain

The apparent wide differences in the ex post failure experience between Manley-Anthony chain members and other Florida banks begs the question of the extent to which these differences were visible to depositors ex ante. If chain banks were observably more risky than others, then depositors likely were ignoring their typical discipline during the panic. However, if chain banks appeared similar, then it must have been because depositors were continuing to require them to outwardly signal that they were not risky and our bounded rationality explanation is upheld. Because nearly all members of the chain were state banks, we focus on them in order to hold regulatory requirements and reputation constant.

Section 2.2 identifies key observable indicators of risk. Table 1 examines those key ratios as well as other observables at the bank-level separately by a bank's chain status in December 1924 (i.e., the last observations depositors would have had before the peak of the boom). The banks look similar. Only three variables are significantly different for chain banks: chain banks have more assets, were more likely to receive interbank deposits, and had less capital and surplus relative to assets. The first two of these would signal less risk, while the third signals more risk. Importantly, neither the composite measure of the loans-to-buffer ratio nor the level of bills payable (a red flag due to its high interest) are statistically significantly different across the two types. Based upon observables, chain banks do not necessarily seem to be more risky than other Florida banks. From the standpoint of balance sheet measures of risk and our summary measure, chains and non-chains look similar and exhibit little change from 1922 to 1924, with both groups showing a slight decline in the loan-to-buffer ratio since the start of the decade.

The similarity of chain and non-chain banks is remarkable given the high failure rate of chain banks. As seen in Table 1, nearly all the closures in 1926 were chain members; 81% of banks that closed or suspended in 1926 were members of the chain despite the chain representing only 10% of total banks.[7] This indicates that not only did a high number of chain banks close or suspend but that relatively few other banks did. Specifically, over 55% of chain banks either

[7] Closure data are from the Federal Reserve's *Committee on Branch, Group, and Chain Banking* and *Rand McNally*.

closed or suspended in 1926 compared to 3.7% of non-chain banks. The picture is similar if one measures closures through 1927, as additional chain banks closed in that year.

The data in Table 1 suggest that the traditional signals used by depositors and investors to judge a bank's health were ineffective in the period. We test this implication by estimating the probability of a bank's failure based on its balance sheet indicators while controlling for local economic activity and demographics. We examine three different measures of failure: (1) whether a bank suspended or closed during 1926, (2) whether a bank was open in December 1926, and (3) whether a bank was suspended or closed by June 1927. The first measure is our preferred measure as it provides a comprehensive measure of all bank distress during the most relevant period, whereas the other two focus respectively on a narrower definition and a longer time horizon. Regardless of the outcome, however, the results are similar.

The model is:

$$Closure_i = a + \beta_1 Chain_i + \beta_2 BalSheet_i + \beta_3 X_i + e_i \quad (1)$$

where $Closure_i$ indicates whether bank *i* had closed, $Chain_i$ indicates for whether the bank was a member of the Manley-Anthony chain, $Balsheet_i$ is a vector of balance sheet items (log of total assets, loans/assets, cash and balances due from banks/deposits, due from banks/cash+due from banks, capital+profits/assets, the loans-to-buffer ratio, and an indicator for whether the bank had any bills payable), X_i is a vector of county characteristics from Haines (2004) which include the logarithm of population, the fraction of the population living in an urban area, value of crops per square mile, value of manufacturing output per square mile, and the logarithm of the value of farms per square mile.[8] e_i is the standard error clustered by town. Because the loans-to-

[8] We aggregate counties to their 1920 boundaries fill values in between each Census observation with a linear trend.

buffer ratio is largely collinear when all the other balance sheet ratios are included, we regress this only in a separate regression when the other ratios are removed.

The estimated coefficients for equation (1) are provided in Table 2. The data clearly show that being a member of the chain is a statistically significant and economically important predictor of failure regardless of the definition used or the other variables included in the model. The chain membership status indicator is a measure of outsider ignorance about risk management; that is, the hidden imprudent practices associated with many of the chain banks. Outside of chain status, however, only the size of a bank's assets is significantly correlated with failure in any specification, and even then, it is not significant when including the full set of balance sheet ratios. The data, therefore, make clear that depositors who followed typical investing principles would have missed the risk being taken by the chain banks over the period.

Under the assumption that failing chain banks took unobservably higher risks than non-failing chain banks, we further divide chain banks into two groups: banks that closed and those that did not. According to the measures reported in Table 1, chain banks that closed during 1926 were relatively similar to those who remained open. The observable risk differences were mixed. Compared to surviving chain banks, failing chain banks had less assets, less interbank deposits, more reserves, fewer bills payable, a higher capital-to-assets ratio, and a lower loans-to-buffer ratio. The differences are not only mixed, but are also relatively small.

This picture is different when comparing failed and surviving *non*-chain banks, provided in the same table. For almost every measure, failed non-chain banks were more observably risky: they had less assets, interbank deposits, reserves, and surplus, and higher loans to assets, and loans to buffer. In terms of less risk, only capital to assets was higher for failed non-chain banks.

We conclude that chain banks (even the riskiest) were purposely managing their balance sheet profiles to appear less risky despite taking on much more unobservable risk during the boom.

We test this observation using a model similar to equation (1) but estimated separately for chain and non-chain banks. The estimated coefficients presented in Table 3 provide a few interesting observations. First, the estimates for non-chain banks look much more similar to what we expect from prior studies of bank failures in other periods. While not always statistically significant, non-chain failures are predicted by lower reserves, higher leverage, more bills payable, and a higher loans-to-buffer ratio. The coefficient estimates for reserves and the loans-to-buffer ratio are also statistically significant. Second, the estimates for the chain banks are quite different and generally not statistically significant. While total assets, loans-to-assets and capital-to-assets are similar to what would be expected be expected, the effect of reserves, bills payable, and loans-to-buffer are opposite what would be expected. Through 1926, only the size of a chain bank's assets is statistically significant for the main portion of the bust.

What unobservable investments were banks making in 1924? Likely in response to the unusual market circumstances, the Florida Comptroller published a breakdown of state bank lending in June 1926. The Comptroller divided loans into real estate loans, loans secured by other collateral, and other loans. While the data come after the peak of the boom, they come before the collapse of the chain. The average state bank invested 26.5% of their total loans on real estate, 28.5% on other collateral, and the remainder was on non-collateralized loans.

Figure 7 shows that the ratio of real estate loans to total loans varied across the state. Areas with a lower proportion of real estate loans often had more chain members. This jibes with Vickers' characterization that chain banks often lent against stock and other non-real estate collateral. We estimate a cross-sectional regression testing whether chain members had different lending distributions after controlling for local factors. For each of three types of lending, we normalize them either by total assets or total loans. The model takes the form:

$$LoanType_{i,1926} = a + \beta_1 Chain_i + \beta_2 X_i + e_i, \quad (2)$$

where $LoanType_{i,1926}$ is the fraction of loans by type for bank *i* in 1926.

The estimates of equation (2) are provided in Table 4. Whether normalizing by total assets or total loans, chain banks held much smaller fractions of real estate loans than other Florida banks. Being a member of the chain is associated with a 4.3 percentage points lower fraction of real estate loans to assets. These effects are large given that the average real estate to total loans ratio in 1926 was only 26.5%. Chain banks significantly invested in loans secured by other collateral, although the coefficient on unsecured other loans is positive but statistically insignificant. The pattern of the data indicates that the chain's banks were helping to fund either developers or Manley and Anthony's endeavors directly by securing loans on stock.

The data should be taken with a grain of salt since the observation comes after the peak of the boom and could represent resurrection risk-taking by banks. However, evidence suggests a similar pattern would also be visible in 1924 had the loan data for that year been available. As we have noted, Vickers' highlights on many occasions how banks were willing to accept stock in development companies as collateral for loans and even provided personal loans to directors. Moreover, the end of boom hit Florida's entire banking system, suggesting that if there was such risk-taking it would have been widespread. Therefore, we conclude that chain banks seem to have had more ability or willingness to make such loans compared to the average Florida bank.

This is consistent with H4 from Section 2.2. The chain's banks were not substantially changing their observable risk and on some measures appeared more conservative over time. Given that the vast majority of banks that closed during the bust were chain members, they appear to have been increasing unobservable risk. It follows that depositors do not seem to be irrationally investing in observably risky banks, but rather they used standard rules of thumb that had been rendered useless because of the unknowable risk behind the public numbers.

5.4 Fingerprints of Fraud

Thus far we have shown that the banking crisis associated with the Florida land collapse of 1926 was largely confined to about half of the members of a bank chain, and that the observable characteristics of these failed chain member banks did not provide ex ante information to indicate their high-risk loadings on the land boom. These banks made unobservable choices to take advantage of risk-taking opportunities that appear to have been tied to chain membership (a choice that a similar number of other chain members did not make).

We hypothesize that risk-taking opportunities related to chain membership were of two types. First, chain membership increased market opportunities to fund a bank's insider lending (H7). That is, chain membership status may have made it easier to attract deposit accounts, which were deployed to fund risky loans to bank shareholders who also were land developers or investors. Second, chain membership increased the potential for members to fund risky insider loans originated by other chain bank members which would have increased risk-taking banks' "due-from" balances (H8). We see these both as possible and complementary contributors to the unobservable risk taking that occurred within the chain.

To investigate these risk-taking opportunities, we pursue a sort of bank failure forensics in this section, which we label examining the fingerprints of fraud within the failed chain banks. Under H7, we consider what kinds of behavior a bank that engaged in promoting loans to its stockholders would have engaged in. We posit that such a bank would have had a higher ratio of loans to other earning assets, would have charged lower loan interest rates to its (conflicted) borrowers, and retained less of its profits so that it could pay more dividends to its (developer) stockholders who would use the funds to make further real estate investments. Under H8, we expect that the risk-taking would have taken a different form, specifically increasing the ratio of "due-from" balances. This would also have produced lower interest on earning assets, given that even risky due-from accounts will tend to earn less than loans (reflecting greater seniority and lower physical costs of funding other banks relative to funding bank borrowers).

We note that these fingerprints of fraud should not be seen as evidence of useful ex ante predictors of failure. We are examining bank characteristics (such as retentions, interest earned, and the fractions of assets invested in each category) conditional on ex post evidence of failure and therefore, ex post evidence of a bank's apparent ex ante high risk taking. Prior to the actual failures of these banks, low interest rates or greater dividend payout could have had many alternative interpretations, and would not have been reasonably seen as indicative of high failure risk. For example, low interest rates (which, in any case, were not easily observable to market participants) might have been viewed as indicators of low risk. And high dividends might indicate greater corporate governance discipline, or less of a desire to grow, which would have pointed to lower risk. So we hasten to point out that ex post fingerprints of fraud observed in a forensic analysis of failed banks should not be construed as ex ante predictors of failure.

In our comparisons, we consider three groups of banks: closed chain members, non-closed chain members, and non-closed non-chain members. The latter two presumably pursued less risk ex ante. When we analyze retention rates and interest rates on earning assets, we generally confine ourselves to a subset of banks – specifically, as we explain further below, those for which we can reasonably estimate average interest rates on earning assets and retention rates.

The top panel of Table 5 reports data on differences in the structure of earning assets across the three types of banks. Confirming H7 and H8, closed chain banks have higher median deposits due from other banks and loans as fractions of earning assets than either non-closed chain banks or non-closed non-chain banks. Consistent with these patterns, closed chain banks maintained lower median ratios of bonds and stocks to earning assets than the other groups.

Under H7 and H8, we expect lower interest rates on earned assets and lower retention rates (defined as the percentage of earnings retained by the bank) for closed chain banks. However, prior research has not estimated interest rates on earned assets or retention rates of earnings for individual banks in the 1920s (or for any period when income statement data are unavailable) since such data are not directly reported on balance sheets. We, therefore, develop novel approaches in order to estimate them.

We start by estimating interest rates on earning assets for banks. Traditionally, a bank receives interest from earning assets, pays interest on deposits and overhead costs, and then decides whether to retain the remaining earnings on the balance sheet or pay out dividends to stockholders. So for each bank:

$$I_e*(\text{EarnAssets}) = I_d*(\text{Deposits}) + \text{Physical Costs} + \text{Dividends} + \Delta\text{Surplus}, \quad (3)$$

The balance sheet provides information on earning assets (i.e., loans, bonds and stocks, and balances due from bank), deposits, and surplus, but reports limited information on dividends (only the amount unpaid). However, if we assume that physical operational costs, dividends, and interest rates are relatively fixed for an individual bank over a short time period and there were no significant loan loss writedowns (which is likely during a boom), we can combine information from adjacent years to eliminate most of the unknown variables. Specifically, we estimate the interest rate on earning assets for any given bank in 1924 as:

$I_{e,24} = [\Delta Surplus_{24} - \Delta Surplus_{23} + I_d *(Deposits_{24} - Deposits_{23})]/(EarnAssets_{24} - EarnAssets_{23})$, (4)

Note our method for extracting information about the interest rate on earning assets can only estimate the average interest rate for all earning assets combined. It is not possible for us to say anything about interest rates earned on each category of earning assets.

Next, we examine the few banks with information on dividends unpaid. Dividends unpaid represent declared dividends that were to be paid out at a future date. Therefore, banks without any dividends unpaid could still have issued dividends earlier in the year. In addition to examining dividends unpaid, we calculate the profit retention rate for 1924 as:

$$\text{Profit Retention Rate: } (I_{e,24} - (\text{Unpaid Dividends}_{24}/\text{EarnAssets}_{24})/ I_{e,24}) , \quad (5)$$

The profit retention rate provides a measure of the amount of earnings that are being kept at the bank rather than distributed to stockholders.

As we explain further in the Appendix, to obtain a reliable measure for both interest rates and dividends, we focus on the set of 18 banks (2 closed chains, 4 non-closed chains, and 12 non-closed non-chains) whose unpaid dividends were not changing and whose balance sheet did not experience any large declines. To put it another way, for these 18 banks, we can be reasonably confident that the assumptions of the interest rate calculation are correct and that we can measure dividend behavior. Consistent with H7 and H8, the two closed chain banks had a substantially lower median interest rate on earning assets and profit retention rate.

For purposes of comparison, and under the unverifiable assumption that banks in each category had the same dividend in 1923 and 1924, we also report the implied median interest rate on earning assets for all state banks (not just the subset of 18 for which we can make informed estimates). While we place little weight on this estimate (given the absence of data about dividend payments), we find that the median interest rate on earning assets is lower for closed chain banks than for the other two categories.

6. Conclusion

We think the key aspect to the Florida story – one capable of explaining why developers, not just depositors, suffered such great losses – was the novelty of both the Florida land market and the Florida banking system. We provide evidence for this story by developing and testing eight hypotheses. Seen in Table 6, these hypotheses revolve around key aspects of the markets that allow them to function efficiently in normal periods of time. From these perspectives, the crisis is understandable from a bounded rationality perspective: people behaved reasonably, and did not invest in the information that might have produced different, better-informed behavior.

On the real estate side, Florida land had new, unique and hard-to-observe characteristics. It was hard to judge the average quality and quantity of land being developed when much of the land was away from population centers and purchased from a distance. Advertisements for Florida land were unusual, too, and this was the first time (to our knowledge) that national marketing schemes for such properties were attempted, further skewing views of Florida land quality. Furthermore, the amount of aggregate activity was not observable, which helps explain how supply could get so far ahead of potential demand. Real estate buyers, and even developers, lacked information that would have put the value of land into more realistic forecast. Consistent with Barberis et al. (2018) there is plenty of evidence that advertisements encouraged extrapolative thinking about land prices (e.g., using recent price rises to entice buyers based on the prospect of future appreciation). But given the unprecedented nature of the Florida land boom and the hard-to-observe fundamentals, extrapolative thinking was somewhat defensible.

In the banking market, novel aspects of the Manley-Anthony chain meant that depositors, who reasonably depended on their experience with other banks, were fooled by a new type of banking and bank regulatory system. Banks managed their observable risks very carefully, maintaining substantial equity and cash asset buffers and appearing to be prudently managed. Given that regulators and bank examiners did not enforce rules that would have prevented those hidden risks from insider lending, even highly informed depositors could not have known the hidden risks that ended up toppling many of those banks.

In a sense, our paper integrates two existing strands of the literature on the Florida land boom of the 1920s. On the one hand, we provide new microeconomic evidence on bank characteristics to show, consistent with Fraser and Guthrie Jr. (1995), that most Florida banks behaved in ways similar to banks in other places and other times. Specifically, they grew from a combination of retained earnings and new deposits, they maintained substantial net worth and cash asset buffers, and most did not collapse when land values declined. On the other hand, consistent with the discussion of Vickers (1994) and others, we show that some banks within the dominant Florida bank chain behaved fraudulently, purposely hiding high levels of loan risk, engaging in substantial insider lending, and even suborning their regulators.

Our study has broader methodological lessons for the study of financial crises. All crises are not alike. They should be studied not as examples of a common phenomenon, but as distinct historical phenomena. When novel investments and financing systems are undertaken for the first time, the possibilities for mistaken beliefs are much greater. Before jumping to the conclusion of irrationality of investors, it is best to start by understanding how traditional markets work and then carefully examine whether particular aspects of those are either unknown or obscured as well as whether there were incentives to investing in such a boom.

While the historical period does not have modern financial statements on which to study, we have found that a detailed examination of balance sheet information can be quite fruitful. In addition to the standard ratios used by many studies, we develop a summary composite measure of those ratios as well as new calculations to get at dividend and interest rate behavior. These measures allow us to examine different aspects of bank risk-taking behavior and can be quickly applied in most contexts.

References

Barberis, Nicholas, Robin Greenwood, Lawrence Jin, and Andrei Shleifer. "Extrapolation and bubbles." *Journal of Financial Economics* 129 (2018): 203-227.

Bekaert, Geert, Marie Hoerova, and Marco Lo Duca. "Risk, Uncertainty, and Monetary Policy," *Journal of Monetary Economics* 60 (2013): 771-88.

Bolch, Ben, Rendigs Fels, and Marshall McMahon. "Housing Surplus in the 1920's?." *Explorations in Economic History* 8 (1971): 259-283.

Brocker, Michael, and Christopher Hanes. "The 1920s American real estate boom and the downturn of the great depression: Evidence from city cross sections". In *Housing and mortgage markets in historical perspective* edited by Eugene N. White, Kenneth Snowden, and Price Fishback. Chicago: University of Chicago Press, 2014.

Calomiris, Charles W., and Mark Carlson. "Corporate governance and risk management at unprotected banks: National banks in the 1890s." *Journal of Financial Economics* 119 (2016): 512-532.

Calomiris, Charles W., Charles P. Himmelberg, and Paul Wachtel. "Commercial paper, corporate finance, and the business cycle: a microeconomic perspective." *Carnegie-Rochester Conference Series on Public Policy* 42 (1995): 203-250.

Calomiris, Charles W., and Matthew Jaremski. "Stealing deposits: Deposit insurance, risk-taking, and the removal of market discipline in early 20th-century banks." *Journal of Finance* 74 (2019): 711-754.

Calomiris, Charles W., and Charles M. Kahn. "The role of demandable debt in structuring optimal banking arrangements." *American Economic Review* (1991): 497-513.

Calomiris, Charles W., and Joseph R. Mason. "Fundamentals, Panics, and Bank Distress During the Depression." *American Economic Review* 93 (2003): 1615-47.

Calomiris, Charles W., and Andrew Powell. "Can emerging market bank regulators establish credible discipline? The case of Argentina, 1992-99." In *Prudential supervision: What works and what doesn't*, 147-196 ed. by F. Mishkin. Chicago: University of Chicago Press, 2001.

Calomiris, Charles W., and Berry Wilson. "Bank Capital and Portfolio Management: The 1930s 'Capital Crunch' and Scramble to Shed Risk," *Journal of Business* 77 (2004): 421-55.

Carey, Mark S. *Feeding the fad: the federal land banks, land market efficiency, and the farm credit crisis*. University of California, Berkeley, 1990.

Carlson, Mark, Kris Mitchener, and Gary Richardson. "Arresting banking panics: Federal Reserve liquidity provision and the forgotten panic of 1929." *Journal of Political Economy* 119 (2011): 889-924.

Cortes, Gustavo S., and Marc D. Weidenmier. "Stock volatility and the Great Depression." *Review of Financial Studies* 32 (2019): 3544-3570.

Committee on Branch, Group, and Chain Banking, 1935-. *Banking Groups and Chains.* (1932) https://fraser.stlouisfed.org/title/798.

Field, Alexander James. "Uncontrolled land development and the duration of the Depression in the United States." *Journal of Economic History* 52 (1992): 785-805.

Frazer, William Johnson, John J. Guthrie, and John Guthrie. *The Florida Land Boom: Speculation, Money, and the Banks*. Westport, CT: Quorum Book, 1995.

Galbraith, John K., *The Great Crash, 1929*. Boston, Houghton Mifflin, 1955.

Garber, Peter M. "Tulipmania." *Journal of Political Economy* 97 (1989): 535-560.

Garber, Peter M. *Famous first bubbles: The fundamentals of early manias*. MIT Press, 2000.

Gordon, Robert A. "Cyclical experience in the interwar period: The investment boom of the twenties." In *Conference on Business Cycles*, pp. 163-224. NBER, 1951.

Gorton, Gary, and George Pennacchi. "Financial intermediaries and liquidity creation." *Journal of Finance* 45 (1990): 49-71.

Greenwood, Robin, Andrei Shleifer, and Yang You. "Bubbles for Fama." *Journal of Financial Economics* 131 (2019): 40-43.

Haines, Michael R. *Historical, Demographic, Economic, and Social Data: The United States, 1790-2000*. ICPSR Study 2896. Ann Arbor, MI: Inter-university Consortium for Political and Social Research, 2004.

Horvitz, Paul M. "The Collapse of the Texas Thrift Industry: Causes of the Problem and Implications for Reform". *Restructuring the American Financial System*, 95-116 edited by George G. Kaufman. Hingham, MA: Kluwer Press, 1990.

Jaremski, Matthew, and David C. Wheelock. "Banking on the boom, tripped by the bust: Banks and the World War I agricultural price shock." *Journal of Money, Credit and Banking* 52 (2020): 1719-1754.

Jaremski, Matthew. 2018. "The (Dis)Advantages of Clearinghouses Before the Fed" *Journal of Financial Economics* 127 (2018): 435-458.

Kabiri, Ali. 2015. *The Great Crash of 1929: A Reconciliation*. Palgrave MacMillan.

Kindleberger, Charles P., and Robert Z. Aliber. *Extraordinary Manias, Panics and Crashes: A History of Financial Crises*. Wiley, 2011.

Knowlton, Christopher. *Bubble in the Sun: The Florida Boom of the 1920s and how it Brought on the Great Depression*. Simon & Schuster, 2021.

Martinez Peria, Maria Soledad, and Sergio L. Schmukler. "Do depositors punish banks for bad behavior? Market discipline, deposit insurance, and banking crises." *Journal of Finance* 56 (2001): 1029-1051.

Minsky, Hyman P. "Financial resources in a fragile financial environment." *Challenge* 18 (1975): 6-13.

Minnesota Population Center. (2004) *National Historical Geographic Information System: Pre-release Version 0.1*. Minneapolis, MN: University of Minnesota.

Mormino, Gary R. *Land of Sunshine, State of Dreams: A Social History of Modern Florida.* Gainesville, FL.: University Press of Florida, 2005.

Nicholas, Tom. "Does innovation cause stock market runups? Evidence from the great crash." *American Economic Review* 98 (2008): 1370-96.

Sessa, Frank B. "Anti-Florida Propaganda and Counter Measures During the 1920s." *Tequesta* 21 (1961): 41-51.

Temin, Peter, and Hans-Joachim Voth. *Prometheus shackled: goldsmith banks and England's financial revolution after 1700*. Oxford University Press, 2013.

Turner, Gregg. *The Florida Land Boom of the 1920s*. Jefferson, NC: McFarland and Co, 2015.

Vanderblue, Homer B. "The Florida land boom." *Journal of Land & Public Utility Economics* 3 (1927): 252-269.

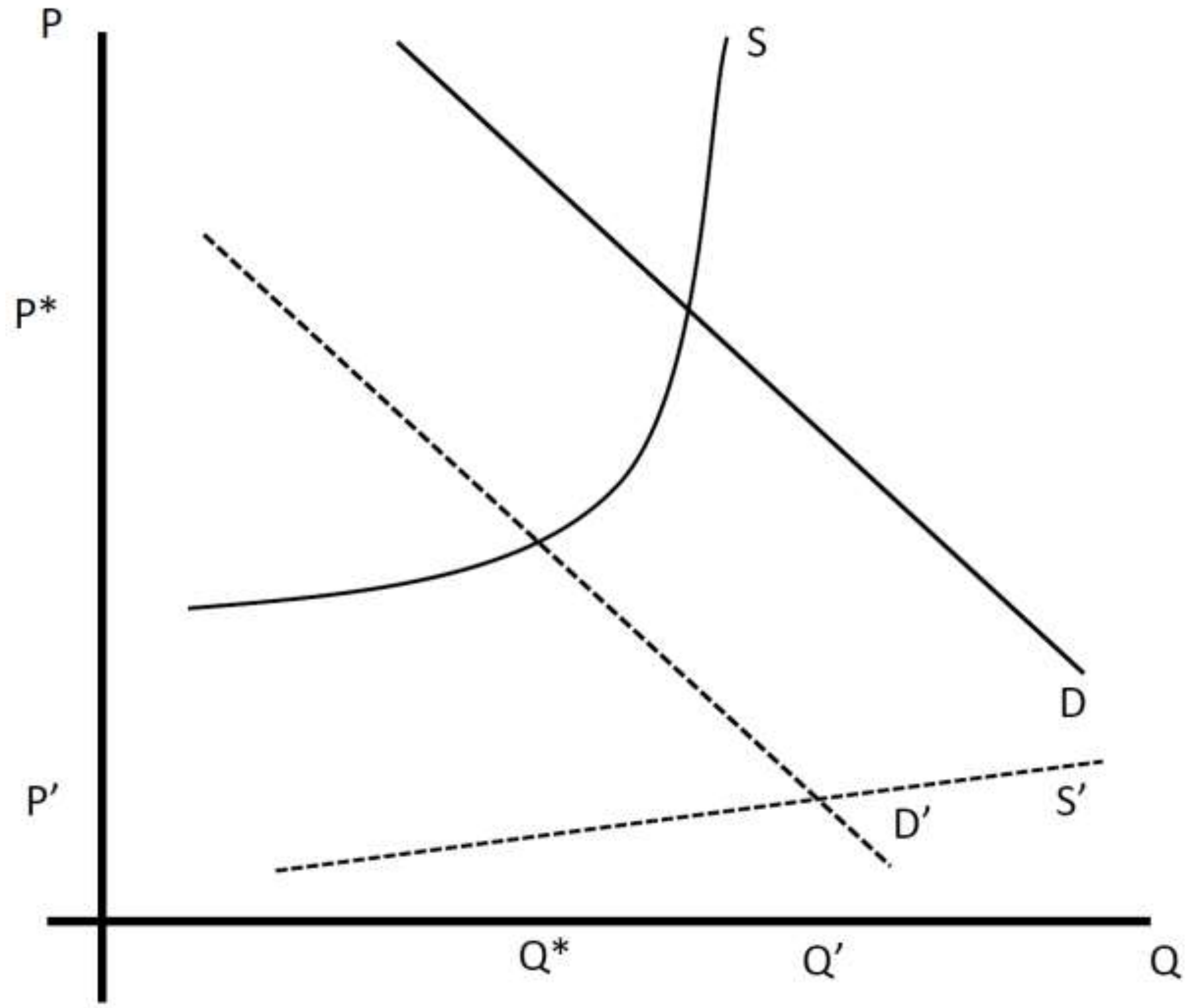
Vickers, Raymond B. *Panic in paradise: Florida's banking crash of 1926*. University of Alabama Press, 1994.

Villard, Henry S. "Florida Aftermath." *The Nation* 6 (1928).

Wheelock, David C., and Paul W. Wilson. "Why do banks disappear? The determinants of US bank failures and acquisitions." *Review of Economics and Statistics* 82 (2000): 127-138.

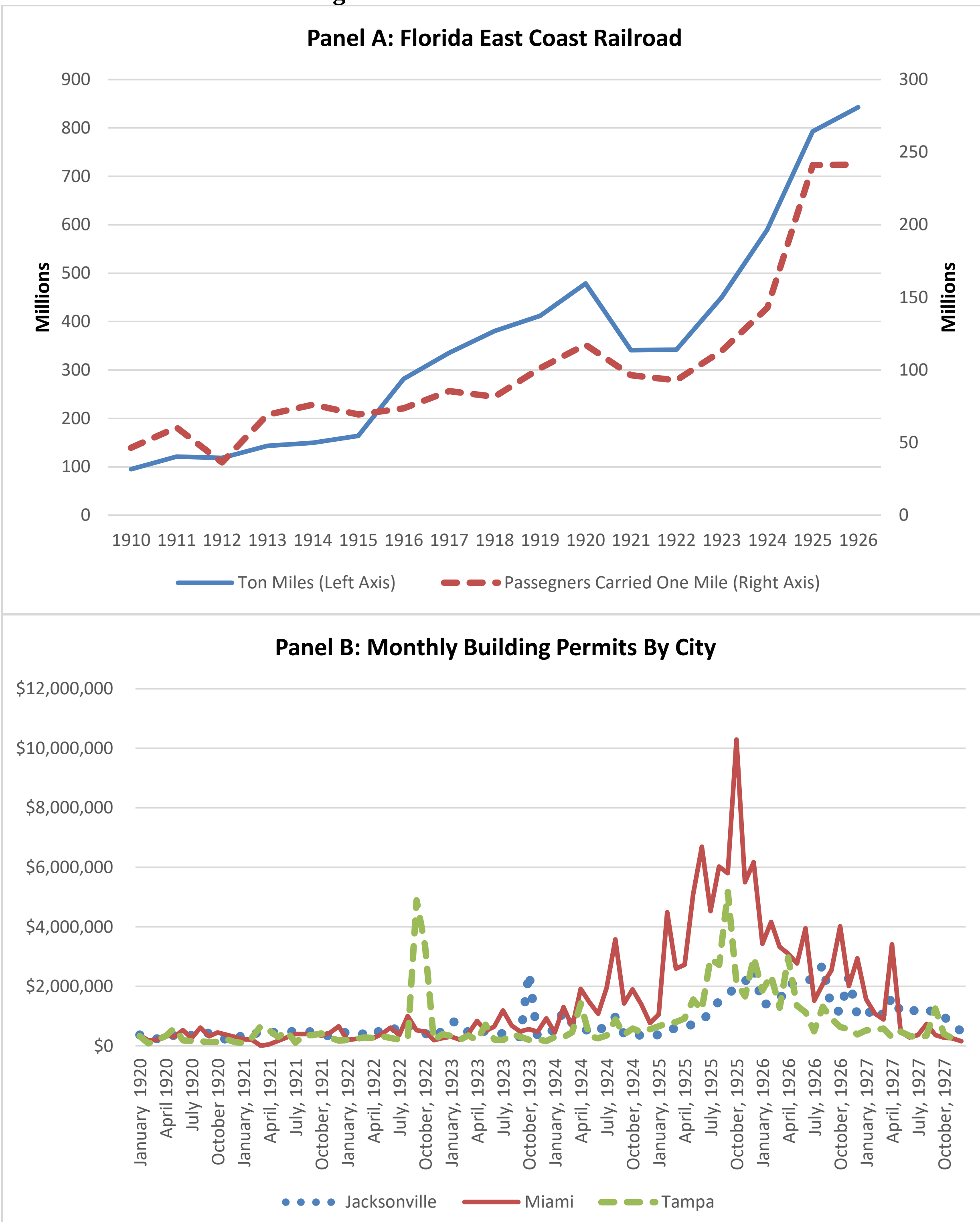
White, Eugene N. "Lessons from the Great American Real Estate Boom and Bust of the 1920s." In *Housing and mortgage markets in historical perspective* edited by Eugene White, Kenneth Snowden, and Price Fishback. Chicago: University of Chicago Press, 2014.

Figure 1: Market for Real Estate



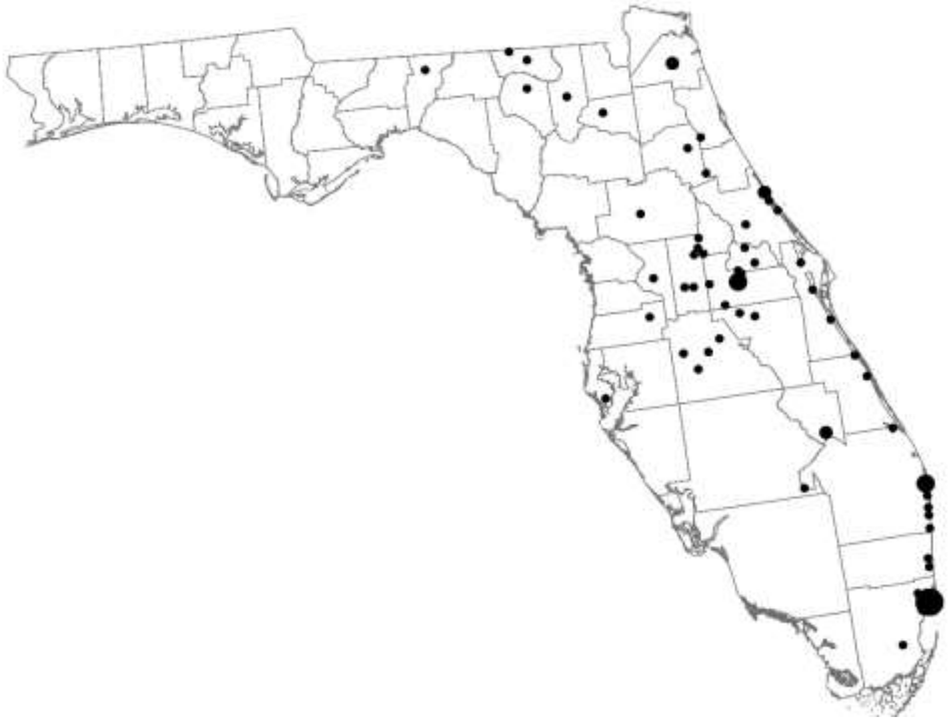
Notes: Figure provides the market for land described in Section 2.1.

Figure 2: Florida Growth Statistics



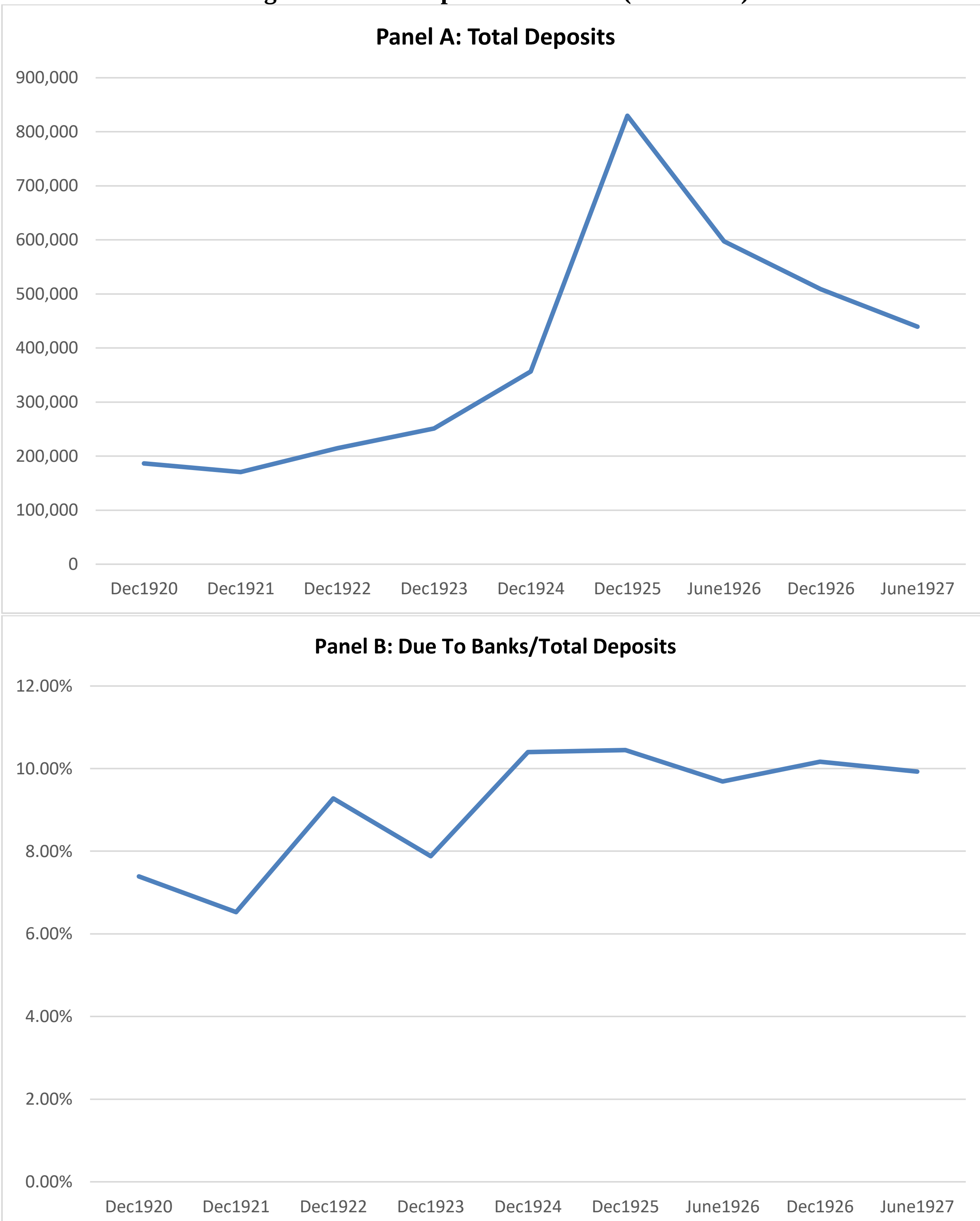
Notes: Panel A provides information on freight and passengers on the Florida Estate Coast Railroad. Information from Vanderblue (1927, Table 1). Panel B provides the value of building permits per month by city. Data from Cortes and Weidenmeir (2019).

Figure 3: Manley-Anthony Chain Members in Florida



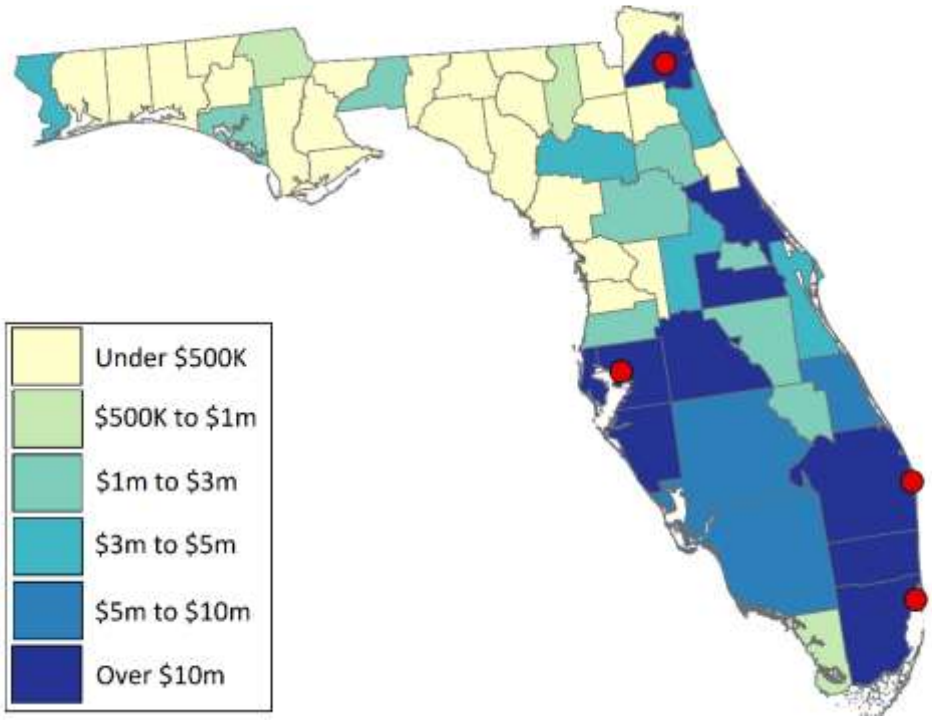
Notes: Figure provides the locations of each member of the Manley-Anthony chain. The dots size denotes the number of members in the location. Boundaries were obtained from Minnesota Population Center (2004).

Figure 4: Bank Deposits in Florida (1920-1927)



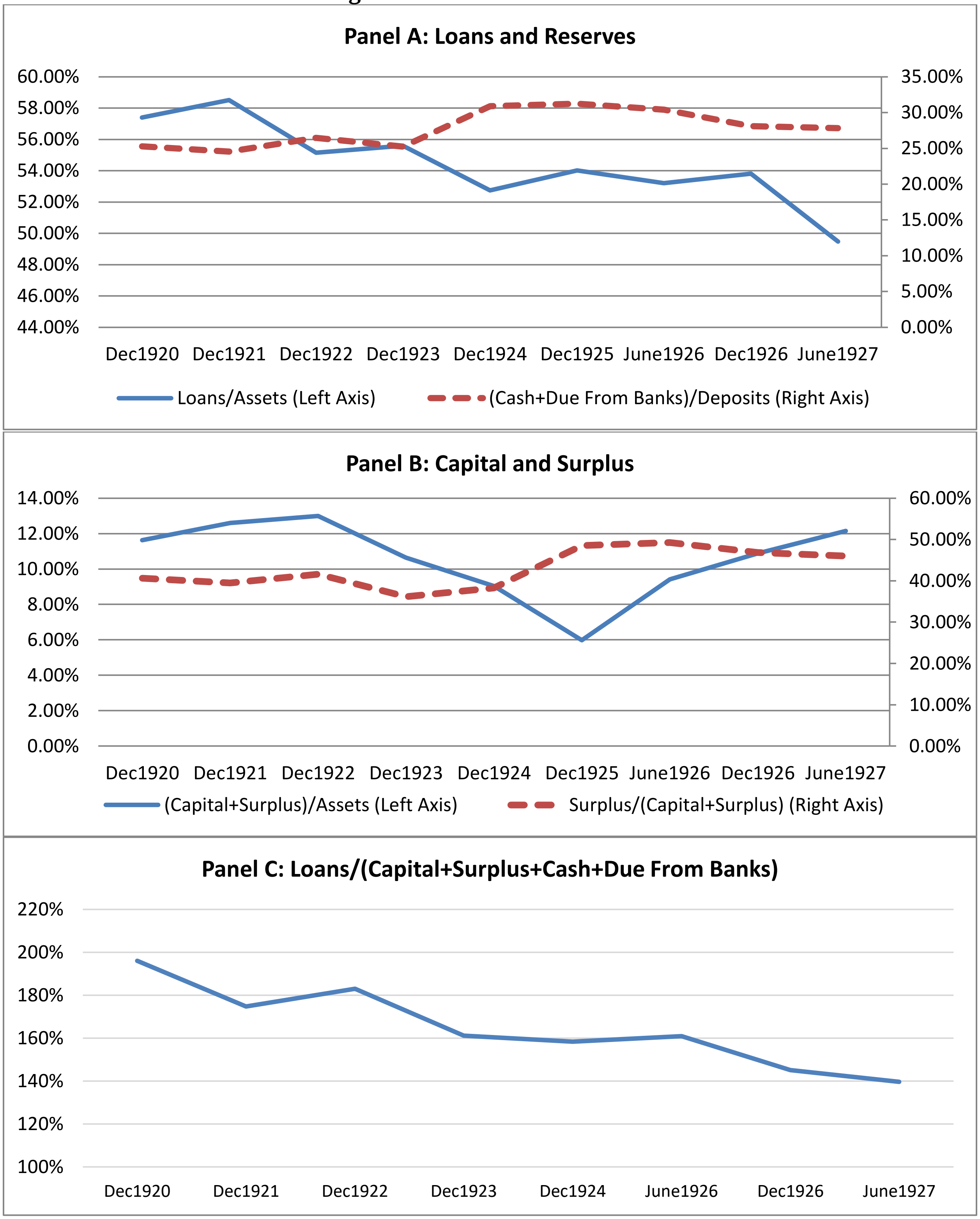
Notes: Figure provides the nominal value of commercial bank deposits in Florida. Information from national banks are from the Comptroller of the Currency's *Annual Report* and information from state banks are from Florida's Comptroller's *Annual Report*.

Figure 5: Change in Total Bank Deposits - 1924 - 1925



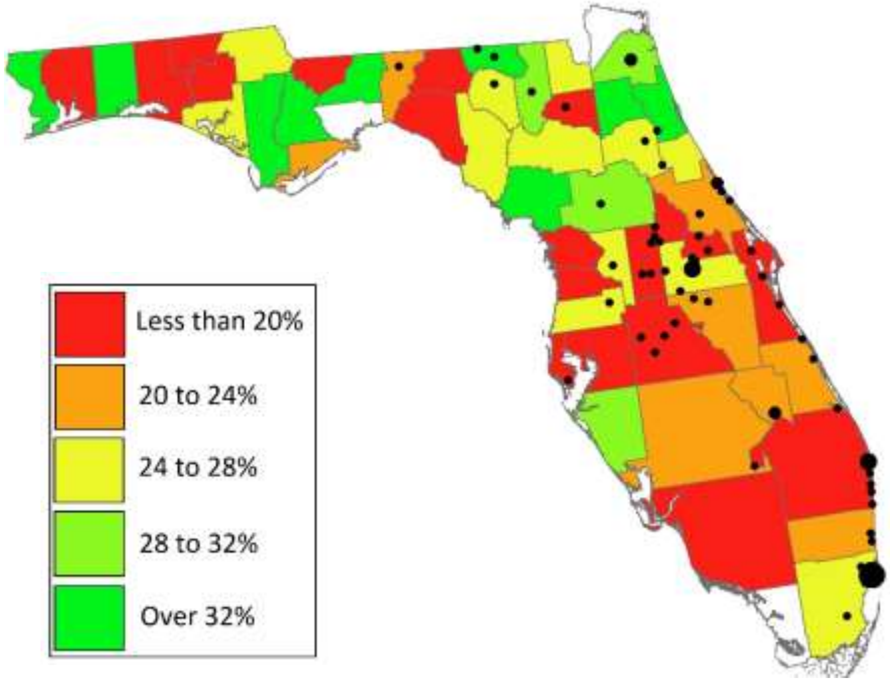
Notes: Figure provides the nominal change in total deposits of commercial banks December 1924 to December 1925/January 1926. Information from national banks are from the Comptroller of the Currency's *Annual Report*, information from state banks are from Florida's Comptroller's *Annual Report* in 1924 and from *Rand McNally Bankers Directory* for January 1926. Boundaries were obtained from Minnesota Population Center (2004).

Figure 6: Balance Sheet Ratios



Notes: Figure provides the nominal value of the described balance sheet ratio in Florida. Information from national banks are from the Comptroller of the Currency's *Annual Report* and information from state banks are from Florida's Comptroller's *Annual Report*.

Figure 7: Real Estate Loans/ Total Loans in 1926



Notes: Figure provides ratio of real estate loans to total loans in state bank by county in 1926. The dots denote the number of chain members in that location. Information are from Florida's Comptroller's Annual Report in 1926. Boundaries were obtained from Minnesota Population Center (2004).

Table 1: Summary Statistics in 1924 for State Banks By Chain Status

	Non-Chain Members			Chain Members		
	All	Surviving 1926	Closed or Suspended in 1926	All	Surviving 1926	Closed or Suspended in 1926
# of Banks	187	180	7	54	24	30
Fraction Closed or Suspended in 1926	3.9%	0.0%	100.0%	55.6%	0.0%	100.0%
Due To Banks/Assets	1.0%	1.0%	0.2%	1.4%	2.2%	0.7%
Fraction Any Due To Banks	13.9%	13.9%	14.3%	27.8%	37.5%	20.0%
Fraction Any Bills Payable	25.1%	23.9%	57.1%	25.9%	33.3%	20.0%
Bills Payable/Assets	2.1%	1.9%	5.5%	1.9%	2.4%	1.5%
Loans/Assets	57.9%	57.6%	64.8%	57.4%	57.1%	57.6%
Cash+Duefrom/Total Deposits	32.1%	32.5%	20.1%	33.3%	32.0%	34.3%
Capital + Surplus/ Assets	14.7%	14.6%	17.6%	10.9%	9.9%	11.6%
Surplus/Capital+Surplus	30.1%	30.7%	14.1%	27.1%	31.1%	23.9%
Loans-to-Buffer	161.6%	159.0%	226.8%	166.8%	177.1%	158.5%
Due from Banks/(Cash + Due from Banks)	78.1%	78.4%	70.3%	79.5%	80.2%	79.0%
Ln(Assets)	10.6	10.6	10.0	10.9	11.3	10.6

Notes: Table provides the summary statistics of the groups of state banks provided in the column headings as of December 1924. With the exception of the number of banks, means are provided for all the variables. Surviving is denoted as whether the bank did not suspend or close during 1926.

Table 2: Determinants of Florida State Bank Closure During Bust

	Closed or Suspended Before December 1926		Not Open in December 1926		Closed or Suspended by July 1927	
	(1)	(2)	(3)	(4)	(5)	(6)
Chain Bank	0.546***	0.546***	0.204***	0.206***	0.568***	0.564***
	[0.068]	[0.067]	[0.057]	[0.059]	[0.076]	[0.076]
Ln(Assets) in 1924	-0.035*	-0.029*	-0.024	-0.022	-0.002	-0.018
	[0.021]	[0.016]	[0.018]	[0.016]	[0.031]	[0.023]
Loans/Assets in 1924	0.192		0.022		0.259	
	[0.244]		[0.223]		[0.282]	
(Due from Banks + Cash)/ Total Deposits in 1924	-0.025		0.001		0.219	
	[0.244]		[0.219]		[0.283]	
Due from Banks/(Cash + Due from Banks) in 1924	-0.046		-0.170		-0.406*	
	[0.146]		[0.141]		[0.211]	
(Capital+ Profits)/ Assets in 1924	-0.139		-0.189		0.172	
	[0.274]		[0.235]		[0.424]	
Any Bills Payable in 1924	-0.039		-0.005		-0.073	
	[0.048]		[0.040]		[0.056]	
Loans-to-Buffer		0.024		0.020		0.010
		[0.031]		[0.023]		[0.035]
County-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	241	241	241	241	241	241
R-squared	0.394	0.391	0.133	0.129	0.335	0.319

Notes: The table presents the coefficients from the linear probability model in equation (1). Each observation is a bank in December 1924. The dependent variable is provided in the column headings. "County Controls" includes the logarithm of population, the fraction of the county's population that lived in an urban area, the value of crops per square mile, the value of manufacturing output per square mile, and the logarithm of the value of farms per square mile. Standard errors clustered across all banks in a city are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table 3: Effect of Manley-Anthony Chain on Loan Types (1926)

	Real Estate Loans/Assets	Loans on Other Collateral/ Assets	Other Loans/Assets	Real Estate Loans/Total Loans	Loans on Other Collateral/ Total Loans	Other Loans/Total Loans
	(1)	(2)	(3)	(4)	(5)	(6)
Chain Bank	-0.036**	0.043**	0.020	-0.083***	0.065**	0.018
	[0.015]	[0.019]	[0.018]	[0.025]	[0.027]	[0.027]
County-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	256	256	256	256	256	256
R-squared	0.047	0.060	0.077	0.075	0.063	0.067

Notes: Table presents the estimated coefficients of the cross-sectional Ordinary Least Squares regression described in equation (2). Each observation is a bank in 1926. The column heading provides the outcome variable. "Chain" is an indicator for whether the bank was a member of the Manley-Anthony Chain. "County Controls" includes the logarithm of population, the fraction of the county's population that lived in an urban area, the value of crops per square mile, the value of manufacturing output per square mile, and the logarithm of the value of farms per square mile. Standard errors clustered across all banks in a location are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table 4: Determinants of Florida State Bank Closure During Bust - By Membership Status

	Closed or Suspended Before December 1926			
	Non-Chain Members		Only Chain Members	
	(1)	(2)	(3)	(4)
Ln(Assets) in 1924	-0.001	-0.009	-0.153*	-0.154**
	[0.014]	[0.011]	[0.081]	[0.059]
Loans/Assets in 1924	-0.187		1.787	
	[0.183]		[1.074]	
(Due from Banks + Cash)/ Total Deposits in 1924	-0.369*		1.085	
	[0.194]		[1.026]	
Due from Banks/(Cash + Due from Banks) in 1924	0.001		-0.290	
	[0.086]		[0.772]	
(Capital+ Profits)/ Assets in 1924	-0.035		-0.119	
	[0.172]		[1.614]	
Any Bills Payable in 1924	0.052		-0.229	
	[0.038]		[0.199]	
Loans-to-Buffer		0.050**		-0.069
		[0.025]		[0.110]
County-Level Controls	Yes	Yes	Yes	Yes
Observations	187	187	54	54
R-squared	0.119	0.102	0.331	0.276

Notes: The table presents the coefficients from the linear probability model in equation (1). Each observation is a bank in December 1924. The dependent variable is an indicator for whether the bank closed or suspended by December 1926. "County Controls" includes the logarithm of population, the fraction of the county's population that lived in an urban area, the value of crops per square mile, the value of manufacturing output per square mile, and the logarithm of the value of farms per square mile. Standard errors clustered across all banks in a city are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table 5: Estimated Dividends and Interest Rates For Subsample Banks

	All State Banks		
	Non-Chain	Non-Closed Chain	Closed Chain
# of Banks	180	24	30
Loans/Earning Assets (p25)	57.70%	53.02%	57.62%
Loans/Earning Assets (p50)	66.09%	65.81%	68.70%
Loans/Earning Assets (p75)	73.95%	77.65%	73.44%
Due from Banks/Earning Assets (p25)	14.44%	16.01%	18.55%
Due from Banks/Earning Assets (p50)	22.06%	23.77%	26.69%
Due from Banks/Earning Assets (p75)	31.34%	31.93%	35.62%
Bonds and Stocks/Earning Assets (p25)	4.76%	3.39%	1.05%
Bonds and Stocks/Earning Assets (p50)	8.07%	8.68%	5.86%
Bonds and Stocks/Earning Assets (p75)	15.76%	12.15%	9.38%
Unreliable Interest Rate Estimate (Median)	2.89%	3.55%	2.78%
	State Banks With Same Unpaid Dividends 1923 & 1924		
	Non-Chain	Non-Closed Chain	Closed Chain
# of Banks	12	4	2
Interest Rate Estimate (Median)	4.91%	4.34%	1.63%
Unpaid Dividends/Capital (Median)	4.63%	3.06%	4.50%
Unpaid Dividends/Earning Assets (Median)	0.29%	0.09%	0.43%
Profit Retention Rate (Median)	95.93%	97.70%	68.84%

Notes: Table provides the sample statistics listed for various samples of state banks. See section 4.5 of description of the variables.

Table 6: Empirical Hypotheses On Florida Land Boom

Description	Confirmed By:
H1: Information about the quality of land being developed was hard to determine	Narrative and limited public data availability
H2: Information about the quantity of land being developed relative to the potential quantity of developable land was hard to determine	Narrative, newspaper advertisements, and endogenous land supply
H3: Information about the long-run demand for land, conditional on its quality, was hard to determine	Narrative and limited public data availability
H4: Banks on average during the boom maintained apparently similar (or safer) balance sheet ratios as they had before	Balance sheet data
H5: Any changes to the traditional covenants used by banks would have been unobservable	Examination practices and loan data
H6: Bank regulators and those tasked with observing bank risk-taking must have allowed risk-taking to take place	Data on loan practices and types
H7: Chain membership in the chain increased market opportunities to fund a bank's own insider lending	Chain failure rate, earning asset composition, and interest rates and dividend payouts
H8: Chain membership increased the potential for risk-taking banks to fund risky insider loans originated by other chain bank members	Chain failure rate, earning asset composition, and interest rates

Notes: Table provides a list of the paper's hypotheses and how they were confirmed.

Online Appendix for "Florida (Un)Chained"

Appendix A: Discussion of the Loans-to-Buffer Measure

Over the land boom, Florida's banks displayed (on average) a small increase in their cash-to-loans ratio and a small decrease in their equity-to-loans ratio. How can one combine these two changes (which have opposite implications for changes in deposit risk) into a single measure of the change in depositor loss risk? In Section 5.2, we describe and make use of a new measure of observable bank risk: the loans-to-buffer ratio (i.e., loans divided by the sum of cash assets and equity). This Appendix shows that the loans-to-buffer ratio provides a useful (but not perfect) single measure of depositor loss risk that combines the effects of loans, cash, and equity.

To motivate our measure, we use a simple model of a bank that holds risky, interest-earning assets (loans) and riskless cash assets. The bank funds its acquisitions of these assets by a combination of equity and debt. The expected loss to depositors comes entirely from possible loan losses. For a given amount of loans being intermediated, the bank can limit prospective losses for depositors by issuing more equity or by holding a greater proportion of cash assets.

Using this model, we perform three related analyses. We first verify the implicit assumption in using the loans-to-buffer ratio (i.e., that for a given amount of risk in the risky assets on the balance sheet, a dollar more cash held by the bank is similar in its effect on depositor loss risk to a dollar more equity financing). By similar, we mean that a bank that increases cash by a small amount and reduces equity by that same amount experiences little change in depositor expected loss as a consequence of a given asset risk.

Second, we use our model to consider whether the actual declining average loan-to-buffer ratio and increasing average cash-to-equity ratio observed on average for Florida banks in the early 1920s was associated with a change in depositor expected loss. As our first analysis shows, a bank maintaining a constant loan-to-buffer ratio combined with a rising ratio of cash-to-equity, would experience a small increase in depositor expected loss (if loan portfolio loss risk were unchanged). But the actual loan-to-buffer ratios in Florida declined. Here we investigate whether that decline more than offset the substitution of cash for equity within the buffer.

Third, and finally, we investigate a richer model of expected depositor loss – one that considers how the mix of cash vs. equity might systematically affect the asset risk of the bank in the future. To be clear, unlike the prior analysis, in this third part of our analysis, the level of asset risk is not assumed to be given, but may change in the future.

Equity and Cash Similarly Reduce Expected Depositor Loss for a Given Level of Asset Risk

With respect to our first exercise, for illustrative purposes and without loss of generality, we consider three examples of banks with identical loan portfolios. Each of these banks makes $100,000 in risky loans. Each bank maintains a combined "buffer" (the sum of the cash assets it holds and the equity it issues to fund itself) of $40,000 alongside the $100,000 of loans. Bank 1 holds $15,000 in cash assets and issues $25,000 in equity. Bank 2 holds $20,000 in cash and issues $20,000 in equity. Bank 3 holds $25,000 in cash and issues $15,000 in equity. As displayed in the top panel of Table A.1, although all three banks have a loan-to-buffer ratio of 100/40, their ratios of equity to loans, like their ratios of cash to loans, range from 15/100 to 25/100. This range of difference in the mix of cash and equity within the buffer conservatively assumes that both cash and equity could be as low as 15% of loans; within our sample, the average of Florida banks is higher in all years.

We assume the distribution function of loan risk is discretized as follows: a 2% chance of a 30% loan loss; a 3% chance of a 20% loan loss; a 5% chance of a 10% loan loss, and a 90% chance of less than a 10% loan loss. These possibilities of loss are extreme. At the time, it would not have been expected for a bank to have a loan portfolio consisting entirely of real estate loans, and standard practice for the loan-to-value limits for real estate loans were more conservative than today (e.g., limits under two-thirds). A 30% decline in loans would be difficult to imagine, even for a bank making only real estate loans. For such a bank, land values would have to fall by more than 50% for it to sustain a 30% decline in the value of its portfolio.

Table A.1 computes the expected depositor loss rate in basis points in each bank, defined as the probability of a loss (in each loss state) multiplied by the loss given default in that loss state. Note that the expected losses are quite similar across the banks, but that the banks with more equity tend to have slightly lower expected loss. The expected losses range from 11 basis points at Bank 1 to 41 basis points of expected loss at Bank 3 (for Bank 2, the expected loss is 20 basis points). Even with a risk premium that increases with expected loss, the total implied maximum spread differences on deposits would remain very similar across the banks (i.e., each implying loss risks generally associated with a "single A" credit rating). We conclude from this exercise that the loan-to-buffer ratio is a useful simple measure of depositor loss risk for a banking system where the variation over time in the average reliance on cash vs. equity is similar to or smaller than that assumed in our example (as was the case in Florida).

In summary, we have shown, first, that the loan-to-buffer ratio provides a useful, but not perfect, summary statistic for measuring depositor loss risk of a bank's observable balance sheet ratios. Further, it is important to note that our assumptions bias the results towards finding depositor losses. First, loan to value restrictions and collateral requirements would have made 30% (and even 20%) declines very rare. Second, the assumption that the bank's only earning asset was loans instead of considering the inclusion of securities in the portfolio (which tended to have low risk) increases the default risk of deposits. Securities averaged 10% of assets in 1922 and 9% of assets in 1924. Typically, these consisted of a diverse portfolio of government and other highly rated corporate bonds sold on a national market, which had small potential loss and their risk of loss would likely have had a small positive covariance with Florida loan loss risk. Hickman (1958) shows that realized returns on a portfolio of bonds were roughly equal to yield at issue, even for the period including the Great Depression, and there was virtually no difference between the two for investment-grade bonds, implying very little expected portfolio loss, even for a nationwide severe recession. In a state of the world where Florida land values would fall dramatically, this diverse national portfolio would be expected to preserve most, if not all of its value. To be concrete, suppose securities equal to 10% of assets were added to our examples above, and suppose that the portfolio fell to 95% of its original value in all three states of the world in which severe loan losses occurred (in all states of the world where loan losses were 10% or more), and otherwise retained their full value. This variant of our simulation of expected depositor loss would increase the initial balance sheet by 10% on the asset side (consisting of securities) and by the same dollar amount of deposits on the liability side. The implied expected loss for depositors previously for the three banks reported in Table A.1 would be nearly identical but would display a slightly tighter range (from 11 to 38 basis points).

Third, historically, bank stockholders were subject to double liability that would have increased the capital buffer beyond that implied by the paid in capital amount, resulting in smaller expected losses for all banks (especially those relatively reliant on equity as a buffer). Double liability, which was typical, applied to paid in capital, not to surplus, and did not imply a doubling of expected paid in capital in a bank distress state, as the receiver of the bank would have to locate and assess all bank stockholders, and they would have to have sufficient wealth in the bank distress state to be collected by the receiver. Goldenweiser et al.'s (1932, p. 107) review of recoveries from receivers suggests that in the 1920s, it would have been reasonable to expect only a small fraction (34%) of additional capital could have been collected by a receiver. Arguably, during the Florida land boom, it would have been expected that a collapse in land values and loan values would have been associated with even lower assessable wealth of bank stockholders by receivers. Therefore, the contribution of double liability to bank stability in the event of a large local loan value decline (like the Florida land bust) might have been expected to be similar or even smaller.

Assuming Given Asset Risk, Did Expected Depositor Losses Rise in the Early 1920s

Now we turn to the question of whether Florida's banks, which displayed a reduction in the loan-to-buffer ratio and an increase in the reliance on cash within the buffer, saw any material change in their risk of depositor loss (for an unchanging distribution function of loan loss). On average, from 1922 to 1924, cash-to-loans rose from roughly 45% to 52%, while equity-to-loans ratio fell from roughly 28% to 25%. We illustrate that change at a hypothetical bank in Figure A.2. Specifically, we compute the expected depositor losses of the average Florida bank in 1922 and 1924 in Table A.2.

We find that, under our loan loss distribution assumptions, the average Florida bank's expected depositor loss rose only slightly from 3 basis points in 1922 to 8 basis points in 1924, which are both generally consistent with a double-A rating. As such, the example shows that actual Florida banks were more conservative than those in our example, and maintained a small and essentially constant average expected loss risk for depositors from 1922 to 1924. Of course, these calculations are based on banks' observable characteristics, under the expectation that the banks were not lending without proper collateral or committing fraud, and that examiners were doing their job to ensure that banks were doing so.

Cash Can Be Superior for Limiting Future Increases in Asset Risk

In the first part of this analysis, we showed that, for a given level of asset risk, a dollar more of equity is slightly better than a dollar more of cash from the perspective of depositors' expected loss. However, when asset risk is allowed to vary over time, higher cash can have an additional role in limiting depositor loss, because it can be more effective than equity for discoursing banks to voluntarily undertake increases in asset risk. This can happen for two reasons. First, there is a moral hazard problem in bank risk taking related to limited liability that can cause loan risk to rise. When banks experience a large loss, they may unobservably increase loan risk to increase the value of the put option implicit in their deposit funding under limited liability. As Calomiris et al. (2017) show, higher cash reserves lower the upper bound on the potential losses of depositors from the bank's loan losses, which discourages banks that have suffered loan losses from unobservably increasing their loan portfolio's riskiness (to increase the value of the put option implicit in their deposit contracts). A dollar more of equity is not as powerful as a dollar more of cash for discouraging this moral-hazard play because a dollar more of equity does not lower the upper bound on depositor losses from loan risk.

Second, a greater reliance on cash can make it easier for banks to adjust to withdrawals of deposits that may result from deteriorating market conditions (e.g., increased risk of loan loss); banks that hold cash can use it to repay withdrawing deposits in lieu of selling risky assets. This can help a bank avoid liquidating risky assets at fire sale prices. The potential disruptions of such illiquidity episodes contribute to potential loan losses (as banks may be forced to liquidate loans at fire sale prices), and therefore, to greater ex ante expected depositor loss.

Both of these influences imply that a dollar of cash is superior to a dollar of equity from the perspective of limiting future increases in depositor expected loss that can arise from deteriorating market conditions (loan losses). Thus, even though the prior sections of this Appendix showed that a dollar of equity is slightly superior to a dollar of cash from the perspective of limiting expected depositor losses *for a given loan portfolio value and a given amount of loan risk*, a dollar more of cash is superior a dollar more of equity for limiting increases in risk related to changing market conditions.

Overall, taking into account both initial loan risk and prospective changes in loan risk related to changing market conditions, we conclude that cash and equity have similar and roughly equal effects in limiting expected depositor loss.

References

Calomiris, Charles W., Florian Heider, and Marie Hoerova "A Theory of Bank Liquidity Requirements." Columbia University Working Paper, 2017.

Goldenweiser, E.A., et al. *Bank Suspensions in the United State, 1892-1931*. Material prepared for the information of the Federal Reserve System by the Federal Reserve Committee on Branch, Group, and Chain Banking, 1932.

Hickman, W. Braddock. *Corporate bond quality and investor experience*. *NBER Books*, 1958.

Table A1: Example Banks and Expected Losses

Panel A: Example Bank Balance Sheets

Bank 1		**Bank 2**		**Bank 3**	
$100 Loans $15 Cash	$90 Deposits $25 Capital	$100 Loans $20 Cash	$100 Deposits $20 Capital	$100 Loans $25 Cash	$110 Deposits $15 Capital

Panel B: Expected Losses to Depositors

	30% Loss	**20% Loss**	**10% Loss**	**Expected Loss Total**
Bank 1	5.56%	0.00%	0.00%	11
Bank 2	10.00%	0.00%	0.00%	20
Bank 3	13.64%	4.55%	0.00%	41

Notes: See discussion in Appendix A.

Table A2: Example Florida Banks and Expected Losses

Panel A: Example Bank Balance Sheets

Avg. Florida Bank in 1922		**Avg. Florida Bank in 1924**	
$100 Loans	$117 Deposits	$100 Loans	$127 Deposits
$45 Cash	$28 Capital	$52 Cash	$25 Capital

Panel B: Expected Losses to Depositors

	30% Loss	**20% Loss**	**10% Loss**	**Expected Loss Total**
Avg. Bank in 1922	1.71%	0.00%	0.00%	3
Avg. Bank in 1924	3.94%	0.00%	0.00%	8

Notes: See discussion in Appendix A.

Appendix B: Calculating Interest on Earning Assets

As discussed in Section 5.4, we develop a new technique by which to estimate bank-level interest rates on earning assets. This section discusses and defends its various assumptions.

To calculate interest rates on earning assets in 1924, we begin by noting (as in equation 3 in the main text) the relationship between the capital accounts that appear on the balance sheet (which we observe for Florida banks) and the various sources of revenues and cost that appear on the income statement (which we do not observe for Florida banks). Banks' revenues during this period almost entirely consist of interest income. For banks that are not experiencing write downs of loan losses (and we assume that during a boom, loan losses are near zero), the main expenses are interest cost on deposits and physical costs of running the bank. Interest earnings less interest expense and physical expense, therefore, should be equal to net earnings. Net earnings that are not paid out as dividends are retained earnings, which increase the bank's "surplus" on the balance sheet.

It is useful to note that interest revenues are the product of the average interest rate on earning assets (I_e) and the total amount of earning assets (EarnAssets), and that the interest paid on deposits is equal to the product of the average interest rate paid on deposits (I_d) and the total amount of deposits (Deposits). Subtracting 1923 values from 1924 values, we arrive at the following expression:

$$I_{e,24} * EarnAssets_{24} - I_{e,}23 * EarnAssets_{23} = \Delta Surplus_{24} - \Delta Surplus_{23} + I_{d,24} * Deposits_{24} - I_{d,23} * Deposits_{23} + Dividends_{24} - Dividends_{23} + Physical\ Costs_{24} - Physical\ Costs_{23}, \quad (A1)$$

To calculate interest rates on earning assets for each individual bank, we assume that each bank's interest rates, and physical costs are similar in 1923 and 1924. With respect to dividends, in some calculations we assume that dividends are the same in the two years, and in other calculations, we confine the sample to banks for which we believe there is evidence that dividends were the same in the two years (as discussed further below).

First, prior historical studies show that interest rates on deposits tended to be highly stable over short periods of time. For the calculations in the text, we assume that all banks paid 2% interest on deposits. The choice of 2%, however, does not bias the results as other values (e.g., 1% or 3%) yield a similar sorting between bank types as that reported in Table 5.

Second, the balance sheet data that are sometimes observed for the category "dividends unpaid" suggest that relatively few banks changed their dividends over the period. Of the Florida banks that list dividends unpaid, about 60% had the same dividend payout rate in 1923 and 1924. Of the remaining banks, about half increased their dividend and half decreased them. Importantly, the average dividend change is approximately zero when looking at all state banks or when isolating chain banks or non-chain banks. To purge any potential for dividend changes to drive the differences between bank types, our preferred sample of 18 banks contains only those banks whose dividend payout ratio was constant over the two years.

Third, the assumption of no large changes to costs seems reasonable given historical precedent. Most of the larger costs for banks were for physical capital (i.e., their bank building and furniture/fixtures). We, therefore, restrict the sample to banks that did not experience declines in earning assets or surplus that would signal the bank was spending more money on physical capital.