The Costs of Financial Crises in the United States*

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Abstract

Using a newly-constructed panel dataset of U.S. states from 1863 to 2022 that combines bank balance sheets, real economic activity, and a systematic survey of all major chronologies of U.S. financial crises, we document the following facts: (i) financial crises are followed by a 6% decline in state-level output, (ii) output losses vary substantially across states, (iii) the severity of output losses is predictable with local contractions in deposits or wholesale liabilities, and with the incidence of bank failures, (iv) a composite measure of local financial distress, combining narrative evidence with statistical indicators, predicts state-level output losses of 3%, and (v) the share of states experiencing local financial distress predicts national output beyond a binary crisis indicator. These findings suggest that studies of systemic crises may underestimate the frequency and costs of financial distress.

Keywords: financial crises, regional crises, state-level business cycles

JEL classification: C38, N91, N92, O47

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1 Introduction

Financial crises represent defining moments in economic history, often imposing substantial and persistent costs on society. While an extensive literature documents protracted recessions associated with international banking crises (Cerra and Saxena, 2008; Reinhart and Rogoff, 2009; Schularick and Taylor, 2012), these studies face several limitations: they are typically based on a small number of crises, they necessarily focus only on systemic nationwide events, and they cannot control for country-specific shocks that may coincide with the incidence of crises. In this paper, we address these limitations by focusing on regional variation in financial distress within the United States from the Civil War until today. This allows us to both provide new estimates for the economic impact of financial crises and undertake a comprehensive study of financial crisis dynamics for the United States.

We build on the insight that regional data can be a useful source of variation in macroeconomics (see, e.g., Nakamura and Steinsson, 2018). The U.S. offers a natural laboratory for studying financial crises. From the Panic of 1893 to the 2023 banking sector turmoil, it has experienced financial turbulence with remarkable regularity. However, two critical limitations have made it challenging to systematically study U.S. financial crises.

First, there is a lack of historical regional time series data. Because crises are relatively rare events, an analysis based on national time series alone is subject to small sample bias. The challenge is that few time series for regional data have been digitized. We address this by assembling a new historical state-level macro-financial panel dataset covering 48 states from 1863 to 2022. To do so, we digitize and harmonize historical state-level bank balance sheets from several sources, which we combine with 60 annual indicators of economic activity constructed in a companion paper (Hoon et al., 2025).

Second, there is considerable disagreement among economic historians about which year should be considered a "crisis." To overcome this challenge, we conduct a comprehensive survey of 25 major U.S. financial crisis chronologies covering the entire history of the U.S. Based on carefully documenting the precise definition, type of financial crisis, and time period used by each crisis list, we identify three types of events: (a) years treated as crisis period by any chronology, (b) a "benchmark" list of major crises on which there is broad agreement, and (c) a list of minor crises and episodes of government interventions that are not associated with systemic benchmark crisis events.

Equipped with these data, we establish five key findings about financial crises in the United States using (panel) local projections. First, U.S. financial crises are followed by downturns in state-level economic activity, based on our benchmark chronology. Output remains approximately 6 percent below pre-crisis trends three years after the start of a crisis and remains depressed even after five years. This pattern is consistent with international evidence (Cerra and Saxena, 2008; Reinhart and Rogoff, 2009; Schularick and Taylor, 2012), but has not previously been documented for the United States. The state-level output losses of economic activity following crises are slightly larger than the drop of nationwide U.S. real GDP and industrial production, based on a time series analysis covering the period from 1791 to 2022. This is consistent with general equilibrium factors—such as the occurrence of a nationwide panic, spillovers, or changes in monetary policy—slightly dampening the economic aftermath of crises.

Second, the output losses of U.S. financial crises display substantial heterogeneity across states, ranging from -15% to approximately 0%. These findings are consistent with existing work using regional variation in the exposure to individual crisis episodes to study their consequences (e.g., Peek and Rosengren, 2000; Calomiris and Mason, 2003*a*; Ashcraft, 2005; Huber, 2018), suggesting an important regional dimension to crisis transmission. Different from these existing studies, our analysis highlights persistent differences in the elasticity of output to crises across states using long-run panel data rather than a cross-sectional estimation based on a single crisis.

Third, we show that statistical markers of local banking sector issues strongly predict the severity of subsequent economic contractions. Based on our harmonized long-run dataset, we create three measures of such local issues: (a) growth in state-level deposits, (b) growth in wholesale liabilities, and (c) the rate of local bank failures. When interacted with a dummy for a U.S.-wide crisis from our benchmark list, we find substantially larger output losses when there is a state-level disruption to the banking sector's liquidity (proxied by liabilitiy-side disruptions) or solvency (proxied by failures). These findings are consistent with existing cross-country evidence suggesting that the aftermath of financial distress is partly predictable with the extent of bank equity declines (Baron, Verner and Xiong, 2021), spike in credit spreads (Krishnamurthy and Muir, 2025), deposit contractions (Jamilov et al., 2024), or crisis intensity revealed by textual data (Romer and Romer, 2017; Chen et al., 2023; Ahir et al., 2023).

Fourth, by combining our survey of narrative chronologies with objective statistical measures of local banking sector troubles, we develop a new chronology of local financial distress. In particular, our preferred measure defines local financial distress as state-year observations where (a) any

chronology indicates that the U.S. experiences a crisis and (b) there is evidence of a local deposit or wholesale liability contraction, coupled with at least one bank failure. This measure of state-level financial distress aligns closely with existing narrative evidence but indicates 798 regional "crisis" episodes, considerably more than the seven U.S.-wide benchmark crises in our post-1870 estimation sample. Local financial distress is also associated with output losses on the order of 3%, which remains statistically significant at around 1.5% even after the inclusion of year fixed effects that control for common shocks such as changes in nationwide monetary or fiscal policy. Importantly, these estimates are highly robust across a wide range of perturbations of what constitutes statistical evidence of local banking sector issues and econometric specifications.

Fifth, we show that regional heterogeneity in financial distress contains important information about the future path of the U.S. macroeconomy. In particular, we construct a continuous measure of financial distress we call "states-at-risk", defined as the fraction of the U.S. banking sector experiencing local financial distress at a given moment in time. In a time series analysis, states-at-risk predicts U.S.-wide economic downturns similarly or better relative to a traditional indicator variable for a financial crisis from our benchmark list. This highlights that regional financial distress does not only matter for regional output, but also contains useful information for understanding aggregate fluctuations.

Our findings suggest that the economic costs of financial distress may have been underestimated. It is not only rare systemic nationwide crisis events that predict sizeable output losses, but also the much more frequent localized episodes of financial distress. Previous work on the output losses of crises has focused on cross-country variation in systemic events and aggregate time series that are unable to detect these patterns, and regional evidence has been based on individual episodic evidence. Our work suggests that financial distress is much more common than previously estimated, because it is often limited to particular regions. As we show, such regional distress also matters for aggregate fluctuations even outside of outright crisis episodes, suggesting that regional information is useful for monitoring the risks emanating from non-systemic events.

Related literature. Our paper relates to several strands of the literature. First, we contribute to the (cross-country) literature on the economic costs of financial crises. Among others, work by Cerra and Saxena (2008), Reinhart and Rogoff (2009), Schularick and Taylor (2012), Baron, Verner and Xiong (2021), and Jamilov et al. (2024) show that banking crises in particular are typically associated with severe and prolonged recessions; see Hall (2014) for a discussion focused on the

United States. Our work complements cross-country analyses by focusing on state-level variation within the United States. By using within-country variation, we can address three limitations of existing studies, namely that they (a) are based on a small number of crisis events, (b) assume homogeneous responses across vastly different economies, and (c) entirely abstract from the often localized nature of financial distress and thus underestimate the frequency and costs of negative shocks emanating from the banking sector.

Second, we contribute to the literature investigating historical financial crises in the United States using long time series (e.g., Friedman and Schwartz, 1963; Bordo, Dueker and Wheelock, 2002; Bordo and Haubrich, 2017; Gorton and Tallman, 2019). Giesecke et al. (2014) study the link between corporate bond defaults, banking crises, and GDP growth using time series regressions over the period 1866 to 2010. Correia, Luck and Verner (2024) use long-run historical bank-level data to study U.S. bank failures, and also show that the share of "banks at risk" predicts future U.S. output. Different from this existing work, we explicitly focus on historical state-level variation that allows us to identify regional financial distress and document the link of financial crises with state-level output over close to 160 years.

Third, we build on studies examining the regional effects of financial crises in and outside of the United States. Existing studies have used regional variation to estimate the link between U.S. crises and local output during the National Banking era (e.g., Carlson, Correia and Luck, 2022), 1907 panic (e.g., Jaremski and Wheelock, 2024), the 1920s (e.g., Wheelock, 1992; Davison and Ramirez, 2014; Rajan and Ramcharan, 2015; Jaremski and Wheelock, 2020), the Great Depression (e.g., Calomiris and Mason, 2003*a*,*b*; Carlson and Mitchener, 2009; Cohen, Hachem and Richardson, 2021), and in the early 1990s (Peek and Rosengren, 2000; Ashcraft, 2005). Monnet, Riva and Ungaro (2021) show how bank runs affected real activity in France during the Great Depression, and Huber (2018) studies the real effects of pre-determined local exposure to Commerzbank during the Global Financial Crisis of 2007-08 in Germany. The limitation of these studies is that they focus on a single episode, with a particular emphasis on the U.S. Great Depression, and thus cannot speak to the question of what the costs of financial crises are more generally. We can overcome this limitation due to our newly constructed historical time series spanning 160 years of data.

Fourth, we engage with the literature on measuring financial stress and identifying crises. While there are many chronologies of (U.S.) financial crises we review in more detail below—from the classic work of Friedman and Schwartz (1963) to more recent contributions by Jalil (2015), Bordo and Haubrich (2017), or Baron, Verner and Xiong (2021)—substantial disagreements remain about

which episodes constitute genuine systemic crises (see, e.g., Bordo and Meissner, 2016). Similar to Baron, Verner and Xiong (2021) and Jamilov et al. (2024), we employ a hybrid approach that combines narrative evidence with statistical indicators to identify episodes of financial distress. A key contribution to this literature is our comprehensive survey of all major existing U.S. crisis chronologies and the construction of a regional list of financial distress events.

The paper proceeds as follows. Section 2 introduces our historical state-level macro-financial dataset. Section 3 surveys existing U.S. financial crisis chronologies and introduces our benchmark classification. Section 4 examines the output losses associated with U.S.-wide financial crises. Section 5 develops our methodology for identifying state-level financial distress. Section 6 analyzes how our states-at-risk measure relates to U.S.-wide economic performance. Section 7 concludes.

2 A New State-Level Macro-Financial Dataset, 1863–2024

This section introduces the backbone of our empirical analysis: a new state-level panel dataset with consistent and comprehensive coverage of banking and economic variables for the period from 1863 to 2024. Compiling this dataset involved extensive digitization of historical records and the harmonization of time series across bank types, balance sheet categories, primary sources, and regulatory regimes affecting the comparability of the underlying statistics. Ultimately, our panel provides an unprecedented view into the history of state-level macro-financial linkages in the United States.

2.1 State-Level Banking Sector Balance Sheets

Historical data for 1863–1960 Our analysis of financial crises at the state level requires long-run, comprehensive, and consistent data on banking sector activities. To meet this need, we digitize and harmonize state-level aggregates from the Officer of the Comptroller of the Currency's (OCC) Annual Reports for the period 1863–1960. Figure 2 displays a sample page from these reports, illustrating the granular state-level financial data available throughout this period.

We describe details on the construction of these data in Online Appendix D.1. One important limitation is that, before 1890, the OCC only consistently report balance sheet information on nationally-chartered banks, while the reporting of state-chartered banks is infrequent. We illustrate the inclusion of national banks, state banks, and other institutions types in the OCC reports in Figure D.4, using total liabilities as an example. National banks are the most comprehensively

reported, with around 80% or greater coverage from 1868 onward, and full coverage by 1889. State banks are well reported from 1890 onward, with over 80% of states covered, and complete coverage starting from 1936. White (1983) estimates that national banks had a market share (in terms of total assets) upward of 80% in the 1870s, which decreased after the Civil War and stabilized at around 50% around 1900.[1] We further address the role of state banks in robustness checks by directly incorporating the irregularly reported data on state-chartered banks we observe in the OCC reports.

Modern data for 1960–2024 For the period starting in 1960, we draw on two sources: the Federal Deposit Insurance Corporation (FDIC) and the Federal Financial Institutions Examination Council (FFIEC)'s Consolidated Reports of Condition and Income, better known as "Call Reports". These data provide information on the consolidated balance sheets of all commercial banks operating in the United States that are regulated either by the Federal Reserve, FDIC, or the OCC.[2]

From 1961 to 1980, we use state-level aggregates from the FDIC.[3] From 1981 onwards, we source our data from the Call Reports. To construct state-level aggregates, we collapse the bank-level information from the Call Reports using weighted averages based on each bank's total assets. Doing so is challenging because our sample spans the deregulation of interstate branching, which fundamentally transformed the geographic structure of U.S. banking. Until the 1980s, U.S. banks were generally prohibited to operate branches outside of their headquarter state. As a result, the state of a bank's headquarter location served as a good proxy for its asset exposures. Starting in the late 1970s, several states began allowing banks from other states to open branches, either on a unilateral or reciprocal basis (Kroszner and Strahan, 1999; Goetz, Laeven and Levine, 2013). The Riegle-Neal Act of 1994 removed the remaining barriers, although its effective implementation varied considerably across states (Rice and Strahan, 2010). Unfortunately, the FDIC's historical statistics simply assign all bank activities to headquarter states. Starting in the 1980s, this results in erratic time series because it fails to capture the actual geographic distribution of bank assets

[1] We compare the estimates of national banks' market share in White (1983), the All Bank Statistics and the Historical Statistics of the United States (Carter et al., 2006) in Appendix Figure D.3.

[2] Notably, the Call Reports also provide data on the balance sheets of savings banks (`RSSD9048` == 300), and of savings and loans institutions (`RSSD9048` == 310) as of 2012, following the merger of the Office of Thrift Supervision into the Office of the Comptroller of the Currency in July 2011. We consider these data for robustness checks. Prior to this, thrifts were required to file a Thrift Financial Report with the Office of Thrift Supervision.

[3] While most of this data is available on the FDIC Bank Find Suite, there are two exceptions: 1) capital from 1961-1967, and 2) real estate loans from 1961-1966. We digitize these data from the "Summary Report, Assets and Liabilities of Member Banks", as published by the Board of Governors of the Federal Reserve System.

after the liberalization of interstate branching.

To address this challenge, we develop a methodology to create consistent time series using the FDIC's Summary of Deposits (SOD) data, which provides branch-level information on bank deposits. Using these data, we directly construct time series on total bank deposits in a given state and year by aggregating the branch-level information. To construct other balance sheet items, we use bank-state-year shares based on the proportion of each bank's deposits attributable to branches in a given state. In particular, we apply these deposit-based allocation shares to other balance sheet items, effectively distributing each multi-state bank's activities across the states where it operates. We outline further details in Appendix D.3 and show how influential these adjustments are in Figure D.7.

In order to avoid jumps due to series breaks, we splice the modern data together with the historical OCC data using overlapping data. We outline the methodology in detail in Online Appendix D.4. Note that, since our analysis focuses primarily on growth rates of bank balance sheet variables, this splicing approach has only a minimal impact on the underlying data.

Finally, we gather data on the number of bank failures from $1863-2021$. From $1863-1933$, we define a failed bank as one for which either a receiver is appointed by the OCC, one that undergoes liquidation, or one which is consolidated. From 1934-2021, we follow the FDIC definition to define bank failures as cases where the 1) Institution's charter is terminated and insured deposits plus some assets and other liabilities are transferred to a successor charter, the 2) Open Bank Assistance/Re-privatization, and 3) Payouts.[4] From 1863-1933, data on the number of bank failures is collected from the list of significant bank events compiled by Van Belkum (1968), and revised within Huntoon (2025). From 1934-2021, we collect data on the number of bank failures from the FDIC's "Bank Failures and Assistance" data, as of December 2024.

Coverage and comparison with existing sources. For the historical period, Carlson, Correia and Luck (2022) and Correia, Luck and Verner (2024) also use the OCC reports to construct a historical bank-level database that covers $1865-1904$ and $1865-1941$, respectively. Our approach focuses on the state-level aggregates rather than the bank-level data but offers a complete time series for the entire period from $1863-1960$ that consistently accounts for bank mergers and changes in reporting standards. In addition, unlike Carlson, Correia and Luck (2022) and Correia,

[4] In particular, this encompasses in the first category Purchase and Assumptions, Insured Deposit Transfers and cases where the FSLIC took over management and provided financial assistance, in the second category Assistance Transactions and Re-privatization, and in the third category Payouts.

Luck and Verner (2024), we do not only collect data on national banks but also on state banks, private banks, saving banks, stock savings banks, mutual savings banks, and trust loan companies.

To check the validity of our data construction procedure, we aggregate our times series across the 48 contiguous U.S. states and compare to aggregated series from existing sources of historical data. In Section B of our online appendix, we plot our aggregated series against the aggregated bank-level data constructed by Carlson, Correia and Luck (2022) (`CCL2022`, covering 1867-1904), the aggregated state-level data from the All Bank Statistics (1959) digitized by Cao and Richardson (2022) (`CR2022`, covering 1896-1955), the Historical Statistics of the United States provided by Carter et al. (2006) (`HSUS`, covering 1863-1960) and the Federal Deposit Insurance Corporation (`FDIC`, covering 1934-2022). Overall, our data follow similar trends as these existing efforts but cover a much longer time period than any existing work. For the reasons explained above, our state-level aggregates differ considerably from the FDIC series, which allocates a bank's entire balance sheet to its headquarter state.

The coverage of our dataset varies somewhat across states and time, with more comprehensive data generally available for states with larger banking sectors and for more recent periods. We summarize the coverage across bank types and balance sheet categories in Table D.3. The entry of new states into the Union also creates an unbalanced panel, with western states typically entering the dataset later than eastern ones. Despite these limitations, our dataset provides remarkably consistent and complete coverage across the entire period, with core banking indicators available for over 95% of state-year observations after 1880. This gives us a uniquely comprehensive view of the U.S. banking sector at the state level, spanning from the Civil War until today.

2.2 A Historical State-Level Macroeconomic Dataset

A critical limitation in the study of financial crises in the United States is the lack of long-run panel data on macroeconomic outcomes. To overcome this limitation, we draw on a comprehensive state-level panel dataset introduced in the accompanying work by Hoon et al. (2025). Based on an extensive digitization and harmonization effort, this dataset represents the most complete historical state-level dataset on macroeconomic outcomes, covering all 48 contiguous U.S. states annually from 1863 to 2021. By combining 113 individual sources, 84 of which are newly digitized, these time series provide a unique view into regional economic dynamics over more than 150 years of U.S. history. More details on the coverage and construction of these data can be found in Online Appendix E or by directly referring to Hoon et al. (2025).

The most important variable we take from Hoon et al. (2025) is their estimated state-level index of economic activity that covers the period 1870 to 2022, which they estimate using a mixed-frequency dynamic factor model. We also use their data on state-level unemployment rates, agricultural or manufacturing output, business failures, and state government finances. For the modern period, we complement their data with the Bureau of Economic Analysis (BEA)'s state-level personal income (1929-2023) and state-level GDP (1963-2023).

3 Classifying U. S. Financial Crises

The dating of financial crises has a long tradition in the United States. The divergent crisis dates identified in different chronologies reflect both the complexity of defining what constitutes a crisis and the evolving methodologies used to identify them. In this section, we survey the existing landscape of crisis chronologies, review the major methodological approaches taken in constructing them, explore the sources of disagreement among researchers, and develop a benchmark chronology to use in our analysis.

3.1 A Survey of Existing Chronologies

Table 1 plots an overview of existing financial crisis chronologies for the United States. Overall, we draw on 25 existing crisis lists, spanning from early work by Sprague (1910) to recent work by Jamilov et al. (2024). While these chronologies differ widely in the time periods they cover, they jointly span the years from 1791 to 2023. For each chronology, we mark years identified as the beginning of a crisis by a "Yes", years associated with an ongoing crisis as "O", and years that are part of the study but without crisis years as "—".

Table 1 suggests substantial disagreement across chronologies. Events like the Panic of 1907 appear in nearly all chronologies, while others like the 1973-75 "bank capital sqeeze" surrounding the failure of Franklin National Bank appear in only a small subset. More recent episodes, such as the commercial banking troubles and Savings and Loan Crisis of the 1980s, demonstrate similar classification challenges, with disagreement about whether 1982, 1984, 1988, or all of these years represent distinct crisis events.

There are several potential reasons for the disagreement across chronologies. For one, researchers use different definitions of what types of financial problems constitutes a "crisis", with some requiring bank runs, others focusing on bank failures, and still others emphasizing credit contractions or

policy interventions. To understand how definitional differences affect the classification of crises in the 25 chronologies we consider, we provide the exact definitions used in several major chronologies in considerable detail in Table C.1 of the online appendix.

Another reason is that researchers make different assessments about crisis severity. As a result, some chronologies include more minor or localized episodes of financial distress, while others only focus on events they consider systemic. In fact, the crisis lists of Kemmerer (1910) and Jalil (2015), as well as the quantitative index of financial conditions by Bordo, Dueker and Wheelock (2002), explicitly differentiate between "minor" and "major" crises. Major crisis events typically feature multiple dimensions of financial distress, including bank runs, solvency issues, substantial policy interventions, and clear evidence of a widespread panic. For example, all of these elements were present during the Global Financial Crisis of 2007-08 or the Great Depression. In contrast, several events in the mid-1920s are classified as minor or localized crises by Davison and Ramirez (2014) and Jalil (2015), but are not included in chronologies such as Reinhart and Rogoff (2009), Jordà, Schularick and Taylor (2017), or Baron, Verner and Xiong (2021). Several years between the mid-1890s and 1907 also appear in the lists of Kemmerer (1910), DeLong and Summers (1986), Jalil (2015), and Metrick and Schmelzing (2021), but not in most others.

Finally, researchers differ in how they treat periods with large policy interventions but small disruptions to the financial sector. Most series ignore these events, while Metrick and Schmelzing (2021) explicitly focus on interventions as a sign of potential troubles. As a result, Metrick and Schmelzing (2021) discuss several events during the 1960-70s that are not mentioned in most other crisis chronologies. For example, the 1973-75 period characterized by the failures of the United States National Bank of San Diego, Franklin National Bank, and the Security National Bank of New York appears in Metrick and Schmelzing (2021), Bordo and Haubrich (2017), and Lopez-Salido and Nelson (2010), but not in the widely-used chronologies of Reinhart and Rogoff (2009), Jordà, Schularick and Taylor (2017), Laeven and Valencia (2020), or Baron, Verner and Xiong (2021).

3.2 Quantifying Crisis Probabilities

The heterogeneity in crisis definitions outlined above poses a challenge for researchers attempting to identify patterns in the frequency and severity of crises, and assessing their potential economic impact. In Figure 1, we summarize the historical incidence of financial crises across these chronologies. We focus on crisis lists that span a sufficient number of years to be meaningful, excluding minor crises and years associated with ongoing crises. The figure shows considerable variation in

the fraction of years classified as crises, even among widely-used sources. For instance, Jordà, Schularick and Taylor (2017) and Laeven and Valencia (2020) both report that crises occur in about 4% of years, whereas Jalil (2015) and Baron, Verner and Xiong (2021) imply higher incidences of roughly 6.1% and 6.7%, respectively. Reinhart and Rogoff (2009) reports an incidence of approximately 7.5%, nearly twice that in Jordà, Schularick and Taylor (2017) and Laeven and Valencia (2020). At the upper end, Kemmerer (1910) and Metrick and Schmelzing (2021) each imply crisis incidences of around 16%, reflecting their inclusion of major wars and Federal Reserve interventions as crisis episodes. We note that these comparisons are unconditional, since many chronologies span different time periods. Nonetheless, the broad ranking of crisis incidence remains unchanged when we restrict chronologies to a common sample window, where possible. For example, restricting to the period $1870 - 2014$, the incidence in Jordà, Schularick and Taylor (2017) remains at 4%, still about one-third lower than that of Baron, Verner and Xiong (2021), while the incidence in Metrick and Schmelzing (2021) rises slightly from 16% to about 17%.

3.3 Towards a Benchmark Chronology

In order to undertake our analysis, we construct a "benchmark" chronology of widely accepted major crises. We define a benchmark crisis as one that appears in at least one-half of the reporting chronologies in Table 1 and is identified as a start year of a major crisis based on financial sector disruptions rather than government interventions alone (which is the focus of Metrick and Schmelzing (2021)). Given the discrepancies of chronologies for the 1980s and early 1990s, we follow Lopez-Salido and Nelson (2010)'s persuasive account of this period and assign 1982 as a crisis year, which they argue was the beginning of commercial bank troubles. Since there is no clear agreement about the dating of the Savings and Loan Crisis, or whether it constituted a crisis at all, we do not assign another year in the 1980s or 1990s as a crisis.

This methodology yields the benchmark chronology presented in the first column of Table 2, and identifies ten crisis start years between 1791 and 2023: 1837, 1857, 1873, 1884, 1893, 1907, 1930, 1982, 2007, and 2023. Each of these episodes is consistently recognized by a majority of widely used sources, including Reinhart and Rogoff (2009), Jalil (2015), Jordà, Schularick and Taylor (2017), and Baron, Verner and Xiong (2021). Further discussion of the benchmark chronology is provided in Section C.2 of the online appendix.

To understand how our benchmark list compares with the surveyed chronologies, Figure C.1 shows the fraction of years—including both crisis and non-crisis years—where each chronology's

classification differs from the benchmark. Among the various crisis chronologies, the largest disagreements occur with Kemmerer (1910) and Metrick and Schmelzing (2021), consistent with the results observed in Figure 1.

Finally, Figure 3 demonstrates the relationship between our benchmark crisis episodes and U.S. economic performance measured by GDP growth. We take data on GDP from the Bureau of Economic Analysis from 1929 onwards, and use the estimates by Williamson (2025) before. The figure reveals a clear association between benchmark crises and economic contractions throughout U.S. history. Major episodes like the Panics of 1857, 1893, 1907, and 1930 align with pronounced output declines, suggesting the identified crises likely forecast significant downturns. The 2007-2008 Global Financial Crisis similarly corresponds to one of the most severe economic contractions of the post-World War II era.

4 The Heterogeneous Output Losses of U.S. Financial Crises

Equipped with our macro-financial panel dataset, this section provides new estimates of the output losses of financial crises in the United States. Section 4.1 begins by estimate the state-level response of output to U.S.-wide financial crises. Section 4.2 compares these estimates with impulse responses from a time series analysis covering the period from 1791 to 2022. Section 4.3 shows that the local output response to financial crises varies widely across states. Section 4.4 shows that the extent of a local output decline during crises is predictable with measures of state-level banking conditions.

4.1 Estimating the Local Output Responses to U.S. Financial Crises

To estimate the dynamic relation between financial crises and economic activity, we run variations of local projections (Jordà, 2005), adapted for a panel setting. Our baseline specification is:

$$\Delta Y_{i,t+h} = \alpha_i^h + \beta^h \, \mathbf{1}_t^{\text{U.S. crisis}} + \sum_{k=1}^{5} \gamma^{k,h} \, \Delta X_{i,t-k} + \epsilon_{i,t}^h \quad \text{with} \quad h \in [0,5]. \tag{4.1}$$

where $\Delta Y_{i,t+h}$ represents the change in real economic activity in state i between periods $t-1$ and $t+h$, measured by the natural logarithm of the state-level economic activity index from Hoon et al. (2025). α_i^h captures state fixed effects, accounting for time-invariant differences across states such as long-run growth rates. The indicator variable $\mathbf{1}_t^{\text{U.S. crisis}}$ equals one when year t is identified as a financial crisis in our benchmark chronology. The summation term $\sum_{k=1}^{5} \gamma^{k,h} \Delta X_{i,t-k}$ represents a set of control variables, where the baseline specification only includes five lags of changes in

state-level economic activitiy to account for pre-crisis economic conditions. Finally, $\epsilon_{i,t}^h$ is the error term.

The key parameter of interest, β^h, measures the average elasticity of output over the next h years to the start of a financial crisis, relative to what would have been expected in the absence of a crisis. Together with the estimates of β^h, we report their 90% confidence intervals constructed using standard errors clustered by state. By estimating this equation separately for each horizon h, we trace out the differential dynamic response of economic activity over time.

Figure 4 plots the impulse response function from estimating equation (4.1), which shows how state-level real economic activity evolves following U.S. financial crisis episodes from 1863 to 2022. The results reveal substantial output losses. In the first year after a crisis, state-level output falls by approximately 3 percent relative to its pre-crisis trend. This contraction reaches its maximum depth of approximately 6 percent by the third year. Five years after a crisis, there are some signs of a recovery, but output remains depressed at around 2.5% lower than the pre-crisis trend.

These findings broadly align with existing estimates from cross-country studies. For example, Cerra and Saxena (2008), Reinhart and Rogoff (2009), and Jordà, Schularick and Taylor (2017) document similar patterns of deep and protracted recessions following financial crises. However, our results are notable for documenting this pattern specifically for the United States across multiple crisis episodes spanning more than 150 years using state-level data.

Robustness Figure A.1 presents a series of robustness checks on the baseline result. These include: (1) employing alternative crisis definitions, (2) analyzing subsamples, (3) estimating weighted regressions and extending the impulse response horizons, and (4) incorporating additional control variables. The results remain broadly consistent with the baseline findings, except that crisis indicators referring to less severe episodes are associated with smaller output losses.

In addition to examining the response of local output—measured by the economic activity index constructed in Hoon et al. (2025)—we also analyze the behavior of a broader set of state-level indicators following a nationwide financial crisis, as shown in Figure A.2. Applying the same estimation framework as in Figure 4, we find significantly positive responses of the unemployment rate, state net debt, and the number of business failures. There is also a notable decline in agricultural and manufacturing output, two sectors that constitute substantial portions of economic activity across most periods in our sample. These results suggest a broad-based economic downturn in the aftermath of financial crises.

4.2 Comparison with Time Series Estimates, 1791–2022

To compare these state-level findings with national patterns, we estimate a time series specification for aggregate U.S. output:

$$\Delta Y_{t+h} = \alpha^h + \beta^h \mathbf{1}_t^{\text{U.S. crisis}} + \sum_{k=1}^{5} \gamma^{k,h} \Delta X_{t-k} + \varepsilon_t^h \tag{4.2}$$

where $\Delta Y_{i,t+h}$ represents the change in output (measured by GDP or industrial production) between $t-1$ and $t+h$, $\mathbf{1}_t^{\text{U.S. crisis}}$ is the same indicator variable for a financial crisis in year t as identified by our benchmark chronology, $\sum_{k=1}^{5} \gamma^{k,h} \Delta Y_{t-k}$ a set of lags of the dependent variable, and ϵ_t^h the error term.

Given that financial crises are rare events, estimating equation (4.2) requires long-run time series on U.S. output. We obtain such series for real GDP and industrial production by combining the official statistics from the Bureau of Economic Analysis (BEA) and Federal Reserve with historical estimates by Miron and Romer (1990), Davis (2004), and Williamson (2025).[5] Combined with our new benchmark chronology, these time series give us an unprecedented time span to study the output response to financial crises in the United States. Figure 5 presents the national-level results, also revealing large output losses in the aggregate time series, similar to the state-level panel. The maximum decline in GDP reaches approximately 8 percent three years after a crisis, with limited evidence of a recovery within our five-year forecast horizon. The response of industrial production is similar, reaching approximately 12 percent three to four years after crisis onset.

4.3 Heterogeneous Impulse Responses Across States

Beyond the average state-level responses documented above, we find substantial heterogeneity in how states respond to financial crises. To showcase this result, we run time series regressions as in equation (4.2) separately for each state. This approach allows for heterogeneous slopes, which may also address potential concerns about the pooled state-level estimates from equation (4.1).

Figure 6 presents the state-specific impulse responses to a U.S. financial crisis and also compares them with the U.S. time series estimate for GDP. We highlight the trajectories for three states—Arkansas, California, and Oklahoma—alongside the full distribution of state responses. Several findings stand out. Most importantly, *all* of the estimated responses are negative and suggest

[5] We combine estimates on industrial production from the Federal Reserve (1920 – 2022), Miron and Romer (1990) (1916 – 1919) and Davis (2004) (1790 – 1915).

relatively limited evidence of a recovery even three or four years after a crisis. That said, the heterogeneity in magnitudes is striking: while some states experience output contractions by nearly 15 percent at their nadir, others face significantly milder recessions with losses of less than 5 percent that revert back to trend after five years. The timing of maximum impact also varies considerably, with some states experiencing their worst outcomes in the second year after crisis onset while others see continued deterioration throughout the five-year horizon.

Among the examples we highlight, California represents an intermediate case that is relatively close to the average response across states. Arkansas exhibits smaller output losses than most other states. Finally, Oklahoma tends to experience a contraction close to the average initially but then shows severe output losses in later years. This regional heterogeneity suggests that national-level analyses may obscure important dimensions of how financial crises unfold. In subsequent sections, we explore how specific financial factors—particularly contractions in bank liabilities and bank failures—help explain this cross-state variation in the output response to crises.

4.4 Local Banking Conditions and the Transmission of U.S. Crises

Having established that U.S. financial crises are linked to substantial contractions in (state-level) output, we next investigate how variations in local banking conditions relate to the severity of these downturns. In particular, we focus on contractions in deposits or wholesale liabilities and the incidence of bank failures, motivated by the observation that financial crises are often defined based on these events (see, e.g., Calomiris and Gorton, 1991; Wicker, 1996).

To begin, we investigate how these measures of local banking conditions differ in years we classify as U.S. "benchmark" crises relative to other periods. Figure 7 visualizes the distribution of state-level deposit growth, wholesale liability growth, and the number of bank failures during U.S.-wide crises and other times. As one may expect, crises are associated with a leftward shift in the distribution of growth of bank liabilities and an increase in the rate of bank failures.

Importantly, there is considerable regional variation underlying these results. Figure 8 uses several case studies to show the uneven geographical patterns of liability-side disturbances and failures during crises. Importantly, there is not only clear regional heterogeneity in which states see banking sector troubles, but we also see changes in which states are affected from episode to episode.

The 1982 commercial bank failures and "LDC debt threat" (Lopez-Salido and Nelson, 2010), depicted in the upper right panel of Figure 8, shows a highly localized pattern of deposit contractions,

with New York banks being particularly affected. The middle right panel of Figure 8 visualizes the widespread contractions of wholesale liabilities during the 2007-2008 Global Financial Crisis. While nearly all states experienced reduced wholesale liability growth, there was still substantial geographical variation. Some states, such as Massachusetts and Delaware, maintained relatively stable wholesale liability growth while several southern states saw particularly large contractions. The bottom panel highlights the vast heterogeneity in bank failure rates during the Panic of 1907 and the Great Depression. In fact, many areas particularly hit by the 1907 crisis were *not* as badly affected by the Depression. This showcases that banking sector troubles do not only vary geographically, but that which states are affected also changes over time.

To understand the role of local financial factors more systematically, we extend our baseline specification by including an interaction term for the U.S. benchmark crisis indicator with the 3-year moving average of state-level deposit growth, wholesale liability growth, or the rate of bank failures:

$$\begin{aligned}\Delta Y_{i,t+h} = \alpha_i^h + \beta_1^h \mathbf{1}_t^{\text{U.S. crisis}} + \beta_2^h \Delta\text{Local banking conditions}_{i,t} \\ + \beta_3^h \mathbf{1}_t^{\text{U.S. crisis}} \times \Delta\text{Local banking conditions}_{i,t} + \sum_{k=1}^{5} \gamma^{k,h} \Delta X_{i,t-k} + \varepsilon_{i,t}^h\end{aligned} \tag{4.3}$$

where $\Delta\text{Local banking conditions}_{i,t}$ refers to the three-year moving average between years $t-1$, t, and $t+1$ in state i for either (a) the percent change in (nominal) bank deposits, (b) the percent change in wholesale liabilities, or (c) the rate of local bank failures (defined as bank failures over the number of banks). We use this smoothing to capture episodes in which states experience banking sector troubles not necessarily in the exact year of a "benchmark" crisis, but rather in the year before or after. In this specification, β_1^h captures the average output loss of a financial crisis at horizon h, β_2^h measures the relationship between state-level banking sector problems and subsequent output during normal times, and β_3^h—our primary coefficient of interest—identifies how this relationship changes during crisis periods. When plotting these estimates, we invert the sign for β_3^h for deposit and wholesale liability growth, based on the hypothesis that heightened banking sector issues (lower liability-side growth, higher bank failures) should signal lower output growth going forward.

Figure 9a presents the results from this analysis, comparing the trajectory of state-level output following U.S. financial crises depending on deposit growth rates. The red line shows the response of

real economic activity following an average crisis, while the blue line illustrates the response when deposit or wholesale liability growth is two standard deviations *below* the mean or bank failure rates two standard deviations above the mean—representing a severe local banking disruption.

States experiencing severe local banking distress based on deposit growth or failures face substantially deeper output losses during crises. By the third year after the start of the crisis, a two standard deviation larger contraction in deposits predicts a close to 15% cumulative drop in economic activity, a large magnitude relative to an output loss of around 5% without such a liability-side contraction. For a two standard deviation increase in bank failures, we find even larger output losses of close to 17%. For contractions in wholesale liabilities, we find a qualitatively similar pattern but quantitatively smaller differences relative to the average crisis, albeit with considerably wider confidence intervals. Taken together, these results suggest that the most severe recessions following financial crises are those coinciding with statistically detectable local banking sector problems.

5 The Aftermath of Local Financial Distress

So far, our analysis has closely followed the existing literature in estimating the output response to *national* financial crises, albeit in the U.S. context. However, this analysis faces two limitations. First, the number of U.S. financial crises is small and, as a result, how exactly one defines a crisis matters for estimates of their frequency and the output losses associated with them. Second, the striking heterogeneity in output losses across states suggests that regional differences are critical for understanding how crises unfold and can partly be predicted by local banking sector health.

In this section, we address both of these limitations by identifying episodes of local financial distress based on a combination of our census of U.S. crisis chronologies and the newly-constructed state-level statistics on deposits, wholesale funding liabilities, and bank failures. The key innovation relative to the existing literature is that we are able to identify hundreds of local distress events, which gives us unprecedented statistical power to estimate their output losses relative to the cross-country literature.

Section 5.1 proposes a measure of local financial distress by combining our survey of U.S. crisis lists with measures of state-level contractions in deposits or wholesale liabilities, as well as the incidence of bank failures. Section 5.2 presents the resulting chronology of state-level financial stress events and additional validation using narrative evidence. Section 5.3 estimates the output

losses of local financial distress.

5.1 Identifying Local Financial Distress Episodes

Building on our finding that local liability-side contractions and bank failures predict the severity of economic downturns following financial crises, we propose a method for identifying *state-level* financial distress since the Civil War. This approach combines the strengths of narrative chronologies with objective statistical indicators, allowing us to capture variation in crisis exposure across states and time. In that sense, we are building on previous work by Baron, Verner and Xiong (2021) and Jamilov et al. (2024), who also combine narrative and statistical evidence to identify banking sector distress in cross-country data.

Our baseline classification of local financial distress on the state-year level is any period that fulfills all of the following criteria:

1. *Any* U.S. crisis chronology indicates a crisis in a given year, and
2. There is at least *one* bank failure in the year of the crisis, and
3. Either deposits or wholesale liabilities decline in absolute terms in the year of the crisis.

This approach is based on two types of complementary criteria. First, we consider the timing of national financial crises as identified by *any* existing chronology reviewed in Section 3. This builds on the insight, discussed in Section 3.3, that the discrepancies across crisis lists outside of a small number of "benchmark" events are best understood as disagreements about the severity of a given crisis, and in particular whether it only affects a certain region or the financial system as a whole. As highlighted by Romer and Romer (2017), narrative evidence helps to sharply distinguish between outright crises and periods where the banking sector contracts for unrelated reasons, such as changes in monetary policy or garden-variety business cycle downturns. Around one-third of years are classified as a "crisis" by at least one chronology.

Second, we require statistical evidence of substantial financial distress at the state level. We focus on two statistical indicators that are key markers of crises: bank runs (proxied by contractions in deposits or wholesale liabilities) and bank failures. These measures are widely-accepted indicators of banking sector troubles, and thus seem like a reasonable starting point for an objective, statistical criterion of banking sector distress.

While we allow for many other versions for robustness exercises, this baseline definition has several attractive features. It requires evidence for both bank failures *and* liability-side disruptions on the state level, which abstracts from cases where bank liabilities contract for idiosyncratic reasons. Because around one-third of all years in our sample are identified as a crisis by at least one chronology, this approach strikes a balance between identifying too few or too many state-year observations as experiencing financial distress. All in all, our baseline measure identifies 798 instances of state-level financial distress.

Our approach addresses several limitations of existing work. Most importantly, it equips us with a considerably larger sample of "crisis" events relative to the cross-country literature. The most comprehensive dataset we are aware of is that of Jamilov et al. (2024), who identify 308 cases of bank runs around the globe since 1800. In contrast, depending on the exact definition, our measure of local financial distress identifies potentially thousands of distress events.

Another advantage is that we exploit geographical variation *within* a country, while existing work has treated financial crises as uniform shocks affecting all areas simultaneously. Our estimates thus sidestep the critique that institutional differences across countries make the estimates of cross-country panel regressions hard to interpret. It also accounts for the reality that crises are often a series of individual events that spread across regions through trade and banking linkages (see, e.g., Calomiris and Gorton, 1991).

Finally, our approach sidesteps disagreements across existing chronologies regarding what constitutes a "true" financial crisis. Rather than attempting to resolve these definitional disputes, we allow for the possibility that different types of financial stress may manifest with varying intensity across regions. By anchoring our identification to objective statistical markers—contractions of bank liabilities and bank failures—we focus on episodes with demonstrable local financial disruption regardless of the level of disagreement in U.S. crisis chronologies.

5.2 A New Chronology of Local Financial Distress

Our state-level chronology of financial distress spans the entire 1870-2022 period. Figure 12 plots the underlying variation over time, where we differentiate between three types of local distress indicator (deposit growth, wholesale liability growth, and bank failures). Historically, local financial distress was often explained by contractions in deposits. After the introduction of federal deposit insurance in 1934, however, most episodes are due to a contraction of wholesale liabilities or bank failures. As such, our chronology of local financial distress also sheds light on the changing nature of financial

stability risks over time.

Table 3 provides an excerpt of the new chronology of local financial distress for selected states. We use our baseline definition, meaning we plot all states and years in which (a) at least one U.S. chronology indicates a crisis, and (b) a state experienced either a deposit or wholesale liability contraction *and* at least one bank failure. We also show the growth rate of deposits and wholesale liabilities, as well as the number of bank failures.

There are considerable differences in crisis frequency and severity. California's experienced relatively frequent and intense periods of distress historically, with particularly severe deposit contractions during 1893 (-27.5%), a large contraction in wholesale liabilities in 1907 (-37.5%), but also dozens of bank failures during the Great Depression.

Florida not only experienced historical banking sector issues but also saw a massive outflow of wholesale liabilities in 1984 (-68.1%) as well as during several other years in the 1980s, 1990s, and 2008. New York's crisis pattern reflects its central role in the U.S. financial system, with significant swings in liability growth rates and a wave of bank failures during the Great Depression. Notably, our methodology does not detect financial distress during the the 2007-08 crisis. Texas shows yet another distinctive pattern with distress being increasingly characterized by wholesale funding disruptions and bank failures over time relative to more traditional outflows of deposits.

Table A.1 in the Online Appendix plots an extended chronology for selected states under a more generous definition. We show all state-year observations where (a) at least one U.S. chronology indicates a crisis, and (b) *any* of the state-level measures we construct—deposit contractions, wholesale liability contractions, and bank failures—indicate distress. This highlights how changing the "threshold" for what constitutes local distress can result in a different number of events.

To validate our new chronology, we compare it with existing but limited narrative evidence on which states experienced crises in particular years. We build on three key sources. First, Jalil (2015) includes a relatively detailed discussion of regional banking crises for the period $1825-1929$. Second, Davison and Ramirez (2014) identify local banking panics in the 1920s using a dataset on bank suspensions as well as newspaper articles. Third, Metrick and Schmelzing (2021), in their chronology of crisis interventions, also frequently discuss their exact location.

Table A.2 shows the states and years for which at least one of these chronologies finds narrative evidence of a crisis, together with three versions of our local financial distress measure. In particular, we consider whether, during a year identified as a U.S. crisis by any chronology, (i) *either* deposits or wholesale liabilities contract, *or* there is at least one bank failure (`broad`), (ii) *either* deposits

or wholesale liabilities contract, *and* there is at least one bank failure (`baseline`), or (iii) whether deposits *and* wholesale liabilities contract, *and* there is at least one bank failure (`narrow`). At least one of our financial distress metrics aligns with narrative evidence on local crises.

5.3 The Output Losses of Local Financial Distress

Having established a new chronology of local financial distress, we now estimate the economic costs of these episodes. We adapt our local projections framework to analyze how state-level economic activity develops after local financial distress using the following specification:

$$\Delta Y_{i,t+h} = \alpha_i^h + \beta^h \mathbf{1}_{it}^{Local\ distress} + \sum_{k=1} \gamma^{k,h} \Delta X_{i,t-k} + \varepsilon_{i,t}^h \tag{5.4}$$

where $\Delta Y_{i,t+h}$ continues to index changes in future state-level output, and $\mathbf{1}_{it}^{Local\ crisis}$ is now an indicator for a *local* (rather than a U.S.-wide) distress period. We continue to report confidence intervals based on standard errors clustered by state but consider alternatives for robustness. In spirit, these estimations are closely related to cross-country regressions on the output losses of financial crises, which similarly relate future cumulative national output to the incidence of a national crisis.

Baseline estimates Figure 10a presents the results from estimating equation (5.4). Local financial distress is followed by substantial output losses. State-level economic activity declines by approximately 2 percent in the first year after crisis onset, with the contraction deepening to roughly 3 percent by the second year. As with U.S.-wide crises, the impact on output gradually reverts back, albeit slowly. By the end of the fifth year, output remains close to 2% below its pre-crisis level.

These output losses are smaller than those estimated for U.S.-wide crises in Figure 4, which showed peak contractions of approximately 6 percent. This difference likely reflects the more limited scope of local distress, which by definition affects specific regions rather than the entire national economy. Importantly, however, the substantial magnitude of the output drop following local distress reveals banking sector disruptions need not be nationwide to impose significant economic costs on the local economy.

While many financial distress episodes we identify are localized in nature, others can occur simultaneously across multiple states during periods of a systemic financial crisis. To separate the

incidence of local financial distress from nationwide events, we thus consider a specification with time fixed effects. By comparing states with and without distress at the same point in time, this specification distinguishes between local financial distress and common shocks. As such, they hold constant confounding factors such as changes in monetary policy and (federal) government spending to the extent they affect all states equally. We believe this is an advantage relative to cross-country studies on the output losses of crises, which cannot control for time-varying country-specific factors.

The results in Figure 10b suggest somewhat smaller but more persistent output loss that declines by around 1.5% five years after a crisis. The difference between results with and without time fixed effects highlights the importance of waves of local financial distress episodes. Many crises affect several states simultaneously, as we will explore in more detail in Section 6. The larger estimates in the specification without year fixed effects capture both the direct impact of local financial distress and the influence of these correlated national factors. The more modest estimates in the specification with year fixed effects isolate the predictive ability of local distress beyond what would be expected from U.S.-wide systemic crises, but discards potentially useful variation coming from the clustered incidence of crises.

Local distress during major vs. minor crises Our baseline definition of local financial distress incorporates narrative evidence of a crisis mentioned by *any* chronology of U.S. financial crises. To distinguish between the role of major systemic events and more minor events in explaining these results, we create two alternative indicators, based on narrative evidence of (a) a benchmark crisis, or (b) a "minor" crisis, defined as all years tagged as a crisis by any chronology that are not a benchmark crisis.

Figure 11 compares the output losses of local financial distress defined based on the combination of our baseline statistical indicators of state-level distress with these various measures of narrative evidence. As one might expect, the output losses of benchmark crises are worse in states experiencing liability-side contractions or failures, consistent with the evidence in Section 4.4. Importantly, however, we also find non-negligible output losses during "minor" crises, suggesting that financial shocks may also matter for the macroeconomy even when they are not associated with country-wide systemic disruptions.

Robustness We consider a wide range of alternative specifications. For example, Figure A.3b explicitly takes into account banks without a federal charter that we observe in the data (state

banks, private banks, savings banks, and trust loan corporations). As outlined in Section 2, our main sample focuses on national banks for which we have consistently-reported time series. That said, Figure D.5 shows that the correlation of national and state bank deposit growth is 0.339. Here, we create a perturbation of our local financial distress dummy that incorporates deposit or wholesale liability contractions for *any* type of institution, not just national banks. For that exercise, we also extend the modern coverage beyond commercial banks to include savings institutions. The results suggest that these changes make relatively little difference to our point estimates.

Figure A.3a asks whether changes in the sources of financial crises over time make a difference for our results. In particular, we create two perturbations of our baseline variable for the period before and after the Banking Act of 1933, which introduced federal deposit insurance. The first measure only incorporates a contraction of deposits as a liability disruption before 1934, and only a contraction of wholesale liabilities thereafter, and we continue to require either a liability-side contraction *or* bank failures to identify local financial distress. The second measure identifies local distress only based on liability-side issues before 1934 and only based on bank failures thereafter. Despite these changes, the resulting estimates are close in magnitude to those from our baseline indicator. The full list of robustness checks is detailed in Figure A.3.

6 States-At-Risk and U.S.-Wide Recessions

The analysis above shows that U.S.-wide and local crises contain information about future state-level output. But do local crises also contain information about U.S.-wide output? This section investigates this question by proposing a new continuous measure of financial distress in section Section 6.1 and studying its predictive properties for U.S. business cycles in section Section 6.2.

6.1 A Continuous Measure of U.S. Financial Distress

Traditional chronologies of financial crises are binary in nature, and thus only differentiate between crisis or non-crisis states; see Bordo and Meissner (2016), Sufi and Taylor (2022), and Frydman and Xu (2023) for recent surveys. A few existing cross-country studies have developed continuous measures of financial stress that capture crisis severity based on a more granular narrative coding (Romer and Romer, 2017), credit spreads (Krishnamurthy and Muir, 2025), bank equity declines (Baron, Verner and Xiong, 2021), deposit contractions (Jamilov et al., 2024), or natural language processing (Ahir et al., 2023; Chen et al., 2023). However, none of these papers have taken into

account the extent to which different *regions* are experiencing financial distress.

Based on our state-level measure of local financial distress, we propose a U.S.-wide continuous measure for the fraction of states whose banking sector experiences distress. We call this measure "states-at-risk". As a baseline, we calculate the weighted average of states experiencing distress based on a state's banking sector assets as weight.

Our states-at-risk measure differs in two ways from existing financial stress indices such as the OFR Financial Stress Index (Monin, 2019), St. Louis Fed Financial Stress Index (Amburgey et al., 2020), Kansas City Fed Financial Stress Index (Hakkio and Keeton, 2009), or New York Fed Corporate Bond Market Distress Index (Boyarchenko et al., 2025). First, it incorporates the geographical dimension of financial distress, rather than combining several national series or issuance-level data. Second, it has unique historical coverage starting shortly after the Civil War. Existing indices typically begin in the late 20^{th} century, with the notable exception of Bordo, Dueker and Wheelock (2002).

Figure 13 plots our measure of states-at-risk—i.e., the fraction of U.S. banking sector assets affected by local financial distress—between 1870 and 2022. In addition, we indicate the benchmark crisis events and the average of the states-at-risk measure over the sample period. Several patterns stand out. First, the states-at-risk measure is elevated during all major benchmark crises, with pronounced spikes during episodes like 1873, 1893, 1907, and 1930. A substantial majority of states, often exceeding 60%, experienced simultaneous local financial distress during or immediately after the benchmark crisis, confirming the truly systemic nature of these historical crises. A key exception to this rule is the 2007-08 crisis, which saw a large spike in failures but relatively little evidence of deposit contractions, which results in fewer distress events that are almost entirely associated with wholesale liability disruptions.

Second, the figure highlights significant variation in the geographic breadth of financial distress across different crisis episodes. Some crises, such as the Great Depression, affected many states simultaneously, reflecting the magnitude of the shock. Others, like the banking problems of the late 1880s affected a limited subset of states, suggesting more regionally concentrated disturbances that did not fully propagate across the national banking system.

Third, the states-at-risk measure identifies periods of significant regional financial distress that do not appear in most national crisis chronologies. For example, the figure shows banking sector stress during the late 1870s, the early 1920s, the late 1960s, the early 1990s, and even the early 2000s rarely classified as national financial crises but characterized by at times significant regional

banking problems. For example, the bank failures of the 1920s have long been recognized as having an impact on the local economy (e.g., Rajan and Ramcharan, 2015; Jaremski and Wheelock, 2020) but are not widely recognized as a nationwide crisis.

The continuous nature of our states-at-risk measure thus provides a more nuanced view of crisis episodes than binary classifications allow. Rather than simply asking whether a financial crisis occurred, we can assess the intensity of financial distress by measuring the proportion of states affected. This approach reveals that financial distress during the Great Depression evolved in waves, with successive peaks affecting different regions as banking problems spread across the country. Similarly, it suggests a more granular interpretation of the crises of the 1980s, with three major peaks in local financial distress spread across the early 1980s, late 1980s, and early 1990s.

6.2 States-at-Risk and Future GDP Growth

Having established the states-at-risk measure as a continuous indicator of financial distress, we now examine its relationship with subsequent U.S. economic performance, as measured by growth in GDP or industrial production. We are particularly interested in whether this measure has predictive power over and above existing binary crisis indicators.

Table 4 presents the results from a set of time series regressions relating growth in national GDP or industrial production to our benchmark crisis indicator and the states-at-risk measure. To account for serial correlation in output growth, we control for five lags of the dependent variable and report Newey-West standard errors.

Column 1 confirms the negative relationship between benchmark financial crises and subsequent GDP growth. The coefficient of -5.210 indicates that, on average, output growth is around 5 percentage points lower in the year following a benchmark crisis compared to non-crisis periods. This large and statistically significant estimate aligns with our earlier findings on the substantial output costs of financial crises.

Column 2 examines the predictive power of our states-at-risk measure. The coefficient of -1.733 indicates that when all states experience banking sector stress (states-at-risk $= 1$), subsequent GDP growth is approximately 1.7 percentage points lower than when no states face financial distress. This is both economically and statistically significant, confirming that our continuous measure of financial distress provides valuable information about future economic performance.

Most importantly, column 3 includes both the benchmark crisis indicator and the states-at-risk measure simultaneously. While both coefficients decrease somewhat in magnitude, the states-at-

risk measures remains fairly stable at −1.581 and highly statistically significant, suggesting that the spatial extent of financial distress provides additional information beyond the simple presence or absence of a benchmark crisis.

Columns 4 through 6 repeat the same exercise using industrial production as the dependent variable. Consistent with our results from local projections in Section 4.2, U.S. financial crises predict a larger drop in industrial production than GDP. Importantly, however, we continue to find that the states-at-risk measure has independent predictive power over and above a crisis dummy.

These findings have several potential implications. First, they suggest that regional financial distress does not only matter for local economies, but is also informative about the future path of national output. Second, the results highlight the value of continuous measures of financial stress compared to traditional binary classifications. Third, this new index may also be useful in many other settings, and could thus be used to better understand why some financial disruptions are associated with severe recessions while others result in more modest slowdowns. As such, monitoring the geographic distribution of banking sector stress could also serves as a potentially useful early warning signal of broader economic slowdowns.

7 Conclusion

This paper studies the aftermath of financial crises in the United States. By constructing a novel historical dataset on state-level banking and economic activity from 1863 to 2022, we establish new facts about the incidence and economic costs of financial crises throughout U.S. history. Our work demonstrates the value of taking a regional perspective to studying financial crises, which complements the existing literature using regional variation in macroeconomics (e.g., Nakamura and Steinsson, 2018).

Our takeaway is that the existing literature may have underestimated the probability and consequences of financial distress for the real economy for two reasons. First, previous studies have almost exclusively focused on systemic financial crises. By definition, these crisis chronologies abstract from smaller or geographically concentrated events. However, as we show, such local financial distress events are much more common than systemic ones: in the U.S. context, there are only a handful of widely agreed-upon crises, while there are many hundreds of local episodes. As such, the incidence of financial distress is higher than previously estimated based on aggregate data.

Second, local financial distress predicts output losses on the order of 3 percent over a period of three years. While these magnitudes are somewhat smaller than the outfall of full-blown systemic meltdowns, they are by no means negligible. To the extent that such state-specific events spill over to other states and ultimately affect a broader region, or if they occur in several large states, they may also affect the U.S. economy as a whole. In fact, as we show, the fraction of states experiencing financial distress—which we dub "states-at-risk"—contains useful information about the future trajectory of U.S. output over and above indicators of systemic financial crises.

These findings provide a rationale for the monitoring of local financial and real economic conditions. For example, the Board of Governors of the Federal Reserve conducts a detailed analysis of the regional economy in each Federal Reserve District as part of its Beige Book publication. What our results suggest is that this monitoring is not only important for local economies but potentially also U.S.-wide economic activity.

Future research could extend our work in several directions. One key question is how the transmission of monetary policy may differ across states depending on the state of their banking sector. Another would be how different regulatory frameworks and policy interventions affect the geographic distribution of crises. Finally, our banking dataset spanning the period from the Civil War until today should in and of itself be a useful resource for researchers in macroeconomics, finance, and economic history.

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Table 1: Chronologies of Financial Crises in the United States, 1791–2023

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W
1791		—		—		—								—				Yes		—				—	
1792		—		—		—								—				Yes		—		Yes		—	
1797		Yes		Yes		—								—				—		—		—		Yes	
1809		—		Yes*		—						—		—				—	—	—		—		—	
1814		—		—	Yes	—						Yes		Yes				Yes	Yes	—		—		—	
1815		—		Yes	O	—						—		—				—	—	—		—		Yes	
1816		—		—	O	—						—		—				—	—	—		—		—	
1817		—		—	O	—						—		—				—	Yes	—		—		—	
1818		—		—	—	—						—		Yes				Yes	O	—		—		—	
1819		Yes		Yes*	Yes	—						Yes		—				—	O	Yes	Yes	—		—	
1820		—		—	—	—						—		—				Yes	—	—	—	—		—	
1825		—		Yes*	—	—					—	—		Yes				—	Yes	—	—	—		Yes	
1826		—		—	—	—					—	—		O				—	—	—	—	—		—	
1829		—		—	—	—					—	—		—				Yes	—	—	—	—		—	
1831		—		—	—	—					—	—		Yes				—	—	—	—	—		—	
1833		—		Yes*	—	—					Yes	—		—				Yes	—	—	—	—		Yes	
1834		—		—	—	—					O	—		—				—	—	—	—	—		—	
1837		Yes		Yes	Yes	Yes					Yes	Yes		Yes				Yes	Yes	Yes	Yes	Yes		Yes	
1838		—		—	—	—					—	—		O				—	O	—	—	—		—	
1839		—		Yes	Yes	—					Yes	—		O				Yes	—	—	Yes	—		Yes	
1840		—		—	O	—					—	—		—				—	—	—	—	—		—	
1841		—		—	O	—					Yes*	Yes		—				—	Yes	—	—	—		—	
1842		—		—	O	—					Yes*	—		—				—	—	—	—	—		—	
1847		—		Yes	—	—					—	—		—				—	—	—	—	—		Yes	
1848		—		—	—	—					—	—		Yes				—	—	—	—	—		—	
1851		—		—	—	—					Yes*	—		—				—	—	—	—	—		—	
1854		—		—	—	—					Yes*	—		—				—	—	—	Yes	—		—	
1857		Yes		Yes	Yes	Yes					Yes	Yes		Yes				Yes	Yes	Yes	Yes	Yes		Yes	
1860		—		—	—	—					Yes*	—		—				—	—	—	—	—		—	
1861		—		—	Yes	—					Yes*	—		—				Yes	Yes	—	—	—		—	
1864		—		—	—	—				—	—	—		—				Yes	Yes	—	—	—	—	—	—
1869		—		—	—	—			—	—	—	—		—				—	—	—	—	Yes	—	—	—
1871	—	—		—	—	—			—	—	—	—	—	—				Yes	—	—	—	—	—	—	—
1873	Yes	—		Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1876	—	—		—	—	—			—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1878	—	Yes		—	—	—			—	—	—	—	—	—	—			—	—	—	—	—	—	—	—
1879	—	—		—	—	—			—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1880	—	—	—	—	—	—			—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1882	—	—	—	—	—	—			—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1884	Yes	—	Yes	—	Yes	Yes			Yes	Yes	Yes*	Yes	—	Yes	Yes*			Yes	Yes	Yes	Yes	Yes	Yes	—	Yes*
1885	—	—	O	—	—	—			—	—	—	—	—	—	—			—	—	—	—	—	—	—	—
1887	—	—	—	—	—	—			—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1888	—	—	—	—	—	—			—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1890	Yes	—	—	—	Yes	Yes		Yes	Yes	Yes	Yes*	—	—	Yes	Yes*			Yes	—	—	Yes	—	Yes	—	Yes*
1892	—	—	Yes	—	—	—		—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—
1893	Yes	—	O	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1894	—	—	—	—	—	—		—	—	—	—	—	—	O	—			—	—	—	—	O	—	—	—
1895	—	—	—	—	—	—		—	—	—	—	—	—	—	Yes*			—	—	—	—	O	—	—	—
1896	—	—	—	—	Yes	—		Yes	—	Yes	Yes*	—	—	—	Yes*			—	—	—	—	—	—	—	—
1898	—	—	—	—	—	—		Yes	—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1899	—	—	—	—	—	—		Yes	—	—	Yes*	—	—	—	Yes			—	—	—	—	—	—	—	—
1901	—	—	—	—	—	—		Yes	—	—	Yes*	—	—	—	Yes			—	—	—	—	Yes	—	—	—
1902	—	—	—	—	—	—		—	—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1903	—	—	—	—	—	—		Yes	—	—	Yes*	—	—	Yes	Yes			—	—	—	—	—	—	—	—
1904	—	—	—	—	—	—		—	—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—		Yes	—	—	Yes*	—	—	—	Yes*			Yes	—	—	—	—	—	—	—

Continued on next page

Table 1: Chronologies of Financial Crises in the United States, 1791–2023 (*continued*)

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W
1906	—	—	—	—	—	—		—	—	—	—	—	—	—	Yes*			—	—	—	—	—	—	—	—
1907	Yes	—	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1908	—	—	—	—	—	—		—	—	—	Yes*	—	—	—	Yes*			—	—	—	—	—	—	—	—
1909	—	—	—	—	—	—		Yes	—	—	—	—	—	—				Yes	—	—	—	—	—	—	—
1913	—	—	—	—	—	—		—	—	—	—	—	—	Yes				—	—	—	—	—		—	—
1914	—	—	Yes	—	Yes	—			—	Yes	—	—	—	—				Yes	Yes	—	—	Yes		—	—
1917	—	—	—	—					—		—	—	—					Yes	—	—	—	—		—	—
1920	—	—	—	—					—		Yes*	—	—					Yes	—	—	—	—		—	—
1923	—	—	—	—			Yes*		—		—	—	—					—	—	—	—	—		—	—
1924	—	—	—	—			Yes*		—		—	—	—					—	—	—	—	—		—	—
1926	—	—	—	—			Yes*		—		Yes*	—	—					—	—	—	—	—			—
1927	—	—	—	—			Yes*		—		Yes*	—	—					—	—	—	—	—			—
1929	—	—	—	—			Yes*		—		Yes*	Yes	—					Yes	Yes	Yes	—	Yes			—
1930	Yes	—	Yes	Yes					Yes			Yes	Yes					—	O	—	Yes	—			Yes
1931	—	Yes	O	Yes					Yes			—	—					—	O	—	—	—			Yes
1932	—	O	O	—					—			Yes	—					—	O	—	—	—			Yes
1933	—	—	O	Yes					Yes			—	—					—	O	—	—	—			Yes
1939	—	—	—						—			—	—					Yes	—	—	—	—			
1958	—	—	—						—			—	—					Yes	—		—	—			
1962	—	—	—									—	—				—	—	—		—	Yes			
1966	—	—	—									—	—				—	Yes	—		—	—			
1969	—	—	—									—	—				—	Yes	—		—	—			
1970	—	—	—									—	—			—	—	Yes	—		—	—			
1973	—	—	Yes									—	—			—	Yes	—	—		—	—			
1974	—	—	O									—	—			—	O	Yes	—		—	—			
1975	—	—	O									—	—			—	O	—	—		—	—			
1976	—	—	—									—	—			—	—	Yes	—		—	—			
1980	—	—	—									—	—			—	—	Yes	—		—	—			
1982	—	Yes	Yes									Yes	—			—	Yes	—	—		—	—			
1983	—	O	O									Yes	—			—	O	—	—		—	—			
1984	Yes	O	O									Yes	Yes			—	O	Yes	Yes		—	—			
1985	—	O	—									Yes	—			—	—	—	O		—	—			
1986	—	O	—									—	—			—	—	—	O		—	—			
1987	—	—	—									—	—			—	—	—	O		—	—			
1988	—	—	Yes									—	—			Yes	Yes	—	O		—				
1989	—	—	O									—	—			—	O	—	O		—				
1990	Yes	—	O									—	—			—	O	—	O		—				
1991	—	—	O									Yes	—			—	O	—	O		—				
1992	—	—	—									Yes	—			—	—	—	—		—				
1998	—		—									—	—			—	—	Yes	—		—				
2001	—		—									—	—			—	—	Yes	—		—				
2007	Yes		Yes									Yes	Yes			Yes		Yes	Yes		—				
2008	—											Yes	—			—		—	O		Yes				
2009	—											—	—			—		—	O						
2010	—											—	—			—		—	O						
2023												Yes													

Notes: This table summarizes existing financial crisis chronologies in the United States from 1791 to 2023. For each chronology, years identified as the start of a crisis are marked "Yes"; years associated with an ongoing crisis are marked "O"; years included in the sample but without a crisis are marked "—"; and years identified as minor crises are marked "Yes*". The chronology definitions are provided in Table C.1 of the online appendix.

Sources: B/V/X (Baron, Verner and Xiong, 2021); B/D/W (Bordo, Dueker and Wheelock, 2002); B/H (Bordo and Haubrich, 2017); B/W (Bordo and Wheelock, 1998); C/G (Calomiris and Gorton, 1991); C (Conant, 1915); D/R (Davison and Ramirez, 2014); DL/S (DeLong and Summers, 1986); F/S (Friedman and Schwartz, 1963); G (Gorton, 1988); J (Jalil, 2015); J/K/M/S (Jamilov, König, Müller and Saidi, 2024); J/S/T (Jordà, Schularick and Taylor, 2017); Ju (Juglar, 1916); K (Kemmerer, 1910); L/V (Laeven and Valencia, 2020); LS/N (Lopez-Salido and Nelson, 2010); M/S (Metrick and Schmelzing, 2021); R/R (Reinhart and Rogoff, 2009); Rb (Rothbard, 2002); Ro (Rockoff, 2021); So (Sobel, 1988); Sp (Sprague, 1910); T (Thorp, 1926); W (Wicker, 2000, 2006). We use the most recent updates of these chronologies when available, as in the cases of J/K/M/S, J/S/T, and R/R.

Table 2: Chronologies of Crisis Years Based on Alternative Indicators, 1791–2023

Year	Benchmark	Minor crisis	Govt. intervention	Year	Benchmark	Minor crisis	Govt. intervention
1791			Yes	1907	Yes		
1792			Yes	1908		Yes	
1809		Yes		1909			Yes
1819		Yes		1917			Yes
1825		Yes		1920			Yes
1829			Yes	1926		Yes	
1833		Yes	Yes	1927		Yes	
1837	Yes			1929		Yes	
1841		Yes		1930	Yes		
1842		Yes		1939			Yes
1851		Yes		1958			Yes
1854		Yes		1966			Yes
1857	Yes			1969			Yes
1860		Yes		1970			Yes
1861		Yes	Yes	1974			Yes
1871			Yes	1976			Yes
1873	Yes			1980			Yes
1884	Yes	Yes		1982	Yes		
1890		Yes		1998			Yes
1893	Yes			2001			Yes
1896		Yes		2007	Yes		
1905		Yes	Yes	2023	Yes		

Notes: This table presents three crisis year indicators for the United States: a benchmark indicator of crisis start years (excluding minor crises), an indicator of minor crisis years, and an indicator of *candidate* crisis start years based on government intervention episodes from Metrick and Schmelzing (2021). For the benchmark, we designate a year as the start of a crisis if it appears in at least one-half of the reporting chronologies in Table 1, and is identified as a start year of a major crisis based on financial sector outcomes rather than government interventions. In addition, we select 1982 as the start year of the Savings and Loan Crisis of the 1980s (rather than 1984 or 1988) since no chronology classifies this year as part of an ongoing crisis episode. For the minor crisis indicator, we classify a year as a minor crisis year if at least half of the chronologies reporting minor crises (i.e., B/W, D/R, J, K, and W) identify a minor crisis episode in that year.

Table 3: Chronologies of Local Financial Distress for Selected States, 1870–2021

State	Year	Deposits (pct. growth)	Wholesale liabilities (pct. growth)	Bank failures	State	Year	Deposits (pct. growth)	Wholesale liabilities (pct. growth)	Bank failures
California	1888	-19.1	2.6	3		1899	-15.4	-13.4	5
	1892	-5.5	-10.6	1		1902	2.6	-1.8	6
	1893	-27.5	-12	3		1903	-11.3	1	7
	1907	-15.3	-37.5	6		1905	-3.1	-15.3	11
	1913	5.3	-0.9	1		1906	-1.3	4.3	4
	1914	5.5	-22.7	4		1907	0.7	-12.7	5
	1917	22.7	-4.2	7		1913	-4.4	-5.1	4
	1920	-3.2	-22.7	10		1914	15.3	-5	5
	1923	8.3	-1.7	19		1917	43.7	-9.1	7
	1924	-5.9	-5.5	17		1920	-8.8	-17.7	14
	1931	8	-21.9	19		1923	-14.1	-9.9	6
	1932	-16.8	-35.5	23		1927	4.5	-2.2	8
	1933	-1.9	-16.7	12		1929	-8.8	-32.6	28
	1983	6	-5.7	5		1931	-11.6	-1.3	45
	1984	3.8	-68	6		1932	-27.1	-35.9	26
	1985	-17	-5.3	7		1933	-2.5	0.3	30
	1990	7.8	-5.4	4		1985	-6	1.4	2
	1991	1.7	-15.9	4		1988	19.9	-0.4	1
	1992	-1.3	-14.3	12		1990	-1.3	0.9	2
Florida	1887	2.3	-33	1		1992	-0.3	2.9	2
	1893	-19.9	-38.2	2	Texas	1878	-0.3	26.2	1
	1895	-18.9	2.4	2		1884	-5.5	-13.3	1
	1907	-6.1	-4.5	2		1890	20.9	-4.9	3
	1913	4.6	-6.6	1		1893	-17.3	-24.9	13
	1914	4.4	-11.9	1		1895	1.8	-17.2	8
	1917	17.5	-0.2	2		1896	-9.2	17.1	9
	1926	21.7	-22.3	2		1899	17.5	-2.8	5
	1927	-18.7	-25.1	4		1901	1.3	-19.4	3
	1929	-12	-24.1	14		1902	0.3	-2.6	4
	1930	-7	-0.3	6		1907	-16.6	-52.6	14
	1931	-11.3	-2.9	5		1914	-11.3	-24.2	9
	1932	-8.9	-37.1	2		1920	-21	-53.3	11
	1984	12.9	-68.1	2		1923	6.6	-5.9	7
	1985	-5.4	2.1	2		1926	2.2	-7.7	12
	1990	8.2	-3.2	7		1929	1.4	-19.5	32
	1991	4.9	-8	10		1930	-4.9	14.6	38
	1992	1.7	-4.1	2		1931	-10.5	7.3	71
	2008	7.1	-7.6	2		1932	-18.2	-33.5	43
New York	1873	-14.1	-8.5	9		1933	-2.3	5	44
	1876	3.4	-2.2	3		1969	1.2	-22.7	5
	1882	-15.3	-0.9	7		1984	9.9	-68.1	6
	1884	-13.3	-11.3	7		1985	5.3	-0.4	12
	1890	-3.6	-6.1	5		1988	0.9	-21.9	175
	1893	-4.3	5.9	2		1990	6.3	-14.5	103
	1895	1.3	-10.6	4		1991	5.3	-29.3	31
	1896	-4.6	7.5	10		1992	5.1	-7.9	31

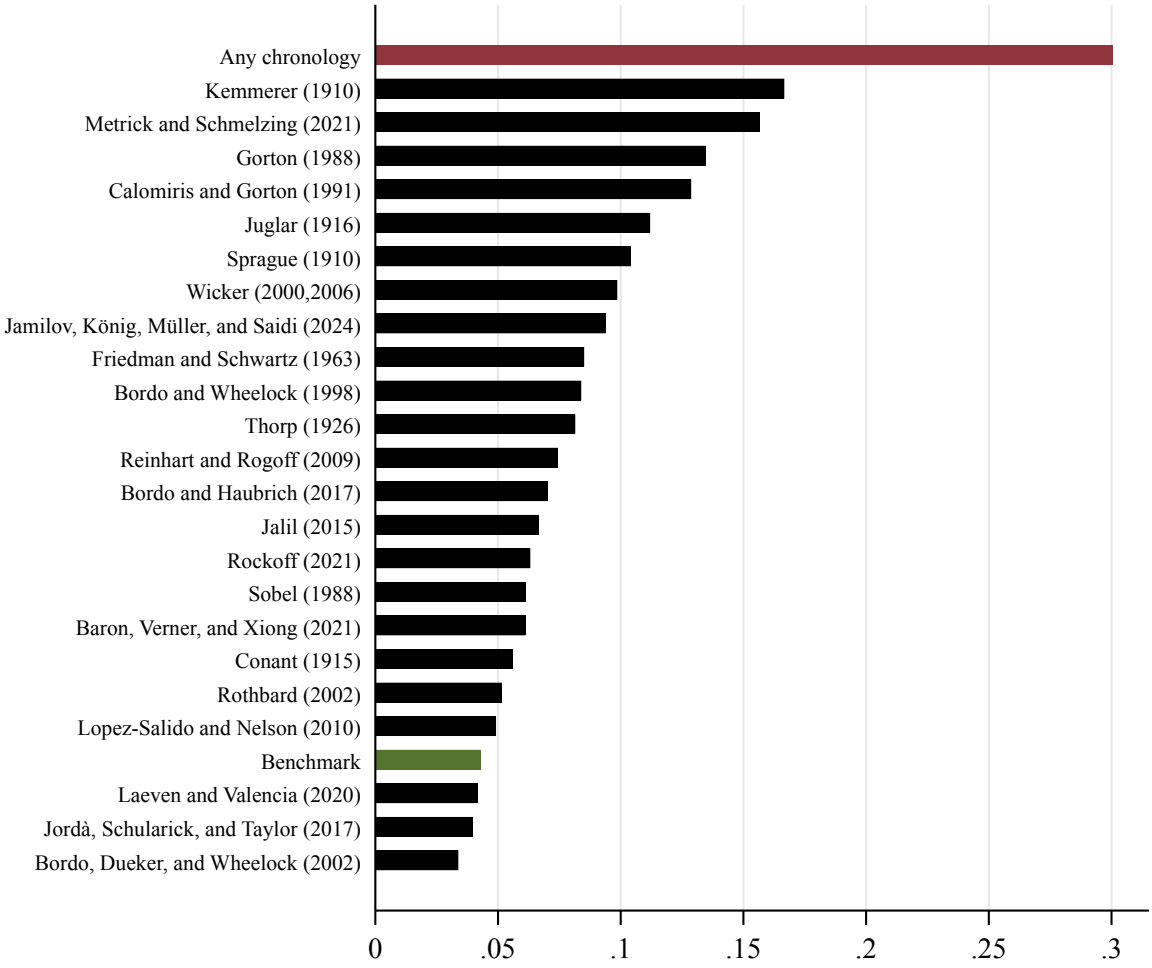
Notes: This table reports the identified episodes of financial distress for California, Florida, New York, and Texas, along with three financial indicators: percentage growth of deposits, percentage growth of wholesale liabilities, and the number of bank failures. For a given state, a year is classified as financially distressed if (i) any chronology surveyed in Table 1 marks it as a crisis start year or a minor crisis year, (ii) at least one bank failure occurs during that year, and (iii) either deposits or wholesale liabilities decline in the same year. See Section D of the online appendix for variable definitions.

Table 4: States-at-Risk and U.S. Output Growth, 1870-2021

Dependent var.:	$100 \times \Delta \text{GDP}_t$			$100 \times \Delta \text{IP}_t$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbf{1}\{\text{BenchmarkCrisis}_{t-1}\}$	-5.210*		-3.508	-11.162***		-8.084***
	(2.737)		(2.213)	(3.482)		(2.874)
$\text{States-at-risk}_{t-1}$		-1.733***	-1.581***		-2.948***	-2.546***
		(0.449)	(0.409)		(0.885)	(0.881)
AR(5)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	145	145	145	145	145	145

Notes: This table reports the results from a time series regression of the log change in real GDP (in columns 1-3) or industrial production (in columns 4-6) on a dummy for U.S. financial crises (`BenchmarkCrisis`) and the asset-weighted share of states experiencing local financial distress (`States-at-risk`) as of the previous year. $\mathbf{1}\{\text{BenchmarkCrisis}_{t-1}\}$ is an indicator for the benchmark crisis years. $\text{States-at-risk}_{t-1}$ is the asset-weighted fraction of states experiencing local financial distress in any given year, standardized to have a mean of 0 and standard deviation of 1. We classify an event as "local financial distress" if the following criteria are met: (i) *any* existing chronology surveyed in Table 1 reports a financial crisis in the United States, (ii) there is a contraction either in state-level deposits or wholesale liabilities in the crisis year, and (iii) there is at least one bank failure in a state in the crisis year. We control for 5 lags of US GDP growth rates. The standard errors reported in brackets are computed using 5 Newey-West lags. ***, **, * denote significance at the 1%, 5%, and 10% levels. We construct US-level real GDP by combining data from the BEA (1929 onward) and from Williamson (2025) for pre-1929 years. For industrial production, we combine data from Davis (2004) (1870–1915), Miron and Romer (1990) (1916–1919), and the Federal Reserve (1920–2021).

Figure 1: Fraction of Years Classified as Crisis Years by Chronology



Notes: This figure shows the fraction of years classified as crisis years in the chronologies listed in Table 1, excluding Davison and Ramirez (2014) and DeLong and Summers (1986). Each bar is computed as the number of years classified as crises (excluding minor crises and years associated with ongoing crises) divided by the total number of years covered by that chronology. The bars labeled "Any chronology" and "Benchmark" are based on the full period from 1791 to 2023. "Any chronology" refers to the share of years classified as crises by at least one chronology, whereas the "Benchmark" chronology corresponds to our baseline crisis indicator introduced in Table 2.

Figure 2: The Officer of the Comptroller of the Currency's (OCC) Annual Reports

MINNESOTA.

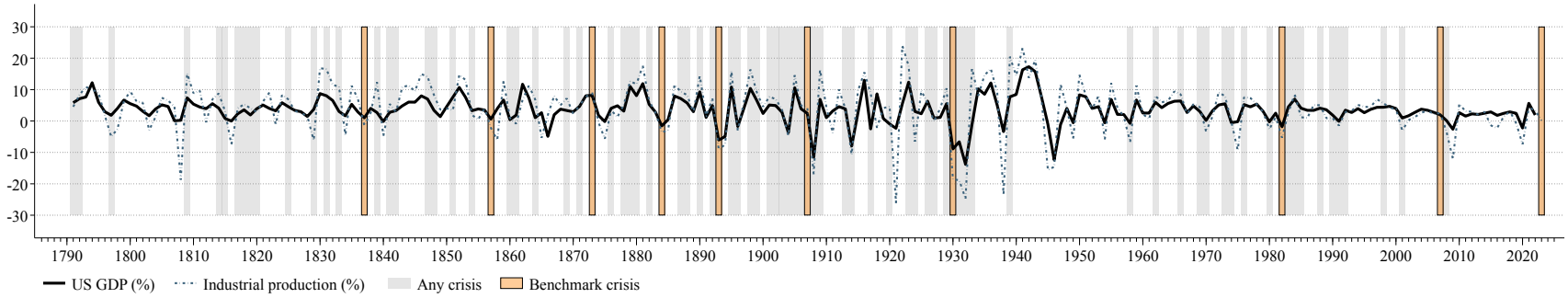
Resources.	JANUARY.	APRIL.	JULY.	OCTOBER.
	15 banks.	15 banks.	15 banks.	15 banks.
Loans and discounts	$2,095,713 77	$1,993,778 31	$2,082,646 26	$2,080,034 77
U. S. bonds dep'd to secure circulation	1,682,200 00	1,682,200 00	1,682,200 00	1,682,200 00
U. S. bonds dep'd to secure deposits	109,550 00	100,000 00	102,250 00	100,000 00
U. S. bonds and securities on hand	106,900 00	110,650 00	136,250 00	90,950 00
Other stocks, bonds, and mortgages	63,257 48	67,439 79	76,725 21	65,440 55
Due from national banks	241,440 33	301,547 26	231,625 07	437,946 07
Due from other banks and bankers	112,476 12	67,379 80	81,180 32	83,317 37
Real estate, furniture, &c	70,565 59	73,619 54	76,688 81	84,714 73
Current expenses	11,010 02	22,352 88	17,618 37	42,392 74
Premiums	22,040 93	19,888 26	18,743 16	10,048 76
Checks and other cash items	130,260 27	72,716 97	150,789 76	144,249 66
Bills of national banks	31,665 00	21,540 00	27,393 00	81,025 00
Bills of other banks	8,229 00	4,622 00	3,399 00	1,993 00
Specie	10,446 71	13,367 35	20,868 02	6,204 69
Legal tender notes and fract'l currency	285,580 69	218,160 72	293,901 38	395,348 26
Compound interest notes	328,450 00	267,530 00	292,500 00	159,650 00
Total	5,309,585 91	5,026,792 88	5,294,778 36	5,465,515 60

IOWA.

	45 banks.	44 banks.	45 banks.	45 banks.
Loans and discounts	$4,704,243 03	$5,083,156 28	$4,915,312 64	$5,249,256 22
U. S. bonds dep'd to secure circulation	3,682,150 00	3,682,150 00	3,712,150 00	3,713,150 00
U. S. bonds dep'd to secure deposits	583,250 00	575,150 00	504,000 00	429,000 00
U. S. bonds and securities on hand	306,350 00	296,250 00	388,900 00	299,600 00
Other stocks, bonds, and mortgages	131,427 82	151,143 69	146,023 00	125,811 71
Due from national banks	1,102,101 39	1,070,215 96	868,189 25	1,196,365 23
Due from other banks and bankers	273,729 72	294,904 00	154,385 35	145,967 58
Real estate, furniture, &c	187,185 55	206,550 60	225,254 68	246,230 96
Current expenses	49,387 07	73,467 89	37,852 46	86,132 43
Premiums	21,406 63	21,005 99	17,575 46	15,961 66
Checks and other cash items	181,190 92	137,842 02	151,279 23	152,678 82
Bills of national banks	215,936 00	201,865 00	216,656 00	253,920 00
Bills of other banks	16,983 00	9,657 00	6,239 00	6,272 00
Specie	55,542 98	47,429 07	43,364 02	29,730 22
Legal tender notes and fract'l currency	1,398,452 06	1,305,581 77	1,266,545 69	1,235,122 99
Compound interest notes	676,000 00	714,550 00	639,950 00	335,440 00
Total	13,585,336 17	13,790,839 27	13,243,656 78	13,522,739 82

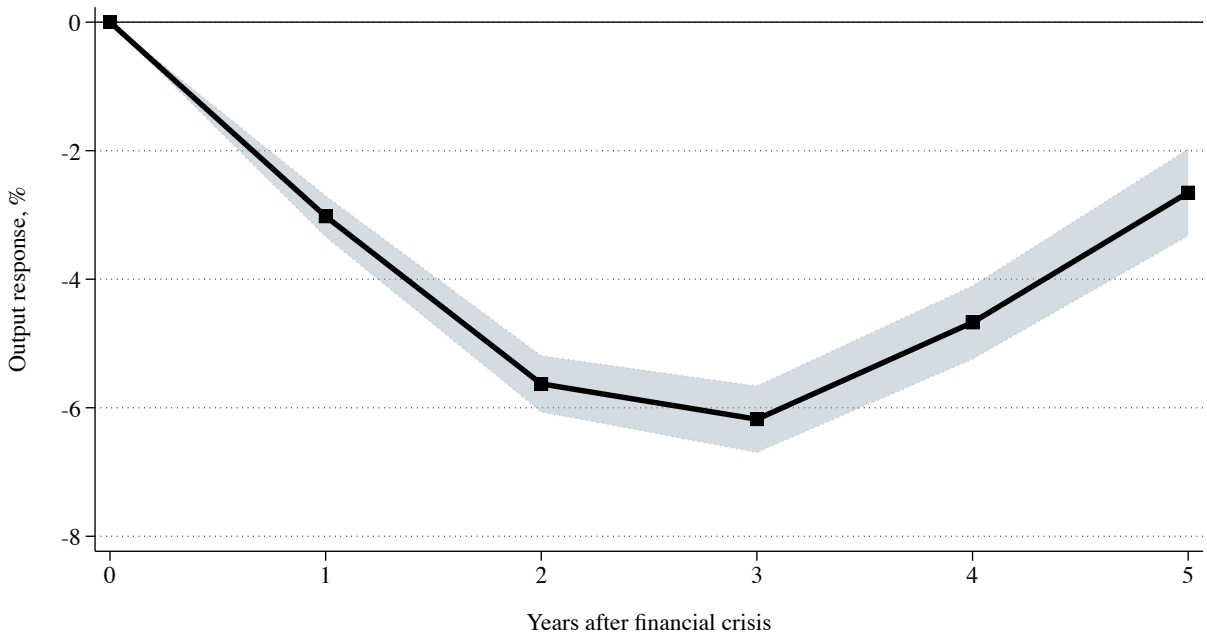
Notes: This figure provides an example of the raw source—the "Annual Report of the Comptroller of the Currency" as published by the United States' Office of the Comptroller of the Currency—from which we digitize state-level bank balance sheets for the period 1863 – 1960. A full list of OCC Annual Reports from 1863 – 1960 can be found on FRASER.

Figure 3: U.S. Financial Crises and Output Growth, 1791-2023



Notes: This figure plots two indicators of national economic activity, U.S. GDP and industrial production, both in growth rates and from 1791 to 2022. We label years where any chronology indicates a financial crisis in gray, and years where a "benchmark crisis" occurs in orange. We collect data on U.S. real GDP from the BEA from 1929 – 2022, and from Williamson (2025) from 1791 – 1928. The data on industrial production series is constructed by combining the data from Davis (2004) (1791–1915), Miron and Romer (1990) (1916–1919), and the Federal Reserve (1920–2022).

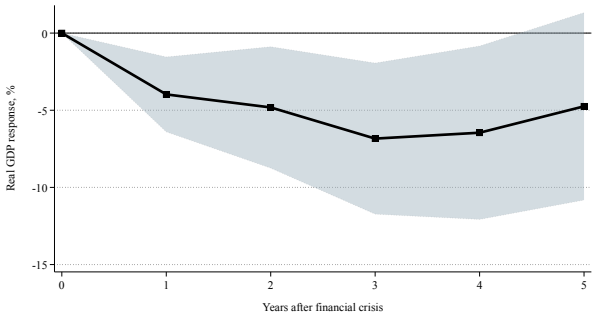
Figure 4: State-Level Output Losses Following U.S. Financial Crises, 1870-2021



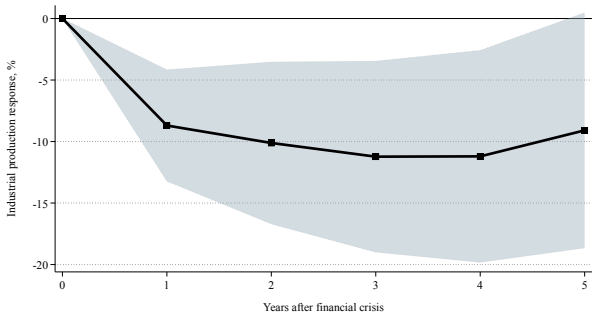
Notes: This figure presents the estimated response of the state-level economic activity index to financial crises identified in our benchmark chronology. We plot the impulse response function estimated from equation (4.1), which is in line with Jordà (2005) adapted for a panel setting, and includes state fixed effects. The black markers represents the estimated coefficient $\beta^h, h \in [0, 5]$, capturing the average response of state-level output over the next h years to the start of a financial crisis, relative to what would have been expected in the absence of it. The shaded region correspond to the 90% confidence interval, with standard errors clustered at the state level.

Figure 5: Output Losses of U.S. Financial Crises: Aggregate Time Series Evidence, 1791–2021

(a) Real GDP Response

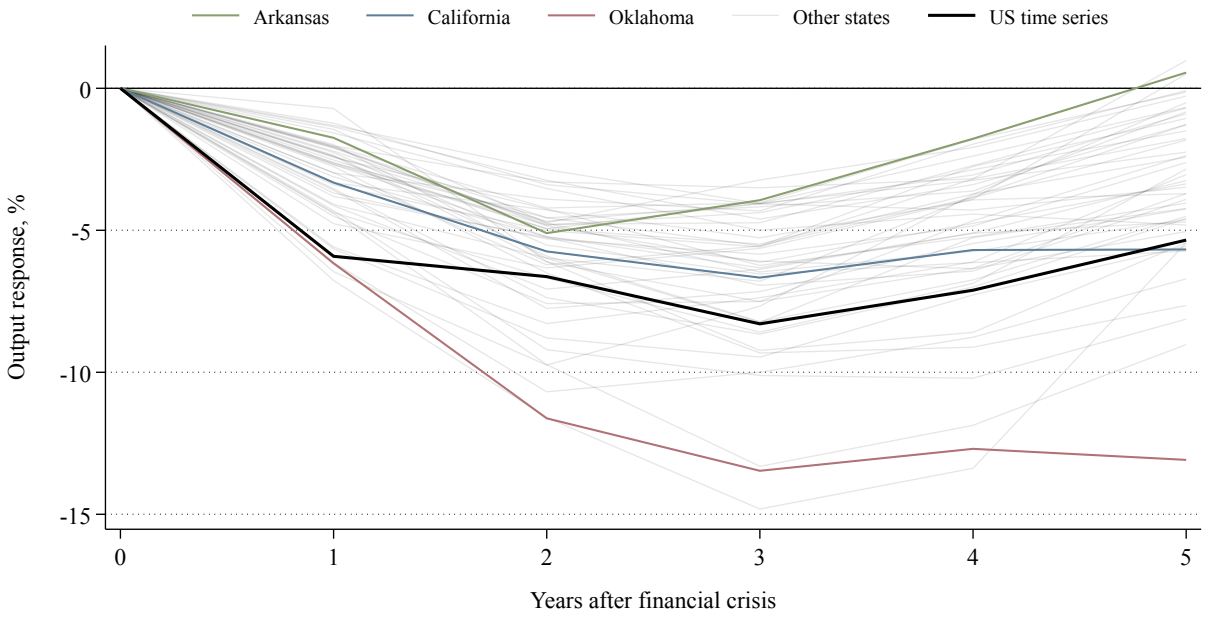


(b) Industrial Production Response



Notes: This figure presents the estimated response of aggregate output to financial crises identified in our benchmark chronology in panel (a), and of aggregate industrial production in panel (b). We plot the impulse response function based on the sequence of β^h coefficients from equation (4.2). The black markers represent the estimated coefficient $\beta^h, h \in [0, 5]$, capturing the average response of the respective indicator over the next h years to the start of a financial crisis, relative to what would have been expected in the absence of it. The shaded region corresponds to the 90% confidence interval based on Newey-West standard errors. U.S. real GDP data is taken from the BEA ($1929 - 2021$) and from Williamson (2025) ($1791 - 1928$). Industrial production is taken from the Federal Reserve ($1920 - 2021$), Miron and Romer (1990) ($1916 - 1919$) and Davis (2004) ($1791 - 1915$).

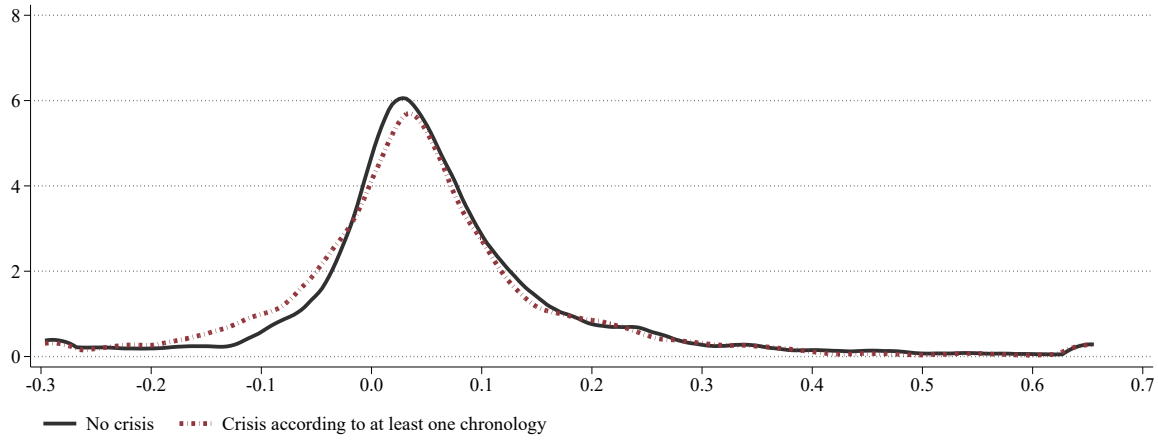
Figure 6: Heterogeneous Output Responses Across States: 1870-2021



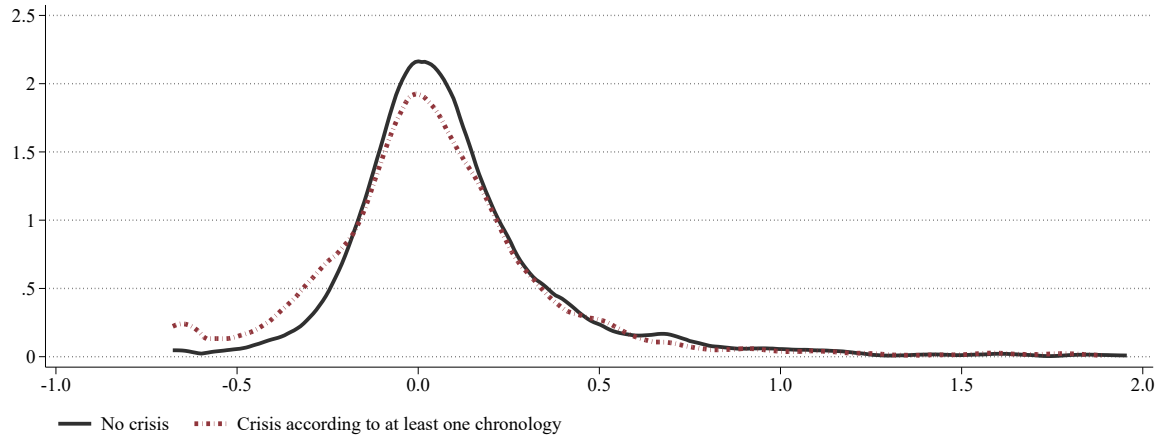
Notes: This figure presents the estimated response of the state-level economic activity index to a financial crisis as identified in our benchmark chronology. We plot the impulse response functions from a time series version of equation (4.1), where we estimate a separate regression for each state similar to equation (4.2). Each line plots the estimated coefficient $\beta^h, h \in [0, 5]$, capturing the average responses of state-level and national output over the next h years to the start of a financial crisis, relative to what would have been expected in the absence of it. We highlight the estimated coefficients of Arkansas, California, Oklahoma and the U.S. time series estimate from Figure 5. Each estimation uses data for the same sample period 1870–2021.

Figure 7: Distribution of Financial Distress Indicators during Financial Crises

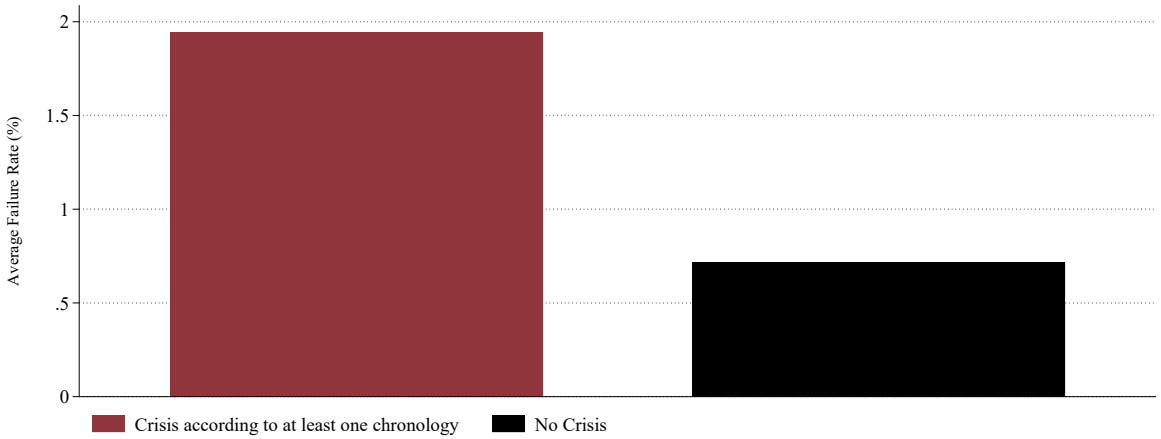
(a) Deposit Growth



(b) Wholesale Liability Growth



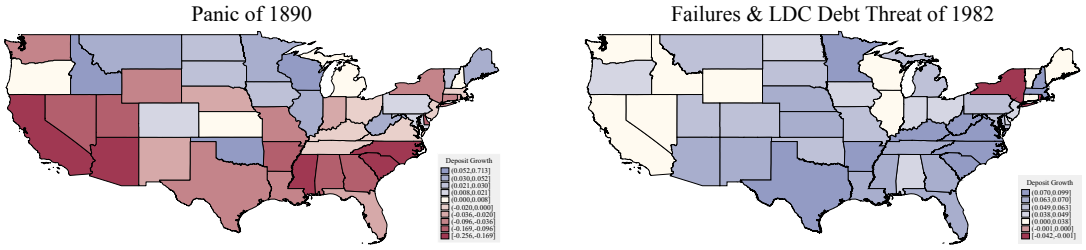
(c) Bank Failure Rate



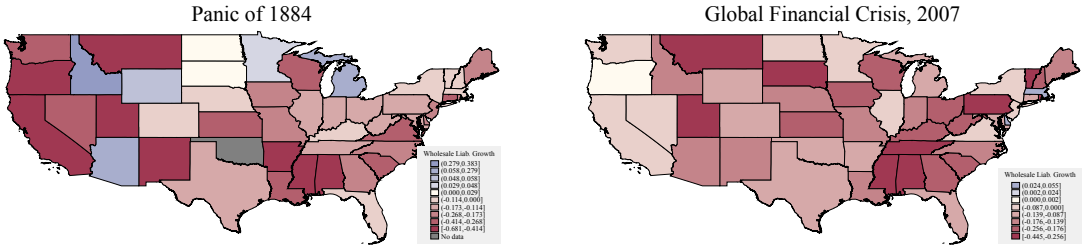
Notes: This figure presents density plots showing the distribution of deposit growth and wholesale liability growth, and a bar plot showing average bank failure rates, by periods of "No Crisis" (in black), and "Crisis according to at least one chronology" (in red). We refer the reader to Table 1 for more details on how we define crisis periods. Bank failure rates are reported in percentages. To account for outliers, bank failure rates are winsorized at the 99 percentile, while deposit growth and wholesale liability growth are truncated at 2.

Figure 8: Indicators of Financial Distress during Financial Crises

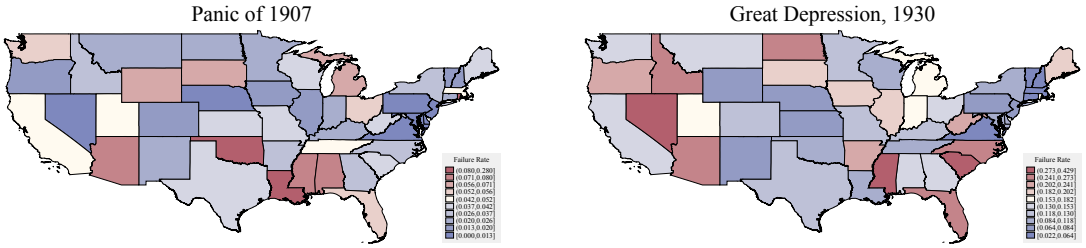
(a) Deposit Growth Rates



(b) Wholesale Liabilities Growth Rates



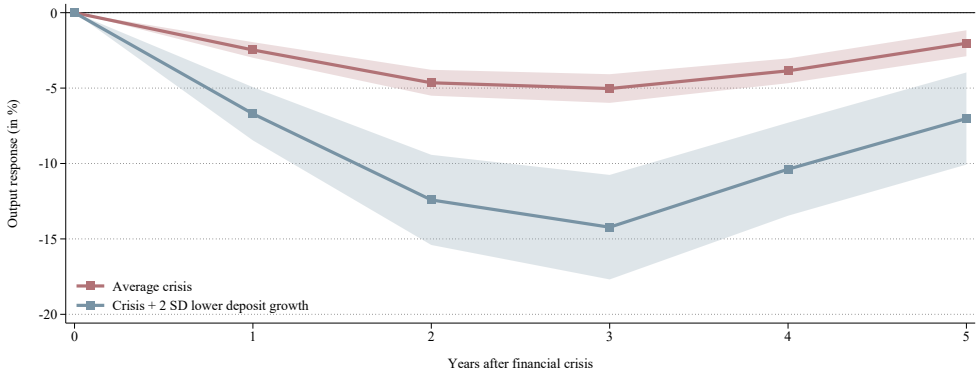
(c) Bank Failure Rates



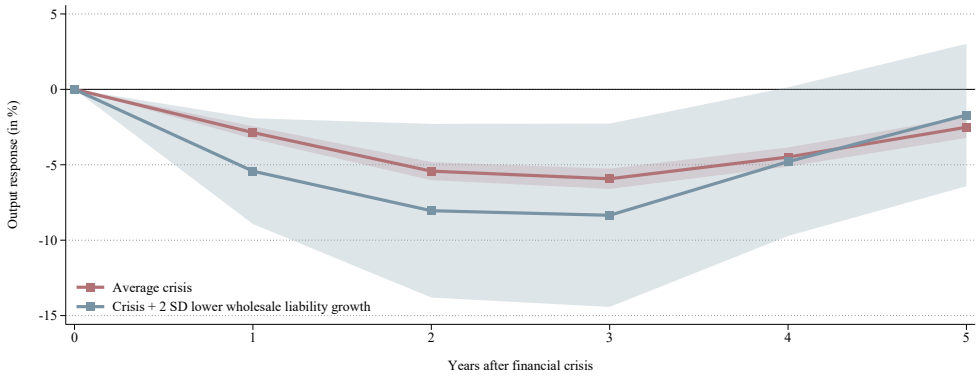
Notes: This figure plots three state-level indicators of financial distress - deposit growth rates, wholesale liabilities growth rates, and bank failure rates - across six significant crisis periods identified by our consensus chronology: the Banking Panic of 1890, the Banking Panic of 1884, the Trust-Company Banking Panic of 1907, the Banking Panic of 1930, the Failures & Less Developed Countries (LDC) Debt Threat of 1982 following Lopez-Salido and Nelson (2010), and the Financial Crisis of 2007. We refer the interested reader to Table C.1 for additional details on how each crisis is defined. For each crisis year, we plot the minimum growth rate of deposits and wholesale liabilities within 2 years of the crisis. Similarly, we plot the maximum failure rate within 2 years of the crisis. For each crisis period, for deposit and wholesale liabilities we assign colors by dividing positive growth rates into five quintiles (shaded in blue), and negative growth rates into five quintiles (shaded in red). We report ten deciles of failure rates, with those above the mean shaded in red, and those below the mean shaded in blue.

Figure 9: Financial Distress Indicators Predict Severity of Output Loss: 1870-2021

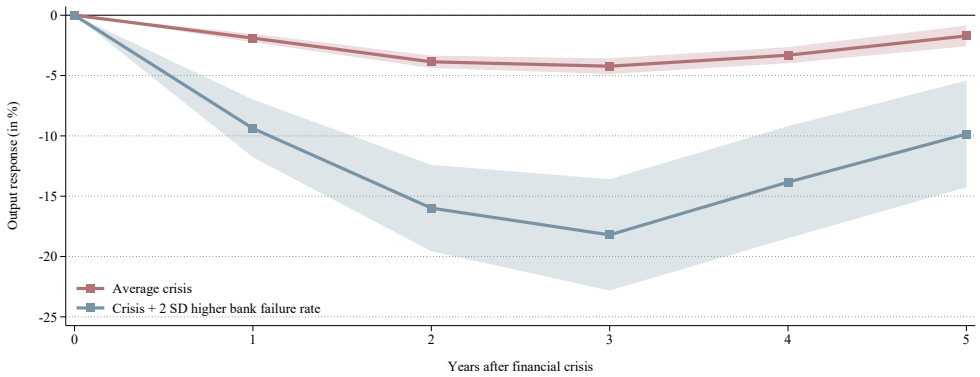
(a) Deposit Growth



(b) Wholesale Liabilities



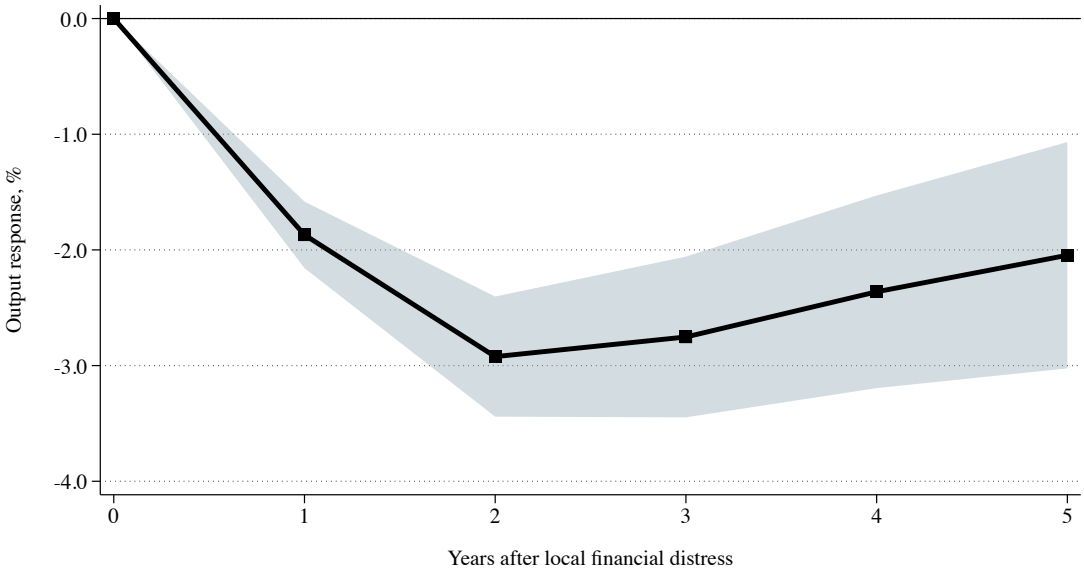
(c) Bank Failure Rate



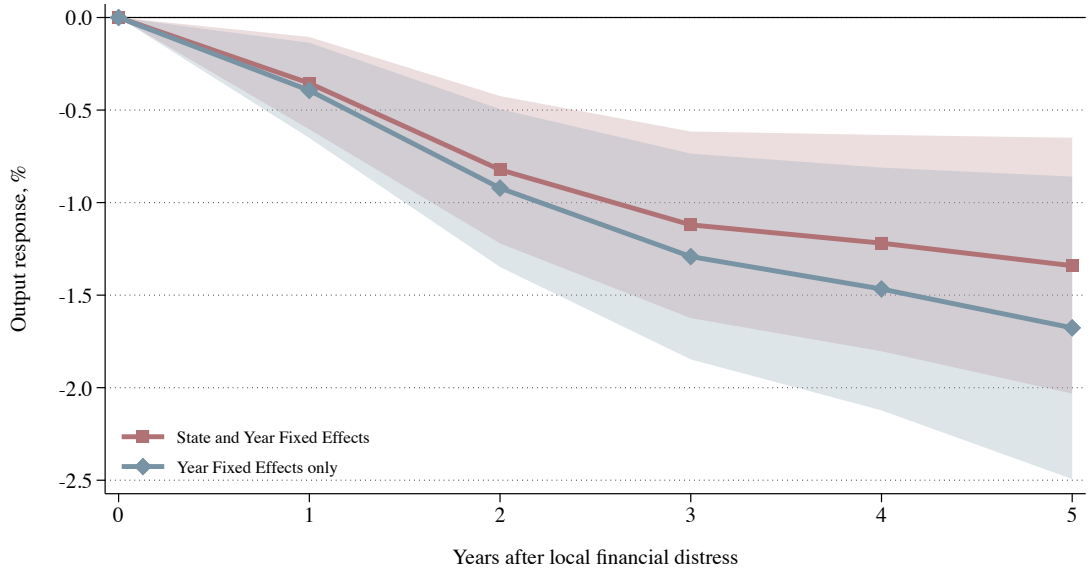
Notes: This figure presents the estimated response of our state-level economic activity index to a financial crisis as identified in our benchmark chronology, conditional on three indicators: the rate of deposit growth, wholesale liability growth, and bank failure rate respectively. We take the three-year moving average of each of these indicators. We plot the impulse response function estimated from equation (4.3), which extends our baseline specification to include each indicator and its interaction with the benchmark crisis dummy, and includes state fixed effects. The red markers represents the estimated coefficient $\beta_1^h, h \in [0,5]$, capturing the average output loss of a financial crisis at horizon h. The blue markers represents, for deposit growth and wholesale liability growth, the estimated coefficient $\beta_1^h - \beta_3^h * 2, h \in [0,5]$, where β_3^h captures how the relationship between the indicator and subsequent output changes during crises periods. Similarly, it represents the estimated coefficient $\beta_1^h + \beta_3^h * 2, h \in [0,5]$ for bank failure rates. The blue markers thus represent estimates of output losses when a state's banking sector experiences distress, as measured by low deposit or wholesale liability growth or alternatively high bank failure rates. The red and blue shaded areas correspond to the 90% confidence intervals based on standard errors clustered at the state level.

Figure 10: Output Losses Following Local Financial Distress, 1870–2021

(a) State Fixed Effects Only

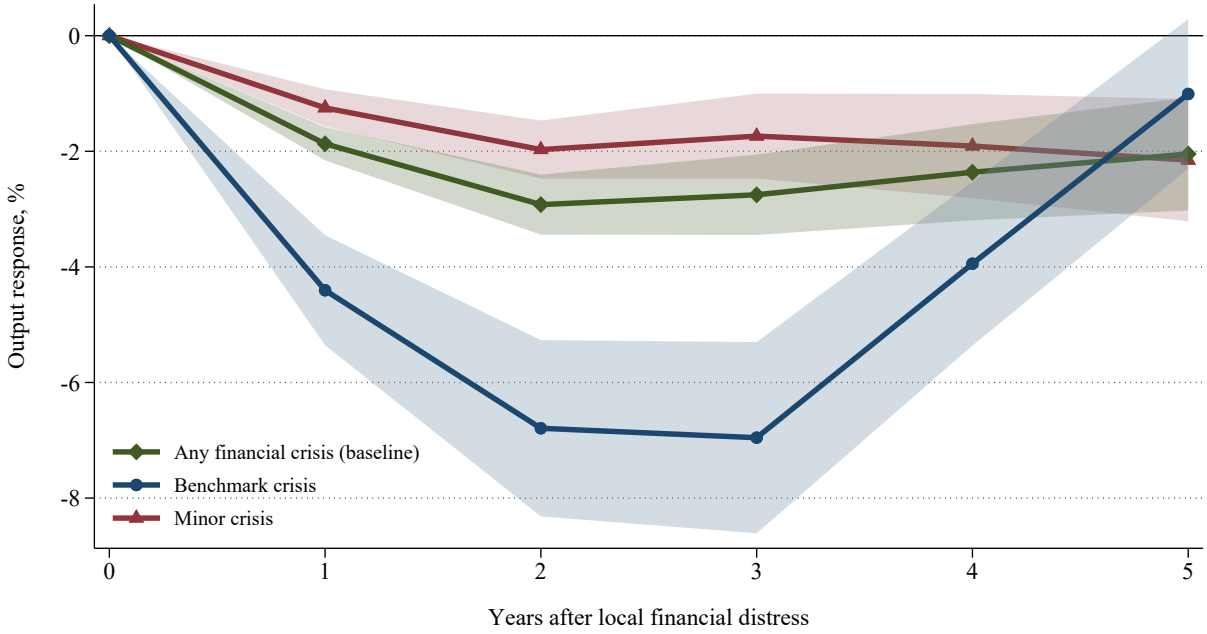


(b) With Year Fixed Effects



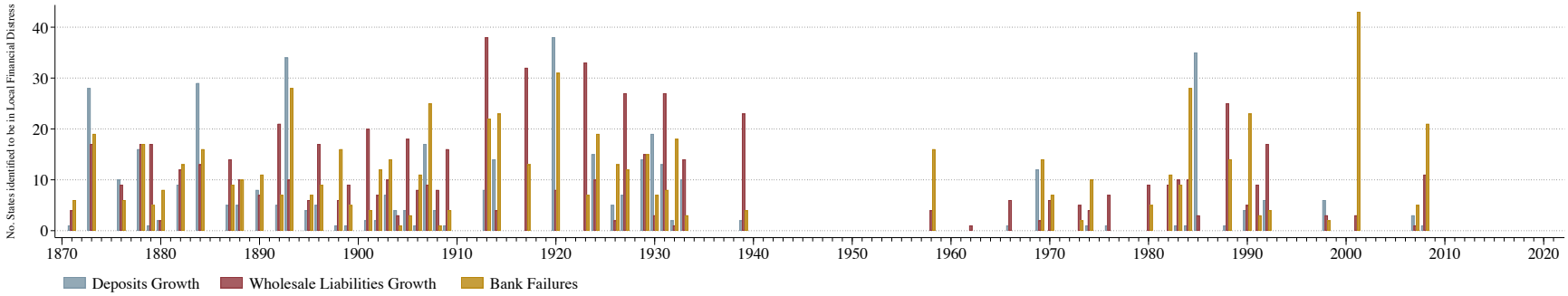
Notes: This figure presents the estimated response of our state-level economic activity index to a local financial distress identified in our state-level distress chronology. We plot the impulse response function estimated from equation (5.4), and report specifications including state fixed effects only in panel (a), and either only year fixed effects or both year fixed effects and state fixed effects in panel (b). The results with state and year fixed effects are presented in red, and including only year fixed effects in blue. The black markers represent the estimated coefficient $\beta^h, h \in [0, 5]$. With the inclusion of time fixed effects α_t^h, β^h captures the response of state-level output over the next h years to the start of a local financial distress, beyond the effect of common national shocks. The shaded regions correspond to the 90% confidence interval based on standard errors clustered by state.

Figure 11: Comparing Local Financial Distress During Major and Minor Crises



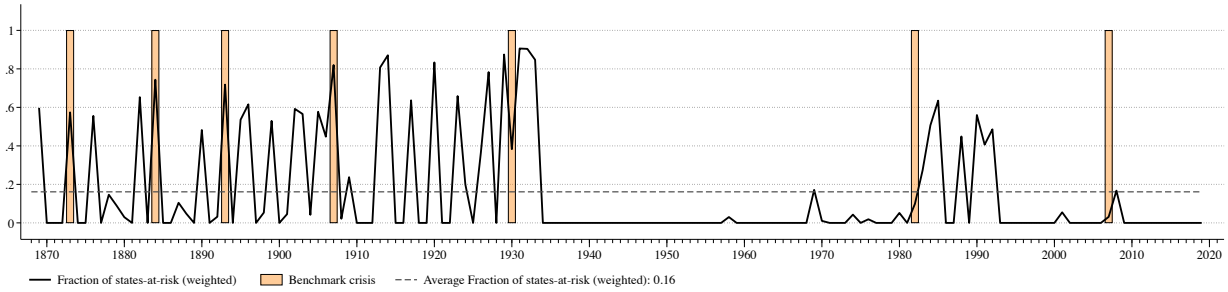
Notes: This figure presents the estimated response of the state-level economic activity index to three measures of local financial distress. Each measure requires there to be statistical evidence of a deposit or wholesale liability contraction in addition to at least one bank failure. The differences arise from further requiring three variants of narrative evidence of a U.S.-wide crisis: (a) in our baseline definition, we require narrative evidence of a crisis from *any* chronology, (b) alternatively, we require there to be evidence of a major "benchmark" crisis on which there is broad agreement, and (c) we also consider a measure based on localized crises, defined as years appearing in at least one chronology that are not classified as a benchmark crisis. We plot the impulse response function estimated from equation (5.4), which includes state fixed effects. The black markers represents the estimated coefficient $\beta^h, h \in [0, 5]$, capturing the total response of state-level output over the next h years to the start of local financial distress, relative to what would have been expected in the absence of a distress. The shaded region corresponds to the 90% confidence interval, based on standard errors clustered at the state level.

Figure 12: Number of Local Financial Distress Episodes by Distress Indicator, 1870-2021



Notes: This figure presents the number of local financial distress episodes across three perturbations of the local financial distress variable, based only on deposit growth (leftmost, in blue), growth in wholesale liabilities (middle, in red), or bank failures (rightmost, in gold). Local financial distress is defined as state-year observations where (a) at least one chronology defines a year as a U.S.-wide crisis, and (b) there is evidence of a contraction in deposits, wholesale liabilities, or at least one bank failure (depending on the measure). For each indicator and year, we plot the number of states experiencing a local financial distress episode as identified by the indicator in question.

Figure 13: Fraction of States Experiencing Local Financial Distress, 1870-2021



Notes: This figure presents the fraction of states whose banking sector experiences a crisis, which we term "states-at-risk". In this figure, we calculate this fraction by weighting states by the total assets of their banking sector, as $frac_states_at_risk_t = \sum_i \mathbf{1}_{i,t}^{Local\ crisis} \cdot a_{i,t} / \sum_i a_{i,t}$, where: $\mathbf{1}_{i,t}^{Local\ crisis}$ is an indicator variable that equals 1 if state i experiences local financial distress in year t, and 0 otherwise, and $a_{i,t}$ represents the total banking assets in state i at time t. Orange bars correspond to years for which a financial crisis is identified according to our benchmark chronology. We plot the average fraction of "states-at-risk" across years as a dotted line.

Online Appendix for

"The Costs of Financial Crises
in the United States"

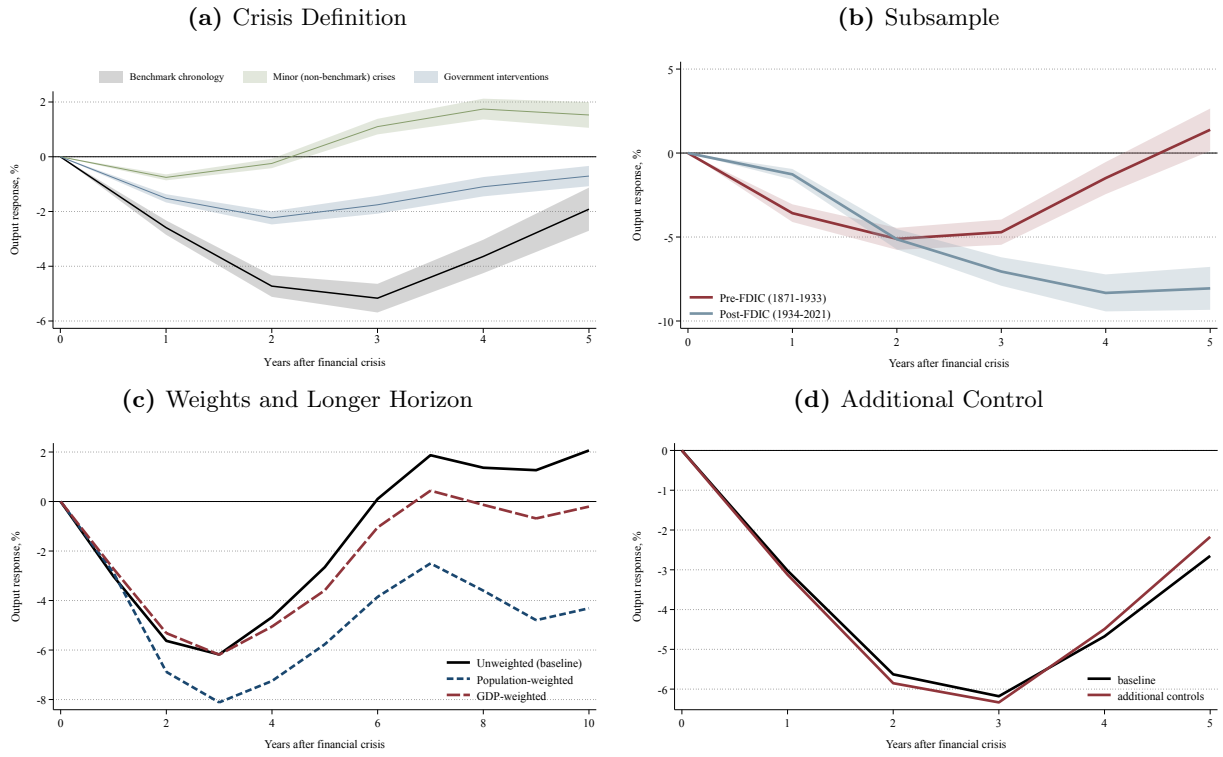
Joseph Hoon Chang Liu Karsten Müller Jonathan Payne Zhongxi Zheng

A Additional Empirical Results

A.1 U.S. Financial Crises

Robustness Tests We provide robustness test for the result shown in Figure 4 below, including: (1) using different crisis definitions, (2) examining the result by subsamples, (3) running regressions using different weights and considering longer prediction horizons, and (4) adding additional control variables including lagged growth rates in agricultural sector gross receipts and U.S. GDP. The results remain largely consistent with the baseline.

Figure A.1: U.S. Crises and Local Output – Robustness



Notes: These figures present the estimated responses of the state-level economic activity index to financial crises identified in our benchmark chronology in (b)–(d) and alternative crisis definitions in (a). The specifications follow that in Figure 4, except that: in (a), we use different crisis definitions; in (b), we examine the results by subsamples of pre- and post-FDIC periods; in (c), we present results of regressions weighted by population and GDP; and in (d), we add additional control variables including lagged growth rates in agricultural sector gross receipts and U.S. GDP.

Alternative Dependent Variables Figure A.2 presents the estimated dynamics responses of alternative state-level economic measures to the benchmark crisis.

A.2 Local Financial Distress

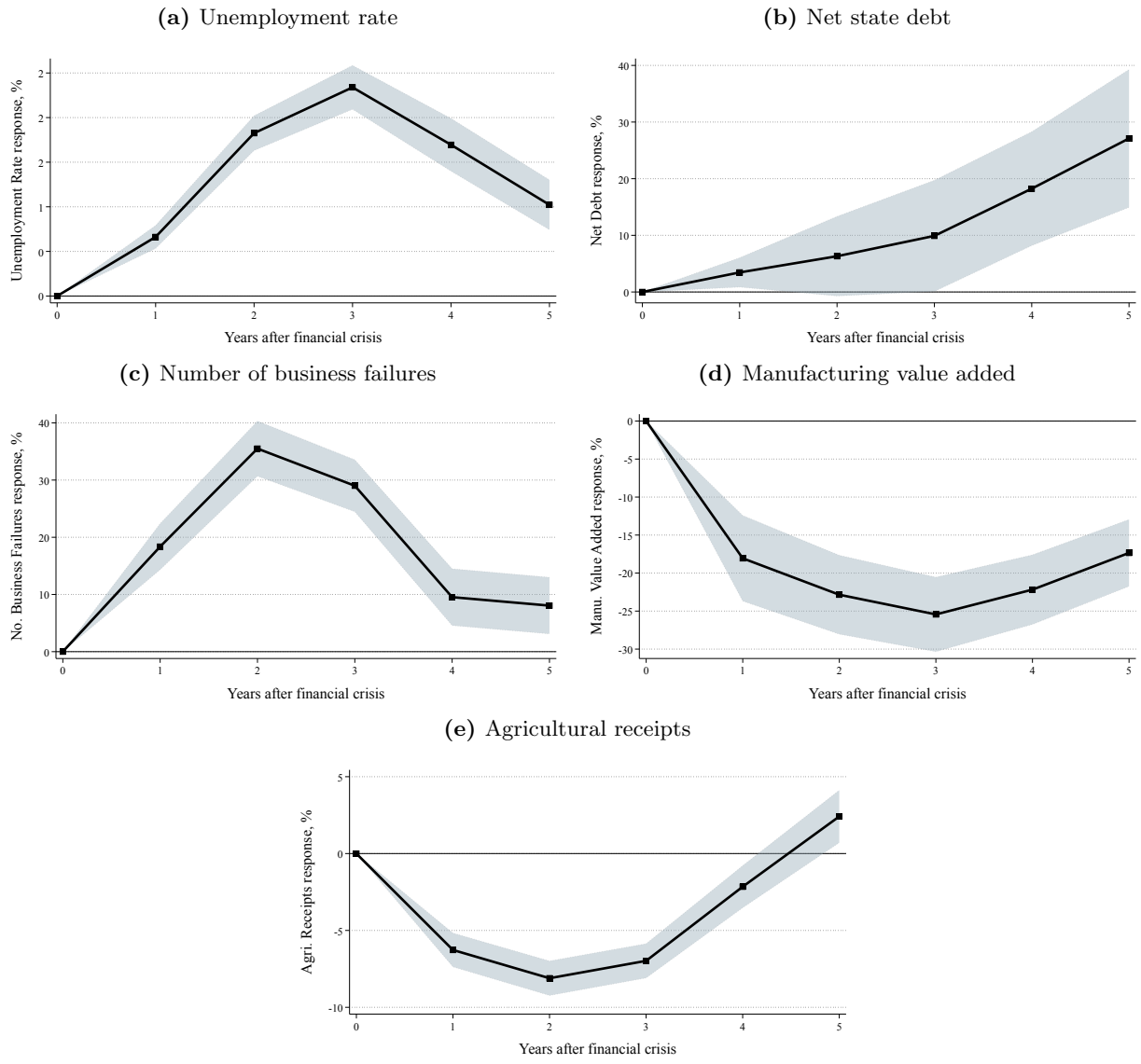
Alternative Classification of Distress We consider alternative classifications of local financial distress and list the details in Table A.1 for four states: California, Florida, New York and Texas. We also compare these distress episodes with narrative-based evidence from Davison and Ramirez (2014), Jalil (2015), and Metrick and Schmelzing (2021) in Table A.2. In particular, we plot all states and years for which we were able to find narrative evidence of a "local crisis" in any one of these chronologies. We find that our method detects local financial distress using at least one of our measures for all of these. This validation highlights the consistency of our distress classifications with narrative accounts when such evidence is available.

Alternative Specifications We provide an array of alternative specifications for the result shown in figure 10a, including: (a) examining the results accounting for changes in the source of crises during the pre- and post-FDIC periods, either going from retail deposits to wholesale liabilities, or going from runs (wholesale liabilities or deposits) to solvency issues (bank failures only) by constructing combined indicators, (b) including other lending institutions from our dataset in constructing deposit and wholesale liability contractions, including state banks, private banks, trust loan corporations, and savings banks in the historical sample, as well as savings institutions in the modern sample, (c) running weighted regressions, and (d) identifying financial distress in a purely statistical manner with deposit contractions, wholesale liability contractions, and increases in bank failures, respectively without taking into account narrative evidence.

Overall, the robustness tests show largely consistent results with our baseline estimates. Panel (d) shows that, when we completely ignore narrative evidence of crises, only deposit contractions robustly predict output losses, highlighting the usefulness of narrative indicators in detecting crises.

Standard Errors In our main exercises, we report standard errors clustered by state. In Figure A.4, we re-run our baseline regression in Figure 10a using heteroskedasticity-robust standard errors, standard errors clustered by state and year, and Driscoll-Kraay standard errors. As expected, the confidence intervals are larger, but still reject the null hypothesis of zero output losses.

Figure A.2: Changes of Other State-Level Variables Following U.S. Financial Crises, 1863-2022



Notes: These figures present the estimated responses of other state-level economic indicators—including the unemployment rate, state net debt, number of business failures, manufacturing sector value added and agriculture sector gross receipts—to financial crises identified in our benchmark chronology. We plot the impulse responses estimated from equation (4.1), which is in line with Jordà (2005) adapted for a panel setting, and includes state fixed effects. The black markers represents the estimated coefficient $\beta^h, h \in [0, 5]$, capturing the average response of state-level output over the next h years to the start of a financial crisis, relative to what would have been expected in the absence of it. The shaded regions correspond to the 90% confidence intervals, based on standard errors clustered at the state level.

Table A.1: Alternative Classifications of Local Financial Distress for Selected States, 1871–2021

					Distress classification									Distress classification		
State	Year	Deposits	Liabilities	Failures	Baseline	Broad	Narrow	State	Year	Deposits	Liabilities	Failures	Baseline	Broad	Narrow
California	1876	-2.3	611	0	No	Yes	No		1899	18.7	-9.1	0	No	Yes	No
	1878	-4.4	16.4	0	No	Yes	No		1903	21	72	2	No	Yes	No
	1879	25.9	90.2	2	No	Yes	No		1907	-6.1	-4.5	2	Yes	Yes	Yes
	1880	34.8	-32.7	0	No	Yes	No		1908	2.2	5.4	1	No	Yes	No
	1884	-21.6	-50.8	0	No	Yes	No		1913	4.6	-6.6	1	Yes	Yes	No
	1888	-19.1	2.6	3	Yes	Yes	No		1914	4.4	-11.9	1	Yes	Yes	No
	1892	-5.5	-10.6	1	Yes	Yes	Yes		1917	17.5	-0.2	2	Yes	Yes	No
	1893	-27.5	-12	3	Yes	Yes	Yes		1920	0.3	-16	0	No	Yes	No
	1895	17.2	33.2	2	No	Yes	No		1923	16.9	17.1	6	No	Yes	No
	1896	-3.3	-0.5	0	No	Yes	No		1924	11.4	27.1	3	No	Yes	No
	1904	2.1	19.5	2	No	Yes	No		1926	21.7	-22.3	2	Yes	Yes	No
	1905	34.6	79.5	2	No	Yes	No		1927	-18.7	-25.1	4	Yes	Yes	Yes
	1907	-15.3	-37.5	6	Yes	Yes	Yes		1929	-12	-24.1	14	Yes	Yes	Yes
	1908	9.6	51.3	1	No	Yes	No		1930	-7	-0.3	6	Yes	Yes	Yes
	1909	23.5	38.6	3	No	Yes	No		1931	-11.3	-2.9	5	Yes	Yes	Yes
	1913	5.3	-0.9	1	Yes	Yes	No		1932	-8.9	-37.1	2	Yes	Yes	Yes
	1914	5.5	-22.7	4	Yes	Yes	No		1933	0.9	4.3	1	No	Yes	No
	1917	22.7	-4.2	7	Yes	Yes	No		1939	20.6	40.4	1	No	Yes	No
	1920	-3.2	-22.7	10	Yes	Yes	Yes		1958	11.6	-6.1	0	No	Yes	No
	1923	8.3	-1.7	19	Yes	Yes	No		1966	8		1	.	Yes	.
	1924	-5.9	-5.5	17	Yes	Yes	Yes		1970	13.3	-2.7	0	No	Yes	No
	1926	1.7	7.4	17	No	Yes	No		1973	15.9	-3	0	No	Yes	No
	1927	71.3	2.3	41	No	Yes	No		1974	5.4	-4.8	0	No	Yes	No
	1929	9.4	0.5	20	No	Yes	No		1980	12.1	38	1	No	Yes	No
	1930	0.2	65.2	14	No	Yes	No		1982	15.6	9.8	1	No	Yes	No
	1931	8	-21.9	19	Yes	Yes	No		1984	12.9	-68.1	2	Yes	Yes	No
	1932	-16.8	-35.5	23	Yes	Yes	Yes		1985	-5.4	2.1	2	Yes	Yes	No
	1933	-1.9	-16.7	12	Yes	Yes	Yes		1988	30.9	9.6	3	No	Yes	No
	1969	-4.2	-6.9	0	No	Yes	No		1990	8.2	-3.2	7	Yes	Yes	No
	1973	10.6	3.8	1	No	Yes	No		1991	4.9	-8	10	Yes	Yes	No
	1974	11.8	-0.2	0	No	Yes	No		1992	1.7	-4.1	2	Yes	Yes	No
	1976	4.2	611	1	No	Yes	No		2001	6.5	-28.5	0	No	Yes	No
	1982	9.4	7.7	2	No	Yes	No		2008	7.1	-7.6	2	Yes	Yes	No
	1983	6	-5.7	5	Yes	Yes	No	New York	1869	-15.5	-6.8	5	Yes	Yes	Yes
	1984	3.8	-68	6	Yes	Yes	No		1871	17.9	15.8	5	No	Yes	No
	1985	-17	-5.3	7	Yes	Yes	Yes		1873	-14.1	-8.5	9	Yes	Yes	Yes
	1988	29.5	7.4	3	No	Yes	No		1876	3.4	-2.2	3	Yes	Yes	No
	1990	7.8	-5.4	4	Yes	Yes	No		1878	11.8	0.4	5	No	Yes	No
	1991	1.7	-15.9	4	Yes	Yes	No		1879	19	28.5	2	No	Yes	No
	1992	-1.3	-14.3	12	Yes	Yes	Yes		1880	44.2	18.5	2	No	Yes	No
	2001	8.1	-25.1	0	No	Yes	No		1882	-15.3	-0.9	7	Yes	Yes	Yes
	2008	17.4	15.8	2	No	Yes	No		1884	-13.3	-11.3	7	Yes	Yes	Yes
Florida	1876	-28.5		0	.	Yes	.		1887	3.4	1.7	3	No	Yes	No
	1879	71.3	-68.1	0	No	Yes	No		1888	10.2	15.2	5	No	Yes	No
	1887	2.3	-33	1	Yes	Yes	No		1890	-3.6	-6.1	5	Yes	Yes	Yes
	1890	27.8	-24.5	0	No	Yes	No		1892	6.7	3.9	2	No	Yes	No
	1892	24	94.3	1	No	Yes	No		1893	-4.3	5.9	2	Yes	Yes	No
	1893	-19.9	-38.2	2	Yes	Yes	Yes		1895	1.3	-10.6	4	Yes	Yes	No
	1895	-18.9	2.4	2	Yes	Yes	No		1896	-4.6	7.5	10	Yes	Yes	No
	1896	-5.1	-20.3	0	No	Yes	No		1898	26.2	19.4	3	No	Yes	No

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Table A.1: Alternative Classifications of Local Financial Distress for Selected States, 1871–2021 (*continued*)

					Distress classification								Distress classification		
State	Year	Deposits	Liabilities	Failures	Baseline	Broad	Narrow	State	Year	Deposits	Liabilities	Failures	Baseline	Broad	Narrow
New York (ct.)	1899	-15.4	-13.4	5	Yes	Yes	Yes	Texas (ct.)	1890	20.9	-4.9	3	Yes	Yes	No
	1901	14.5	9.6	9	No	Yes	No		1892	24.9	19.4	4	No	Yes	No
	1902	2.6	-1.8	6	Yes	Yes	No		1893	-17.3	-24.9	13	Yes	Yes	Yes
	1903	-11.3	1	7	Yes	Yes	No		1895	1.8	-17.2	8	Yes	Yes	No
	1904	40.1	42.2	6	No	Yes	No		1896	-9.2	17.1	9	Yes	Yes	No
	1905	-3.1	-15.3	11	Yes	Yes	Yes		1898	12.1	12.5	9	No	Yes	No
	1906	-1.3	4.3	4	Yes	Yes	No		1899	17.5	-2.8	5	Yes	Yes	No
	1907	0.7	-12.7	5	Yes	Yes	No		1901	1.3	-19.4	3	Yes	Yes	No
	1908	21.4	55.1	5	No	Yes	No		1902	0.3	-2.6	4	Yes	Yes	No
	1909	-4.7	-16.7	0	No	Yes	No		1903	12.7	43.3	8	No	Yes	No
	1913	-4.4	-5.1	4	Yes	Yes	Yes		1904	16.2	31.8	9	No	Yes	No
	1914	15.3	-5	5	Yes	Yes	No		1905	16.7	43.9	18	No	Yes	No
	1917	43.7	-9.1	7	Yes	Yes	No		1906	23.9	38	11	No	Yes	No
	1920	-8.8	-17.7	14	Yes	Yes	Yes		1907	-16.6	-52.6	14	Yes	Yes	Yes
	1923	-14.1	-9.9	6	Yes	Yes	Yes		1908	12	95	9	No	Yes	No
	1924	22	28.7	6	No	Yes	No		1909	17	6.9	19	No	Yes	No
	1926	2.3	6.6	17	No	Yes	No		1913	19	29.2	12	No	Yes	No
	1927	4.5	-2.2	8	Yes	Yes	No		1914	-11.3	-24.2	9	Yes	Yes	Yes
	1929	-8.8	-32.6	28	Yes	Yes	Yes		1917	27.4	13.1	3	No	Yes	No
	1930	29.2	27.2	10	No	Yes	No		1920	-21	-53.3	11	Yes	Yes	Yes
	1931	-11.6	-1.3	45	Yes	Yes	Yes		1923	6.6	-5.9	7	Yes	Yes	No
	1932	-27.1	-35.9	26	Yes	Yes	Yes		1924	8.8	30.1	14	No	Yes	No
	1933	-2.5	0.3	30	Yes	Yes	No		1926	2.2	-7.7	12	Yes	Yes	No
	1939	17.5	18	2	No	Yes	No		1927	7	8	24	No	Yes	No
	1969	-2.2	-19.1	0	No	Yes	No		1929	1.4	-19.5	32	Yes	Yes	No
	1970	8.2	-4	0	No	Yes	No		1930	-4.9	14.6	38	Yes	Yes	No
	1973	8.3	-24	0	No	Yes	No		1931	-10.5	7.3	71	Yes	Yes	No
	1974	15.3	1.4	1	No	Yes	No		1932	-18.2	-33.5	43	Yes	Yes	Yes
	1976	0.7	611	1	No	Yes	No		1933	-2.3	5	44	Yes	Yes	No
	1984	-0.1	-64.1	0	No	Yes	No		1939	9.9	13	4	No	Yes	No
	1985	-6	1.4	2	Yes	Yes	No		1958	10.8	4.6	1	No	Yes	No
	1988	19.9	-0.4	1	Yes	Yes	No		1966	4.9		2	.	Yes	.
	1990	-1.3	0.9	2	Yes	Yes	No		1969	1.2	-22.7	5	Yes	Yes	No
	1991	1.2	7.5	1	No	Yes	No		1973	11.2	16.7	1	No	Yes	No
	1992	-0.3	2.9	2	Yes	Yes	No		1976	12.1	611	4	No	Yes	No
	2001	9.9	-10.5	0	No	Yes	No		1982	16.1	24.3	7	No	Yes	No
	2007	-4	-6.9	0	No	Yes	No		1983	11.5	16.9	3	No	Yes	No
Texas	1869	-20.4	125.9	0	No	Yes	No		1984	9.9	-68.1	6	Yes	Yes	No
	1871	38	-45.7	0	No	Yes	No		1985	5.3	-0.4	12	Yes	Yes	No
	1873	-4.5	-68.1	0	No	Yes	No		1988	0.9	-21.9	175	Yes	Yes	No
	1876	-3.5	84.4	0	No	Yes	No		1990	6.3	-14.5	103	Yes	Yes	No
	1878	-0.3	26.2	1	Yes	Yes	No		1991	5.3	-29.3	31	Yes	Yes	No
	1880	25.9	53	1	No	Yes	No		1992	5.1	-7.9	31	Yes	Yes	No
	1884	-5.5	-13.3	1	Yes	Yes	Yes		2008	12.5	4.9	1	No	Yes	No
	1887	18.1	14.8	1	No	Yes	No								

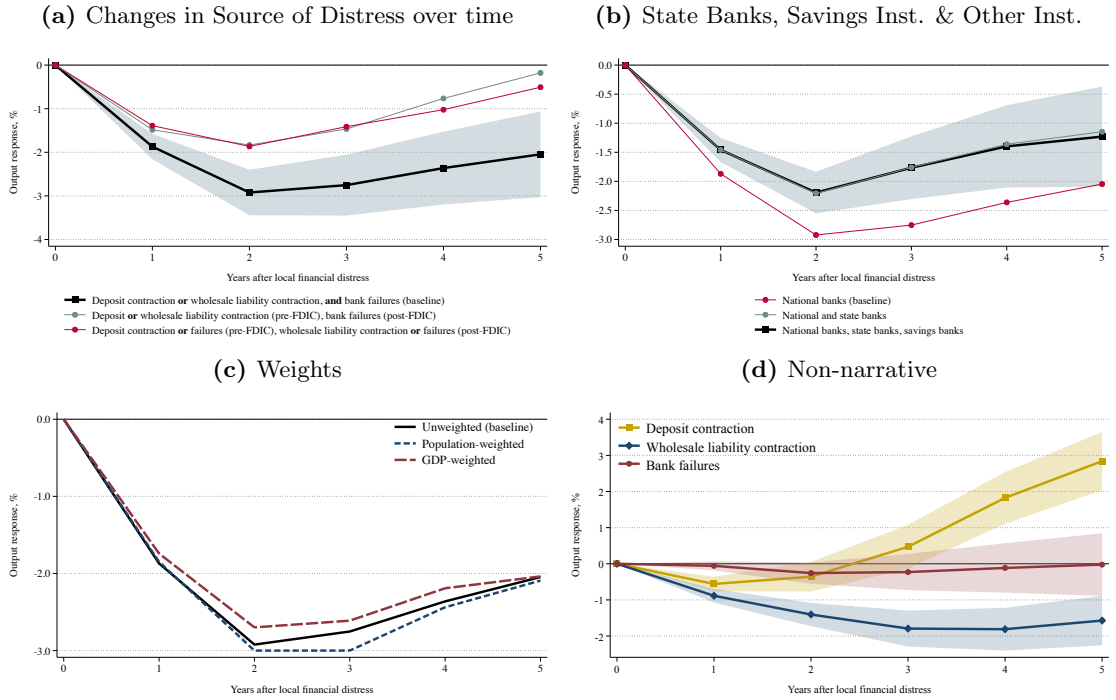
Notes: This table reports episodes of financial distress for selected states under three classifications. The "baseline" classification follows the criteria described in Table 3, defining a distress year as one that meets all of the following: (i) it is identified as a crisis year by at least one surveyed chronology in Table 1, (ii) there is at least one bank failure, and (iii) there is a decline in either deposits or wholesale liabilities in that year. The "broad" classification is more lenient: a year is considered distressed if it meets criterion (i) and has either a bank failure, a decline in deposits, or a decline in wholesale liabilities. The "narrow" classification is more restrictive: a year qualifies as distressed if it meets criterion (i), involves at least one bank failure, and shows declines in both deposits and wholesale liabilities.

Table A.2: Validation of Local Financial Distress Using Narrative Evidence

		Narrative evidence			Distress classification		
State	Year	Jalil	Davison-Ramirez	Metrick-Schmelzing	Baseline	Broad	Narrow
Alabama	1929	No	Yes	No	Yes	Yes	Yes
Florida	1926	Yes	Yes	No	Yes	Yes	No
	1927	Yes	Yes	No	Yes	Yes	Yes
	1929	Yes	Yes	Yes	Yes	Yes	Yes
Georgia	1926	Yes	Yes	No	Yes	Yes	No
Iowa	1926	No	Yes	No	Yes	Yes	Yes
Illinois	1896	Yes	No	No	Yes	Yes	No
	1905	Yes	No	Yes	No	Yes	No
	1929	No	Yes	No	Yes	Yes	Yes
	1932	No	No	Yes	Yes	Yes	Yes
Indiana	1929	No	Yes	No	Yes	Yes	No
Kansas	1927	No	Yes	No	Yes	Yes	No
Massachusetts	1899	Yes	No	No	Yes	Yes	Yes
	1920	Yes	No	No	Yes	Yes	Yes
	1991	No	No	Yes	Yes	Yes	Yes
Maryland	1903	Yes	No	No	No	Yes	No
Minnesota	1896	Yes	No	No	Yes	Yes	No
	1923	No	Yes	No	Yes	Yes	No
Missouri	1926	No	Yes	No	Yes	Yes	No
North Dakota	1920	Yes	No	Yes	Yes	Yes	Yes
Nebraska	1984	No	No	Yes	Yes	Yes	No
New Jersey	1884	Yes	No	No	Yes	Yes	Yes
New Mexico	1924	No	Yes	No	Yes	Yes	Yes
New York	1871	No	No	Yes	No	Yes	No
	1873	Yes	No	No	Yes	Yes	Yes
	1884	Yes	No	No	Yes	Yes	Yes
	1890	Yes	No	No	Yes	Yes	Yes
	1899	Yes	No	No	Yes	Yes	Yes
	1901	Yes	No	No	No	Yes	No
	1907	Yes	No	Yes	Yes	Yes	No
	1908	Yes	No	No	No	Yes	No
Ohio	1985	No	No	Yes	No	Yes	No
Oklahoma	1909	No	No	Yes	No	Yes	No
Pennsylvania	1873	Yes	No	No	No	Yes	No
	1884	Yes	No	No	Yes	Yes	Yes
	1903	Yes	No	No	No	Yes	No
South Dakota	1924	No	Yes	No	Yes	Yes	Yes
	1926	No	Yes	No	Yes	Yes	Yes
Wisconsin	1896	Yes	No	No	Yes	Yes	No

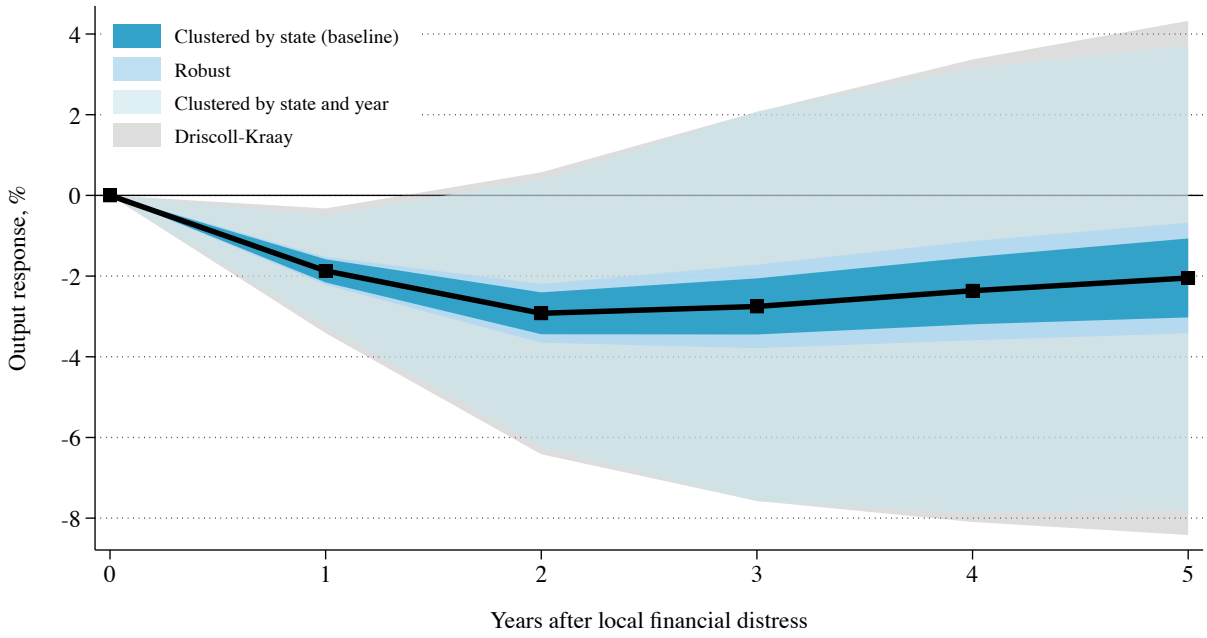
Notes: This table compares our identified episodes of local financial distress with narrative-based evidence from Jalil (2015), Davison and Ramirez (2014), and Metrick and Schmelzing (2021). For each state-year observation, we report whether there is an episode of local financial distress and whether the narrative sources classify it as a localized crisis. Under the "baseline" classification, a year is considered financially distressed if it (i) is marked as a crisis start year or a minor crisis year by any chronology in Table 1, (ii) involves at least one bank failure, and (iii) exhibits a decline in either deposits or wholesale liabilities. The "broad" classification is more lenient, requiring criterion (i) and the presence of either a bank failure, a decline in deposits, or a decline in wholesale liabilities. The "narrow" classification is more restrictive, requiring criterion (i), at least one bank failure, and simultaneous declines in both deposits and wholesale liabilities.

Figure A.3: Local Financial Distress and Output Losses – Robustness



Notes: These figures present the estimated responses of the state-level economic activity index to financial crises identified in our local financial distress chronology, against alternative specifications. The specifications follow that in Figure 10a, except that: in (a), we examine the results accounting for changes in the source of crises during the pre- and post-FDIC periods—from retail deposits to wholesale liabilities, and from runs (wholesale liabilities or deposits) to solvency issues (bank failures only); in (b), we include other institution types present in our dataset in constructing deposit and wholesale liability contractions—pre-1961: State Banks, Private Banks, Trust Loan Corporations, and Savings Banks, and post-1980: Savings Institutions—taking the minimum contraction or maximum failure rate across institutions in each year; in (c), we present results of regressions with versions of the economic index weighted by population and GDP; and in (d) we identify financial distress in a purely statistical manner, using deposit contractions, wholesale liability contractions, and increases in bank failures, respectively, but ignoring narrative evidence.

Figure A.4: Local Financial Distress and Output Losses – Alternative Standard Errors

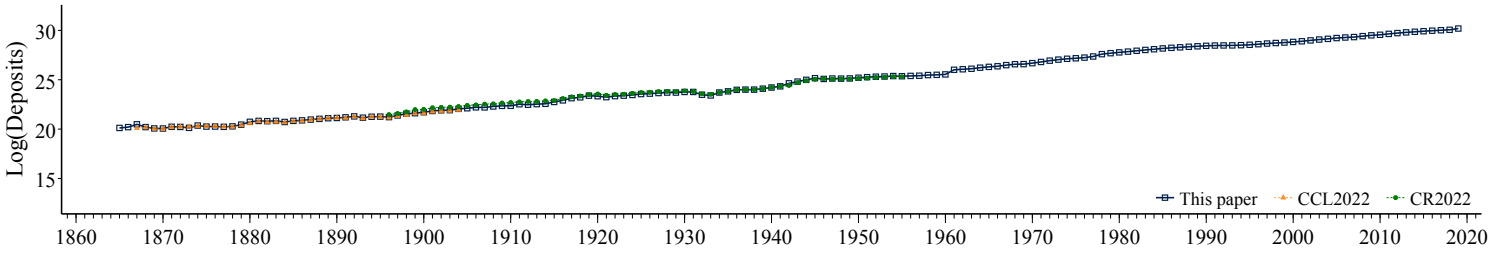


Notes: This figure presents the estimated responses of the state-level economic activity index to financial crises identified in our local financial distress chronology, using alternative standard errors. The specification follows that in Figure 10a. We consider standard errors clustered by state only, heteroskedasticity-robust standard errors, standard errors clustered by state and year, and Driscoll-Kraay standard errors.

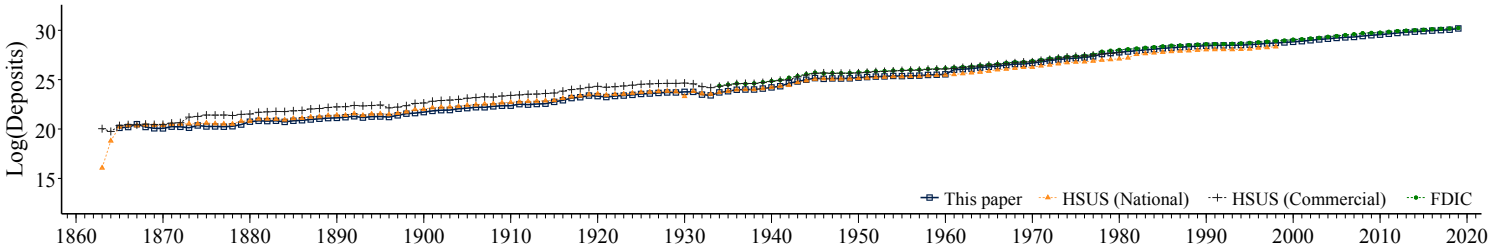
B Validation of the Banking Data

Figure B.1: Comparison With Other Sources of Banking Data (1863-2019)

(a) Bank Deposits – This Paper vs. Cao and Richardson (2022, `CR2022`) and Carlson, Correia, and Luck (2022, `CCL2022`)



(b) Bank Deposits - This Paper vs. HSUS and FDIC



Notes: This figure compares our bank balance sheet dataset ("This paper", 1863 – 2019) aggregated to the U.S.-level, with other datasets using deposits as an example. In the first panel, we compare against the datasets reported in "All Bank Statistics" (1959) as digitized by Cao and Richardson (2022) (CR2022, 1896 – 1955), and Carlson, Correia and Luck (2022) (CCL2022, 1867 – 1904). In the second panel, we compare our dataset against the datasets reported in Carter et al. (2006) (HSUS, 1863 – 1960) and in FDIC (FDIC, 1961 – 2019). HSUS (National) stands for the data on nationally-chartered banks reported in HSUS, while HSUS (Commercial) refers to data on commercial banks.

C Towards a Benchmark Chronology of U.S. Financial Crises

C.1 Existing definitions of financial crises

The existing literature has defined financial crises in various ways. To make progress towards a benchmark chronology we can use in our analysis, we thus begin by outlining the definitions used in the existing literature to the extent we can identify them. In the process, we also indicate the time period they cover.

Early contributions to the development of crisis chronologies include Juglar (1916)'s identification of cyclical patterns in economic activity and Sprague (1910)'s narrative accounts of major banking panics. These works established a foundation for subsequent research by documenting the commentary of contemporaneous observers and the institutional responses to various kinds of financial distress. Kemmerer (1910) expanded this approach by systematically cataloging banking

system disruptions, while Thorp (1926) often discussed financial crises as part of his "Business Annals."

The pioneering methodological approach still shaping most of the work on crisis chronology construction today was introduced by Friedman and Schwartz (1963). Their key insight was to combine a quantitative analysis of monetary aggregates with narrative evidence to identify major banking panics. Their approach focused on episodes characterized by widespread bank failures, deposit contractions, and central bank interventions, all of which are still widely used to identify crises today.

Recent work has applied this methodological approach to date financial crisis episodes for many countries, often covering more than a century. Bordo et al. (2001) introduced an important database of crisis dates covering 120 years, coded using a narrative approach. Reinhart and Rogoff (2009) also employ a primarily narrative approach, identifying crises based on historical accounts. Their chronology is notable for its breadth, covering events from the late 18th century through the early 21st century, and has also been drawn on in work surveying historical financial crises (Frydman and Xu, 2023). The Laeven and Valencia (2020) database, originally introduced as Laeven and Valencia (2013), represents an influential international approach that also provides details on several U.S. crisis episodes. They employ a definition focused on significant banking system distress and substantial policy interventions, resulting in a chronology that primarily captures major systemic events. Their framework has been widely adopted in cross-country studies but captures fewer U.S. crises than some alternative chronologies. Schularick and Taylor (2012) and the expanded Jordà, Schularick and Taylor (2017) database classify crises using a narrative approach in 18 advanced economies, including a detailed discussion of U.S. crises.

Work by Baron, Verner and Xiong (2021) represents a further methodological innovation by focusing specifically on bank equity declines as a source of quantitative evidence on banking sector distress. By combining crashes in bank equity returns with narrative evidence, their approach identifies several episodes not identified by other researchers, particularly in the post-World War II era, partly because systemic financial distress may not always manifest as traditional bank runs. Jamilov et al. (2024) adopt a similar hybrid approach between statistical and narrative evidence but focus entirely on the incidence of bank runs, which they classify into "systemic" and "non-systemic" episodes depending on whether they are accompanied by measurable contractions in banking sector deposits. Their chronology starts in 1800 and thus has a similar coverage to that by Reinhart and Rogoff (2009) despite its narrower conceptual focus on runs rather than other sources of financial

stress.

Metrick and Schmelzing (2021) take a different approach by focusing entirely on identifying crisis *interventions* rather than judging whether an event constitutes a systemic crisis event. We include their work here because many other chronologies, such as Reinhart and Rogoff (2009) or Jordà, Schularick and Taylor (2017), explicitly use government and central bank interventions as one indication of a crisis occurring. Importantly, using interventions to date potential crises is also useful because they may contain information about relatively isolated instances of financial stresses that do not result in system-wide meltdowns.

Since Friedman and Schwartz (1963)'s pioneering work, there have also been important advances in the literature that focuses on dating of U.S. crises specifically rather than taking a cross-country comparative approach. Jalil (2015) offers a significant contribution by drawing on many primary contemporary sources in his dating of historical crisis episodes between 1825 and 1929. This methodology yields a chronology that suggests contemporary accounts often provide more detailed information about the severity and geographic spread of crises than ex-post accounts, and leads Jalil (2015) to reject the classification of certain years as crises, particularly those highlighted by Kemmerer (1910).

Additional work includes Gorton (1988)'s focus on National Banking Era panics, Bordo, Dueker and Wheelock (2002)'s estimated long-run quantitative index of financial conditions, and Lopez-Salido and Nelson (2010)'s attention to the dating of post-War financial crises.

Table C.1 provides an overview of selected chronologies. Chronologies such as Reinhart and Rogoff (2009) or Laeven and Valencia (2020) squarely focus on the incidence of banking crises. Other work, such as Bordo, Dueker and Wheelock (2002), provides a more general history of business cycle fluctuations, from which we extract the timing of various banking crisis events.

Table C.1: Existing Chronologies and Their Definitions

Source	Abbr.	Indicator type	Time coverage	Definition
Baron et al. (2021)	B/V/X	Banking crisis dummy (start-year only)	1870–2016	"Our conceptual definition of a banking crisis is an episode in which the banking sector's ability to intermediate funds is severely impaired. Because equity holders are the first to suffer losses from a banking crisis that damages banks' intermediation capacity, we assume that conceptually, a large bank equity decline is necessary for a banking crisis." (p. 52)
Bordo et al. (2002)	B/D/W	Index of fin. conditions with five categories: 1. severe distress, 2. moderate distress, 3. normal, 4. moderate expansion, 5. euphoria.	1790–1997	The authors construct an annual index of financial conditions, classifying each year from 1790 to 1997 into one of five categories: 1. *severe distress*, 2. *moderate distress*, 3. *normal*, 4. *moderate expansion*, 5. *euphoria*. The index is based on narrative sources prior to 1870 and on four quantitative indicators for 1870–1997: business failure rates, the real interest rate, the interest rate quality spread, and banking conditions. These series are aggregated to construct the index separately for the subperiods 1870–1933 and 1934–1997, as follows: 1. For each series, compute the differences between annual observations and the series median for the subperiod, then divide it by the subperiod standard deviation. 2. Within each subperiod, sum the standardized differences across the four series for each year. Classify a year as *euphoria* (*severe distress*) if the summed standardized difference exceeds 1.5 (−1.5) standard deviations from the overall mean. Classify it as *moderate expansion* (*moderate distress*) if the summed difference is within ±0.75 and ±1.5 standard deviations, and as *normal* if the summed difference falls between −0.75 and 0.75 standard deviations. (p. 526) In Table 1, a year is labeled "Yes" if it is classified as a *severe distress* episode.
Bordo and Haubrich (2017)	B/H	Financial crisis dummy	1880–2007	The authors apply the banking crisis definition of Eichengreen and Bordo (2002) for the years prior to WWII, and additionally include 1914, a year in which the bond markets closed. The definition of Eichengreen and Bordo is outlined as follows: "For an episode to qualify as a banking crisis, we must observe either bank runs, widespread bank failures and the suspension of convertibility of deposits into currency such that the latter circulates at a premium relative to deposits (a banking panic), or significant banking sector problems (including but not limited to bank failures) resulting in the erosion of most or all of banking system collateral that are resolved by a fiscally underwritten bank restructuring." (Eichengreen and Bordo, 2002, pp. 15–16) For the post-WWII years, the authors apply the chronology of Lopez-Salido and Nelson (2010), and additionally include 2007. (Bordo and Haubrich, 2017, p. 533)
Bordo and Wheelock (1998)	B/W	Financial crisis dummy	1790–1929	"We define a financial crisis as a banking panic, which is an event characterized by widespread depositor runs on banks, leading to a decline in the deposit/currency ratio and possibly many bank failures." (p. 44)
Calomiris and Gorton (1991)	C/G	Banking panic dummy	1814–1914	"We define a banking panic as follows: A *banking panic* occurs when bank debt holders at all or many banks in the banking system suddenly demand that banks convert their debt claims into cash (at par) to such an extent that the banks suspend convertibility of their debt into cash or, in the case of the United States, act collectively to avoid suspension of convertibility by issuing clearing-house loan certificates." (p. 112)

Continued on next page

Table C.1: Existing Chronologies and Their Definitions (*cont'd*)

Source	Abbr.	Indicator type	Time coverage	Definition
Jordà et al. (2017)	J/S/T	Banking crisis dummy (start-year only)	1870–2020	"An episode of banking distress is coded as a systemic banking crisis if it is characterized by major bank failures, banking panics, substantial losses in the banking sector, significant recapitalization, and/or significant government intervention. Importantly, this definition excludes the failures or losses of individual/small banks without systemic implications from being coded as a crisis episodes." (p. 1 of the documentation file)
Laeven and Valencia (2020)	L/V	Banking crisis dummy (start-year only)	1970–2020	"We define a banking crisis as an event that meets two conditions: 1. Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations). 2. Significant banking policy intervention measures in response to significant losses in the banking system." (p. 309)
Lopez-Salido and Nelson (2010)	LS/N	Financial crisis dummy	1946–2006	The authors focus on financial crises that are bank-centered, which they define as episodes involving "the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions)". (p. 6)
Reinhart and Rogoff (2009)	R/R	Banking crisis dummy (start-year only)	1800–2016	"We mark a banking crisis by two types of events: 1. Bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions and 2. if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions) that marks the start of a string of similar outcomes for other financial institutions." (p. 10)

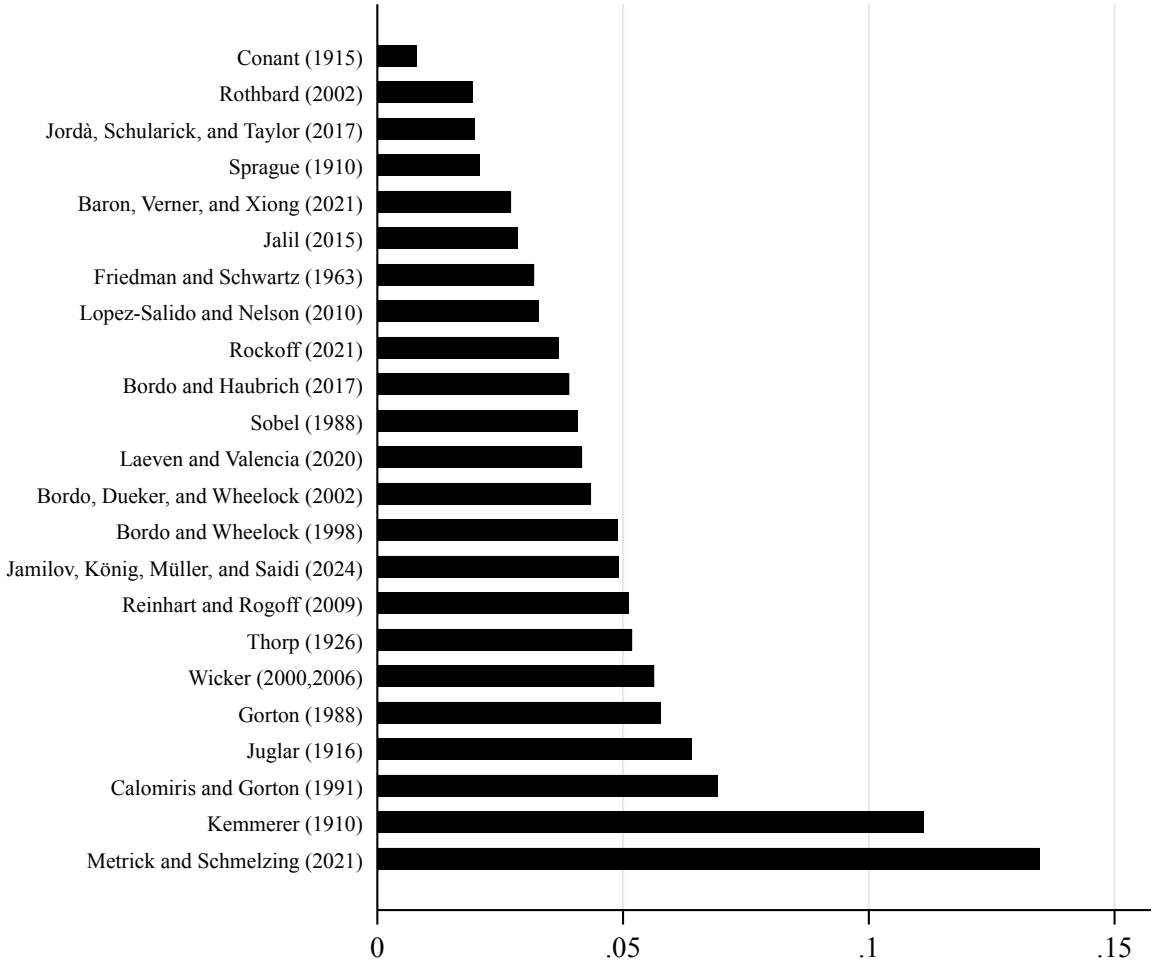
C.2 Identifying benchmark crises

Given the plethora of crisis definitions, we need to decide which of the identified events we should count as a crisis on which there appears to be broad consensus, which we refer to as "benchmark crises." Our goal is not to come up with a new, subjective list of events, but rather condense what the literature already agrees on.

Based on this motivation, we classify a benchmark financial crisis event as one where *the majority of the existing chronologies identify a crisis*. This definition means we effectively crowd-source the incidence of crises based on an equal weighting of chronologies as our baseline measure. Based on this dating scheme, we identify benchmark crises with broad agreement for the years 1837, 1857, 1873, 1884, 1893, 1907, 1930, and 2007. We add 2023 which only appears in a recent paper by Jamilov et al. (2024), but since our estimation sample ends in 2022, this does not affect our results.

The only remaining issue is how to deal with the widely differing timing of the crises identified in the 1980s. Lopez-Salido and Nelson (2010) provide a detailed discussion of the commercial bank failures of the early 1980s at the heel of the Least Developed Country crisis and the subsequent Savings and Loan Crisis, which they treat as distinct events. They argue persuasively that these troubles should be dated as starting in 1982 with the uptick in bank failure rates. Since there is no clear agreement about the dating of the Savings and Loan Crisis, or whether it constituted a crisis at all, we do not assign another year in the 1980s or 1990s as a crisis.

Figure C.1: Fraction of Years with Classification Disagreement Between Chronologies and the Benchmark



Notes: This figure shows the fraction of years in which each crisis chronology disagrees with the benchmark chronology, for the chronologies shown in Figure 1. For each chronology, we compute the share of all years — both crisis years (excluding minor crises and years associated with ongoing crises) and non-crisis years — that are classified differently from the benchmark. The benchmark chronology corresponds to our baseline crisis indicator introduced in Table 2.

D A State-Level Banking Dataset, 1863–2024

D.1 A New State-Level Dataset on Bank Balance Sheets and Failures

The backbone of our paper is a new historical dataset on local banking activity from $1863 - 2024$, as captured by balance sheets and the incidence of failures. For the purpose of this paper, we focus on seven key variables: [1] Total Assets; [2] Total Deposits; [3] Total Loans; [4] Total Real Estate Loans; [5] Total Liabilities; [6] Total Capital; and [7] Bank Failures.

The United States went through a massive change in regulatory and policy regimes over the period we are studying. After the Civil War, the U.S. banking system was made up of separately-regulated national and state banks, with an important role for unit banks (consisting of a single branch). There was no central bank, although clearing houses at times functioned as lenders of last resort during crises. After the founding of the Federal Reserve, the U.S. entered the period of more active monetary policy that was, however, still restrained by the gold standard. Following the Second World War, regulations such as the separation of investment and commercial banking enshrined in the Glass-Steagall Act constrained the banking sector. Starting in the 1980s, the lifting of intrastate and interstate branching restrictions allowed for greater consolidation and diversification of banks, and these liberalizations culminated in a wider loosening of regulatory constraints before the 2007-08 financial crisis. Over the past 15 years, in turn, the Dodd-Frank Act and additional capital requirements on systematically important institutions have added new constraints.

These changes in the regulatory environment pose a few challenges for the construction of consistent long-run time series on banks. In our analysis, we thus focus exclusively on *growth rates* of balance sheet variables (e.g., the year-on-year growth rate of deposits). The advantage of focusing on growth rates is that they are less susceptible to biases compared to estimates of the *level* of a variable (e.g., the outstanding amount of deposits in a state).

Our basic strategy for constructing long-run estimates of state-level banking activity is as follows. First, we digitize state-level aggregates of bank balance sheets from the Officer of the Comptroller of the Currency (OCC)'s Annual Reports for the years from 1863 to 1960. Within the OCC Reports, National Banks are by far the most widely reported institutions even when other institution types are not. Accordingly, we also complement them with information on state banks from the "All Bank Statistics" (1959) as digitized by Cao and Richardson (2022) (also see White, 1983). We provide a detailed discussion of the role of National and State banks in the next section.

Second, for the post-1960 period, we draw on data from the Federal Deposit Insurance Corporation (FDIC) and the Federal Financial Institutions Examination Council (FFIEC)'s Consolidated Reports of Condition and Income, better known as "Call Reports". Using these data to construct growth rates of bank balance sheets is non-trivial because of the liberalization of branching restrictions across states. As a result of these liberalizations, it is impossible to capture the extent of local banking sector activity from bank balance sheets, because all numbers are reported based on each bank's headquarter state rather than the bank's local exposure. We propose a method to get around this issue using the geographical distribution of bank deposits from the FDIC's Summary of Deposits (including a historical extension we obtained through a FOIA request). The section dedicated to these issues also discusses various additional definitional challenges when trying to capture local deposits.

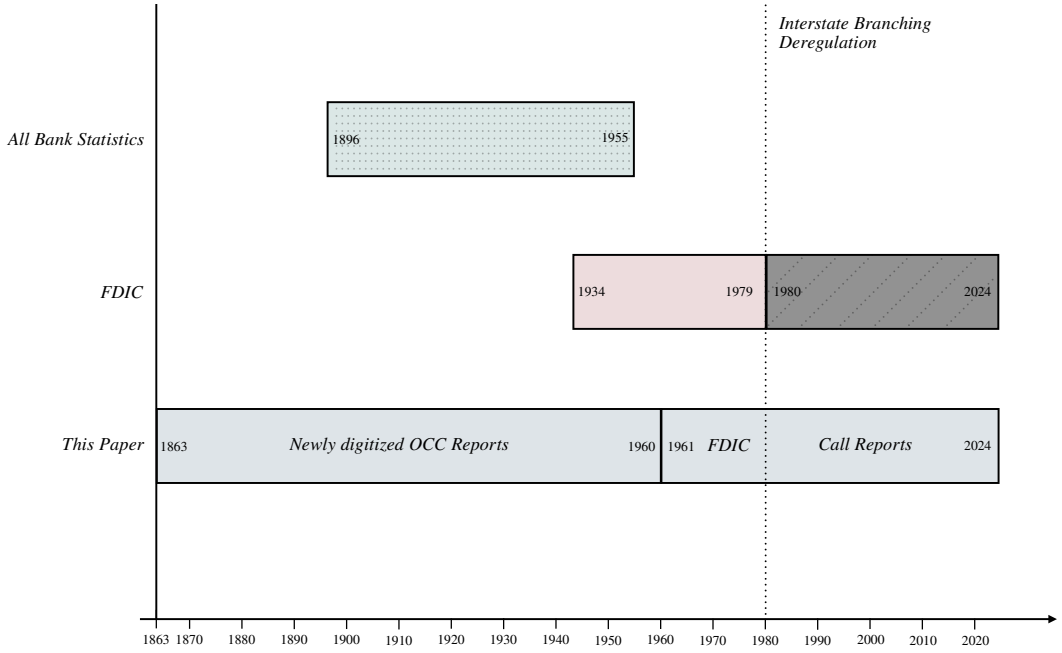
The two sections below outline our process in constructing consistent long time series in more detail.

Table D.2: Description of Variables

Variable	Code	Period	Frequency	Sample	Main Sources
Bank Assets ($)	BNKASST	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Capital ($)	BNKCAP	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Loans ($)	BNKLOAN	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Real Estate Loans ($)	BNKRELOAN	1886–1909 1911–2010	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Liabilities ($)	BNKLIAB	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Deposits ($)	BNKDEP	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports

Notes: The first column reports the variable names. The second column provides the corresponding code labels used in our data sets. The third, fourth, and fifth columns outline the period, frequency, and sample coverages, respectively. Links to main sources are provided in the last column.

Figure D.2: Comparison of state-level bank balance sheet datasets: 1863-2024



Notes: This table compares our state-level banking sector dataset with existing work, in particular, the All Bank Statistics (1959), a publication by the Federal Reserve, as digitized in Flood (1998) and Cao and Richardson (2022), and the FDIC data as collected from Bank Find Suite as of January 2025. We report the coverage of each dataset, indicating the start and end years within each bar. We indicate two potential challenges facing historical bank balance sheet state-level data: first, the transparency of construction of balance sheet items in the All Bank Statistics (dotted), and second, the interstate branching deregulation beginning in 1980 (shaded gray). An in-depth discussion regarding the consequences of interstate branching deregulation on state-level aggregates can be found in Appendix D.3.

D.2 Historical data for 1863–1960

We collect data on both aggregates and sub-items in the Bank Balance sheets from the Officer of the Comptroller of the Currency's (OCC) Annual Reports from 1863−1960. In most years, these reports contain by far the most data on National Banks, although they at times also report information on various State Banks, Private Banks, Trust Loan Companies, Savings Banks, Stock Savings Banks and Mutual Savings Banks. This group of institutions encompasses our baseline definition of Commercial Banks in the modern era (`RSSD9048` == 200 within the FFIEC Call Reports), which includes National Banks, State Banks, depository Trust Companies and Private Banks but excludes non-deposit Trust Companies, Savings Banks and Savings and Loan Institutions, the latter two of which we also collect data on and use in our robustness exercise.[6] However, the reported values on state-chartered banks are inconsistently available and often appear extremely volatile. For example, as detailed in OCC Annual Report 1874 (pg. XXIV-XXV): in accordance with the act of Congress approved 16 February 1873, the Comptroller of the Currency "was able to obtain the necessary information from the State authorities of the condition of the savings banks in only eight States, and of the State banks in no more than nine." In particular, "the official returns of [the State Banks within] the several States are made to their legislatures ... and are not published or received at this Office until [his] report for the current year has been presented." We illustrate the relative availability of balance sheet data pertaining to each institution type in Table D.3. We observe that National Banks are not only (1) consistently reported across states and years within the historical OCC data, yielding an average of 95% non-missing observations across variables[7], but also (2) by far the best reported in comparison to other institution types. As a result, our baseline balance sheet measures focus on National Banks, for which we can create consistent measures over time.

It is worth noting that an existing compilation called "All Bank Statistics" (1959)–digitized by Flood (1998) and Cao and Richardson (2022)–already constructed state-level bank balance sheet aggregates for the period 1896 to 1955. This important contribution, however, suffers from two limitations that necessitate building a new dataset from scratch. First, the construction of individual bank balance sheet items across years of the OCC Annual Report, which is the main source of the "All Bank Statistics", is not straightforward. Unfortunately, the "All Bank Statistics" are not

[6] Credit card companies with commercial bank charters are also included within `RSSD9048` == 200. We note that this group of institutions also encompasses the modern definition of Commercial banks by the FDIC, which differs slightly in that it excludes Private Banks (as of 1947). For more details, see FDIC BankFindSuite Commercial Banks Help.

[7] This is with the notable exception of real estate loans, which National Banks were prohibited to make until 1913, and only gradually permitted after.

Table D.3: Coverage of Historical State-Level Bank Balance Sheet Data: 1863–1960

				Asset subcategories			Liability subcategories	
		Institution type	Assets	Loans	Real estate loans	Liabilities	Deposits	Capital
All states + D.C.	No. of observations	National banks	4,671	4,671	2,159	4,698	4,656	4,698
		State banks	3,652	3,650	2,579	3,651	3,650	3,651
		Private banks	1,319	1,319	1,131	1,319	1,318	1263
		Savings banks	143	143	153	143	143	9
		Stock savings banks	765	744	577	744	744	741
		Mutual savings banks	1,145	1,145	1,060	1,145	1,145	70
		Trust loan companies	1,271	1,257	919	1,257	1,241	1,257
	Pctg. non-missing	National banks	93%	93%	43%	94%	93%	94%
		State banks	73%	73%	52%	73%	73%	73%
		Private banks	26%	26%	23%	26%	26%	25%
		Savings banks	3%	3%	3%	3%	3%	0%
		Stock savings banks	15%	15%	12%	15%	15%	15%
		Mutual savings banks	23%	23%	21%	23%	23%	1%
		Trust loan companies	25%	25%	18%	25%	25%	25%

Notes: This table reports the number of non-missing state-level observations (rows 1–7) and the corresponding percentages relative to the full state-year sample (rows 8–14) across major institution types in our dataset, covering the period from 1863 to 1960. Asset subcategories include total loans and real estate loans, and liability subcategories include deposits and capital.

transparent in their variable definitions over time, which raises questions about the consistency of the state-level time series. To compile consistent series, we thus take a bottom-up approach and create mapping tables for each year of the OCC reports that assign each reported balance sheet item to a harmonized variable definition. Second, the data does not cover the periods before 1896 or $1955-1960$ (when the modern Call Reports begin), which means these intermediate years would have to be spliced using some external dataset subject to its own classifications and challenges (such as the FDIC's compilation of state aggregates).

Construction of OCC Balance Sheet data Harmonizing the OCC balance sheets involves several challenges. The categories of reported balance sheet items change over time, which required us to develop a custom mapping scheme to standardize them in a way that is consistent with their modern (post-1960) equivalents where possible. For example, we created consistent series for loans, securities, cash, assets, deposits, and capital by carefully aggregating subcategories that sometimes changed terminology or reporting conventions. We detail the underlying structure by which we aggregate the data in Table D.4. There are three components in the data: Totals, Principal Items and Subitems. Totals are comprised of Principal Items and Principal Items are comprised of

Subitems.[8] We manually assign each balance sheet item as published in the OCC reports to the corresponding Subitem.

We construct the balance sheet variables Loans, Securities, Cash, Deposits and Capital according to the following procedure: First, we report the Totals whenever available. When unavailable, we instead construct the Totals as the sum of Principal Items. Whenever a Principal Item is unavailable, we construct it as the sum of Subitems. For example, Real Estate Loans is a Principle Item. Accordingly, we report the Principal Item directly whenever available, and construct it from Subitems otherwise. Finally, we follow a similar procedure for Total Assets and Liabilities–reporting the Totals whenever available, and otherwise constructing Total Assets as the sum of Loans, Securities, Cash and Other Assets, and Total Liabilities as the sum of Deposits, Bond Liabilities and Other Liabilities.[9]

We also adjusted for changes in reporting frequency and retained only the last observations reported in a given year despite variations in the underlying schedule (quarterly, semi-annual, or annual). In the digitized raw data, we have $40,307$ "monthly" observations. Of these, 32% $(13,186)$ are years with only one month available, and the remaining 68% have more than one month available. 66% of observations have 4 months or more per year. We aggregate to a yearly level by keeping only the latest available observation in a given year. In doing so, we "lose" 55% of the raw observations but have consistent year-end (or close to year-end) values.

[8] Principal Items are always listed at the beginning of the balance sheet within the OCC Reports.

[9] We note that Capital is listed as a component of Liabilities within the OCC Reports. However, we report Total Liabilities with Capital excluded, and construct Capital including Surplus and Undivided Profits for consistency with the FDIC's definition.

Table D.4: OCC Balance Sheet Assets: Totals, Principals and Subitems

Totals	Principal (FDIC Code if applicable)	Subitems	Examples of Items subsumed by Subitems in OCC Report
ASSETS			
Loans			
Total Loans and Leases (Net)	Real Estate Loans (LNRE)	Real Estate Loans (s)	Secured by farm land, Secured by other properties
Total Loans and Leases (Net)	Other Loans (NEW11_1)	All Other Loans (s)	Loans not classified
Total Loans and Leases (Net)	Bank Loans (LNDEP)	Bank Loans (s)	Loans to domestic commercial and foreign banks
Total Loans and Leases (Net)	Secured Loans, excluding Real Estate (LNCON)	Agricultural Loans	Loans to farmers
Total Loans and Leases (Net)		Commercial & Industrial Loans	Commercial and industrial loans (including open market paper)
Total Loans and Leases (Net)		Loans on securities	Loans to brokers and dealers in securities
Total Loans and Leases (Net)		Commercial Papers	Open market paper
Total Loans and Leases (Net)		Consumer Credit	Consumer loans to individuals, Demand loans
Securities			
Total Securities	U.S. Treasury Securities (SCUST)	U.S. Treasury Securities (s)	Home Owners Loan Corporation guar. by U.S. Government
Total Securities	Equity Securities (SCEQ)	Equity Securities (s)	Bank stocks, Stock of domestic corporations
Total Securities	State, county, and municipal bonds (SCMUNI)	State, county, and municipal bonds (s)	State, municipal, and other bonds and stocks
Total Securities	Railroad Bonds and Stocks	Railroad Bonds and Stocks (s)	Railroad bonds, Railroad stocks
Total Securities	Other Securities	Other Securities (s)	Other bonds, notes, warrants, etc.
Total Securities	Other Bonds and Securities	Foreign Securities	Foreign government bonds and other foreign securities
Total Securities		Bonds of oth. public service corporations	Bonds of Federal land banks
Cash			
Total Cash	Cash on hand	Cash on hand (s)	Gold Coin, Fractional Currency, Gold Certificates
Total Cash	Cash items		
Total Cash	Other Cash		
Other Assets			
	Bank Premises Owned (ORE)		
	Other Real Estate Owned (ORE)		

Notes: This table describes the structure of our OCC bank balance sheet dataset for Asset Items. There are 3 components in the data: Totals, Principal Items and Subitems. Totals are comprised of Principal Items and Principal Items are comprised of Subitems. We provide examples of the balance sheet items coded under each respective Subitem, as reported in the respective OCC reports. "(s)" is used to identify Subitems in cases where they share a common name with a Principal Item. Whenever applicable, we report the FDIC Variable Code which is consistently defined with the Principal Item.

Table D.5: OCC Balance Sheet Liabilities & Capital: Totals, Principals and Subitems

Totals	Principal (FDIC Code if applicable)		Subitems	Examples of Items subsumed by Subitems in OCC Report
LIABILITIES				
Deposits				
Total Deposits	Indiv. Dep. (NEW15_2)	Dem. Dep.	Dem. Dep. - Other Banks (s)	Deposits of banks in foreign countries
Total Deposits	Indiv. Dep. (NEW15_2)	Dem. Dep.	Dem. Dep. - Indiv., Partners. and Corp. (s)	Demand certificates of deposit
Total Deposits	Indiv. Dep. (NEW15_2)	Dem. Dep.	Dem. Dep - States and Pol. Subdiv. Securities (s)	Deposits of states and political subdivisions
Total Deposits	Indiv. Dep. (NEW15_2)	Dem. Dep.	Dem. Dep. - U.S. Government (s)	U.S. Government demand deposits
Total Deposits	Indiv. Dep. (NEW15_2)	Time Dep.	Time Dep. - Other Banks (s)	Time Deposits of banks in United States
Total Deposits	Indiv. Dep. (NEW15_2)	Time Dep.	Time Dep. - Indiv., Partners. and Corp. (s)	Time deposits, open accounts, Christmas savings, etc.
Total Deposits	Indiv. Dep. (NEW15_2)	Time Dep.	Time Dep - States and Pol. Subdiv. Securities (s)	Public funds of states, counties, school districts, etc. (time)
Total Deposits	Indiv. Dep. (NEW15_2)	Time Dep.	Time Dep. - U.S. Government (s)	U.S. Government time deposits
Total Deposits	Indiv. Dep. (NEW15_2)		Unclassified Dep. - Indiv., Partners. and Corp.	Deposits not classified
Total Deposits	Dep. - U.S. Govt (NEW15_3)			
Total Deposits	Other Dep.			
Total Deposits	Liabilities to other Banks			
Bond Liabilities				
Total Bond Financing	Bond Financing			
Other Liabilities				
Liabilities to other Banks				
Demand Notes and Other Liabilities				
Other Liabilities				
CAPITAL				
Capital				
Total Capital			Preferred Stock	Preferred Stock
Total Capital			Other Capital	Capital notes and debentures
Total Capital			Common Stock	Common Stock
Total Capital			Common Stock (Book Value)	Book value
Total Capital	Surplus			
Total Capital	Undivided Profit			

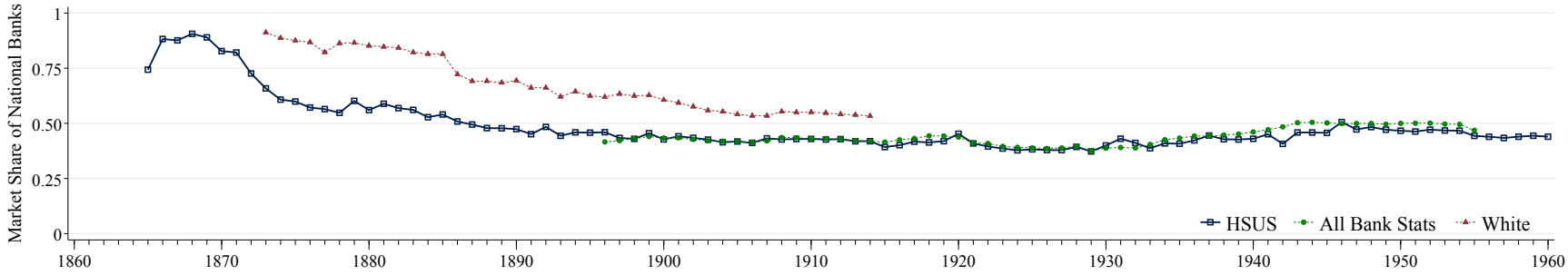
Notes: This table describes the structure of our OCC bank balance sheet dataset for Liability and Capital Items. There are 3 components in the data: Totals, Principal Items and Subitems. Totals are comprised of Principal Items and Principal Items are comprised of Subitems. We provide examples of the balance sheet items coded under each respective Subitem, as reported in the respective OCC reports. "(s)" is used to identify Subitems in cases where they share a common name with a Principal Item. Whenever applicable, we report the FDIC Variable Code which is consistently defined with the Principal Item. Note that Total Deposits comprise Total Individual Deposits (split up into time and demand), U.S. Government Deposits, Liabilities to other Banks and Other Deposits. Finally, we note that "Individual Deposits" category is only reported up till 1928, after which it is reported split up into Time and Demand Deposits.

National Banks and Other Institutions In our setting, the key concern with relying on national bank data is that it might have implications for how we are measuring local banking distress. Historically, national banks were typically not allowed to lend against real estate collateral (see, e.g., Barnett, 1911; Hammond, 1957; White, 1983; Jaremski and Wheelock, 2020). The rationale behind these regulations was that real estate-related lending was considered particularly risky, consistent with recent empirical evidence documenting a link between real estate collateral and financial crises (Jordà, Schularick and Taylor, 2015; Ivashina et al., 2024). While Keehn and Smiley (1977) provides some evidence that national banks attempted to circumvent these regulations, it still raises the question of whether the balance sheets of national banks can plausibly proxy for whether a state's banking system is experiencing distress.

To get a first idea of the potential importance of these issues, Figure D.3 plots the market share of national banks, defined as the total banking assets of national banks relative to those of all banks. We construct these estimates of national banks' market share by drawing on several data sources, including Carter et al. (2006), the "All Bank Statistics" (1959), and White (1983). Beginning with the advent of the National Banking Era in 1865, we observe that national banks capture the lion's share of the banking market, with a market share of around 75%, which hovers around or above 50% from 1886-1960.

We more directly test whether changes in national bank's balance sheets can serve as a reasonable proxy for developments in the overall banking sector by assessing the correlation of nationally- and state-chartered deposit growth rates. Figure D.5 plots a binscatter suggesting a close positive relation. Our takeaway is thus that, while omitting an important part of the U.S. banking sector in the pre-World War II era in particular, nationally-chartered banks' balance sheet can serve as an acceptable starting point for assessing local banking sector distress. This is consistent with White (1983)'s observation that the failure rates of nationally and state-chartered banks in 1930 showed a cross-state correlation of 0.885, also suggesting substantive co-movement.

Figure D.3: Market Share of National Banks, 1865 – 1960



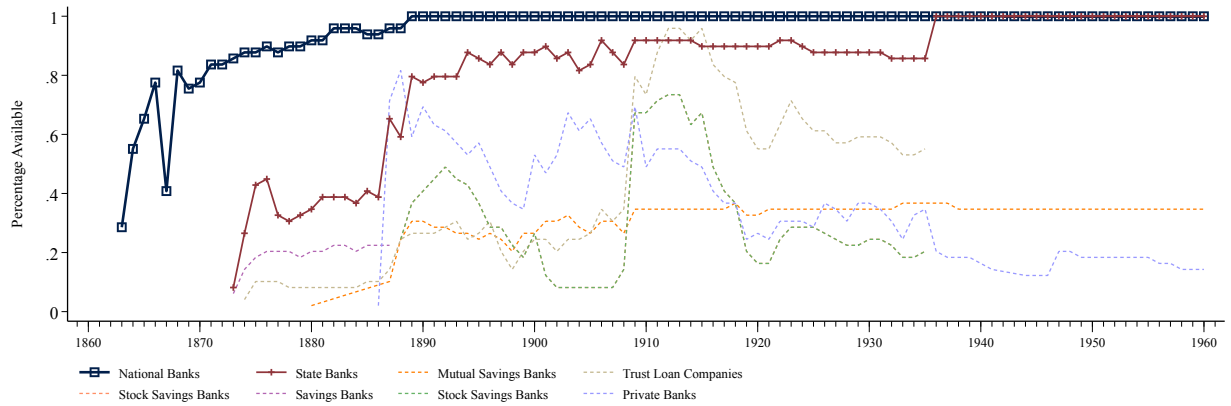
Notes: This figure plots the U.S.-wide market share of national banks, defined as the total assets of national banks divided by those of all banks from 1865 – 1960. Data is compiled from Carter et al. (2006) (HSUS, 1865 – 1960), "All Bank Statistics" (1959) as digitized by Flood (1998) and Cao and Richardson (2022) (All Bank Stats, 1896 – 1955), and White (1983) (White, 1873-1914).

1) Before aggregating the "All Bank Statistics" (1959) to the US-level, we first limit our sample to the 48 Contiguous States + AK + HI. The data includes national banks, all commercial banks (state-chartered commercial banks, mutual savings banks), and unincorporated or private banks.

2) White (1983) reports the total assets of nationally and state-chartered banks (from 1873 onwards), and of private banks and trust companies (from 1886 onwards).

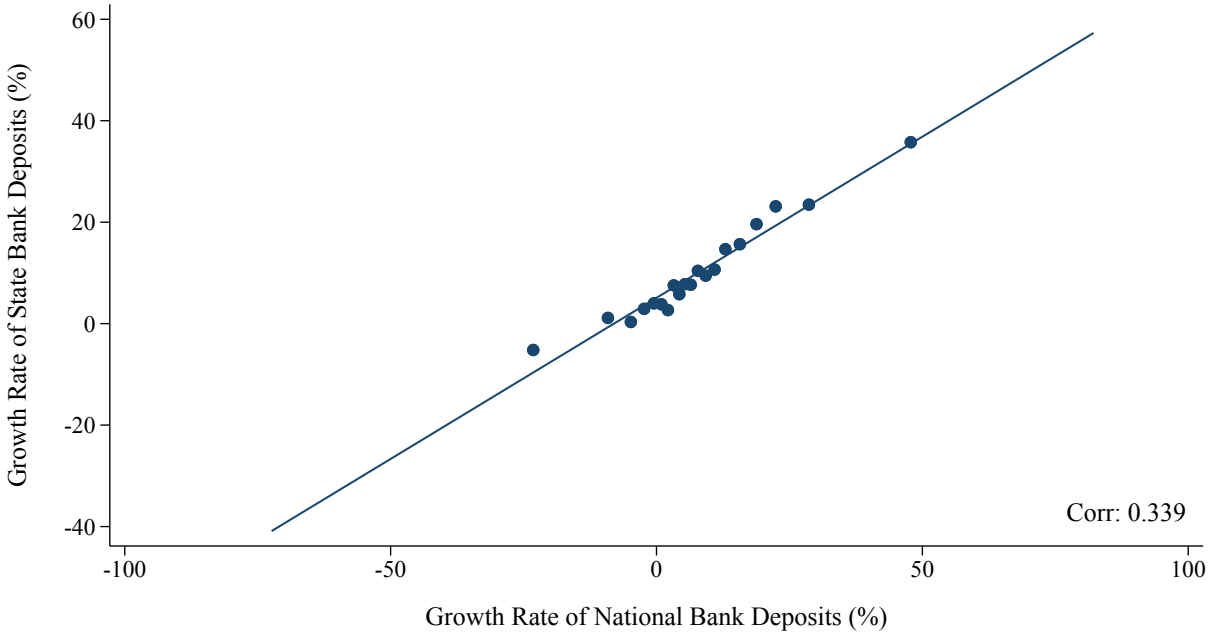
3) From the HSUS dataset, we collect data on national bank assets from `Cj204` (1865 – 1896) and `Cj213` (1897 – 1960). HSUS reports data on the total assets of "all reporting banks" from 1834 – 1895 from the OCC Annual Report 1931 in series `Cj252`. In order to construct a consistent series, we digitize data on the total assets of all reporting banks from the corresponding OCC reports from 1896 – 1960. In particular, we digitize data in 1896 – 1931 from OCC Report 1931, and 1932 – 1936 from OCC Report 1936, both of which are reported as of June. Next, we digitize data for 1936 – 1944 from OCC Report 1944, and 1945 – 1960 from OCC Report 1960, both of which are reported as of December. To account for changes in the reporting month, we adjust the pre-1936 data by taking a simple average of the corresponding years: $assets_t^{dec*} = \frac{assets_t^{june} + assets_{t+1}^{june}}{2}$.

Figure D.4: Coverage of Historical State-Level Bank Balance Sheet Liabilities by Bank and Institution Type: 1863 – 1960



Notes: This figure illustrates the availability of our State-Level Bank Balance Sheet Data, using Total Liabilities as an example. For each year, we plot the percentages available relative to the full state sample, across each major institution type reported within the OCC reports. We highlight the two most frequently reported institution types, National Banks (in blue) and State Banks (in red).

Figure D.5: Correlation between National and State Bank Deposit Growth Rates: 1863 – 1960



Notes: This figure presents a binscatter plot of the deposit growth rate of nationally and state-chartered banks (in %). The number of bins is chosen using the rule-of-thumb bin selector of Cattaneo et al. (2024). Additionally, we report the simple correlation between national and state bank deposit growth rates. To account for outliers, we truncate each sample at the 99th percentile. We note that the correlation is robust to truncating samples at the 95th and 90th percentiles. These specifications yield correlations of 0.392 and 0.403 respectively.

D.3 Modern data for 1960–2024

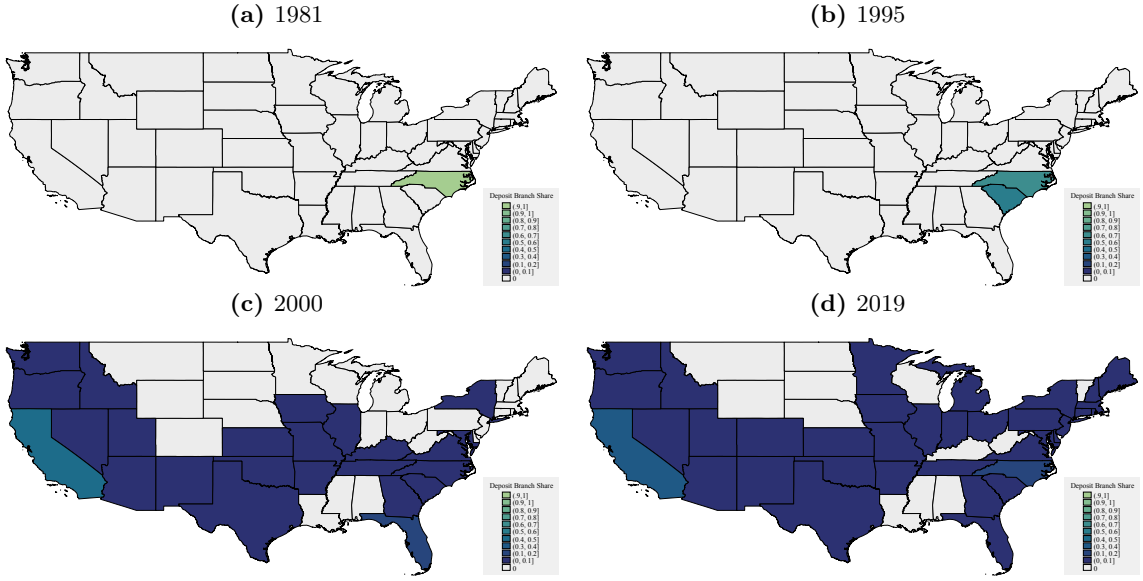
Estimating balance sheet values after branching deregulation Historically, U.S. banks were effectively banned from building branch networks across state borders, leading to the proliferation of "unit banks" with a single branch. The resulting lack of opportunity to diversify and reduce the effect of regional shocks is often cited as a major contributor to the frequency of banking crises before World War II (see, among others, White, 1983; Bordo, 1985; Bordo and Redish, 1996; Calomiris, 2009).

In fact, it was not until the beginning of the 1900s that within-state prohibitions on branching began to be relaxed: in 1909, nine states allowed branch banking statewide, while four others allowed limited branching, typically confined within the bank's home-office city (White, 1983). The early to mid 20$^{\text{th}}$ century came with a rapid expansion in intrastate branch banking–initially a privilege available only to State Banks. National Banks gained similar rights only after the

McFadden Act of 1927, and even then, only within states that explicitly permitted branch banking. Since our study is conducted entirely at the state-level, our results are not affected by the changes in intrastate banking regulation.

Importantly, the McFadden Act continued to prohibit nationwide interstate banking. This remained the status quo up till the early 1980s, whereupon some states began to allow limited interstate banking in regional or reciprocal arrangements. Following the Savings and Loans crisis of the 1980s, a watershed reform came with the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) of 1994, signed into law by President Clinton on September 29.[10] This act eliminated most of the restrictions on interstate banking, allowing for the establishment of new branches across state lines. We illustrate the consequences of interstate branching deregulation in Figure D.6 by tracking the deposit shares of Bank of America (BOA) across different states over time. Before the IBBEA of 1994, the deposits of BOA were entirely concentrated in their headquarter state of North Carolina. Shortly after the act, we observe a spreading out of deposit shares as BOA began to open branches in South Carolina as early as 1995, and continued to do so across the rest of the U.S. through the 2000s.

Figure D.6: Bank of America Deposit Shares across States



Notes: This figure plots state-level deposit shares of the Bank of America (RSS-ID 480228) across four years: 1981, 1995, 2000 and 2019. Using the underlying annual branch-level data from the Summary of Deposits, we construct state-level shares as the ratio of, for a particular state i and year t, $\frac{\text{Total Deposits of Bank of America Branches in state } i \text{ and year } t}{\text{Total Deposits of Bank of America Branches in all states and year } t}$. We select these four years to depict the changes in interstate banking before and after the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994.

[10] States had up till June 1 1997 to decide whether to opt-out of the new branching provisions. Montana and Texas chose to opt-out, but eventually adopted interstate banking–Montana in 2002 and Texas in 1999.

Given that our study aims to understand the impact of local financial distress, it is imperative that we are able to measure bank's activity in a given state for, instead of relying on a measure which allocates all resources of a bank to its headquarter state. This is especially important for deposits, which we use as part of our baseline measure of local distress. Fortunately, the Summary of Deposits (SOD), an annual survey of branch office deposits as of June 30 for all FDIC-insured institutions, reports deposits at the branch-level. The publicly available version begins in 1991, but we were able to obtain additional data for the $1981-91$ period through a FOIA request. This combined version of the SOD thus spans from 1981-present, which exactly coincides with the period of nationwide interstate branching deregulation. Accordingly, we report the Summary of Deposits data on Deposits of all branches geographically located in a particular state, aggregated up to the state-level, from 1981 onward.

Taking advantage of the SOD data, we also adjust our other balance sheet variables to obtain estimates of the localized values within in each state using the following procedure: First, we construct shares at the bank-id-level of the amount of deposits reported by each bank within each state. For bank b, branches r, state s and year t, this corresponds to:

$$share_{b,s,t} = \frac{\sum_{r\in \text{ branches of bank } b \text{ in state } s} deposits_{r,t}}{\sum_s \sum_{r\in \text{ branches of bank } b \text{ in state } s} deposits_{r,t}} \tag{D.1}$$

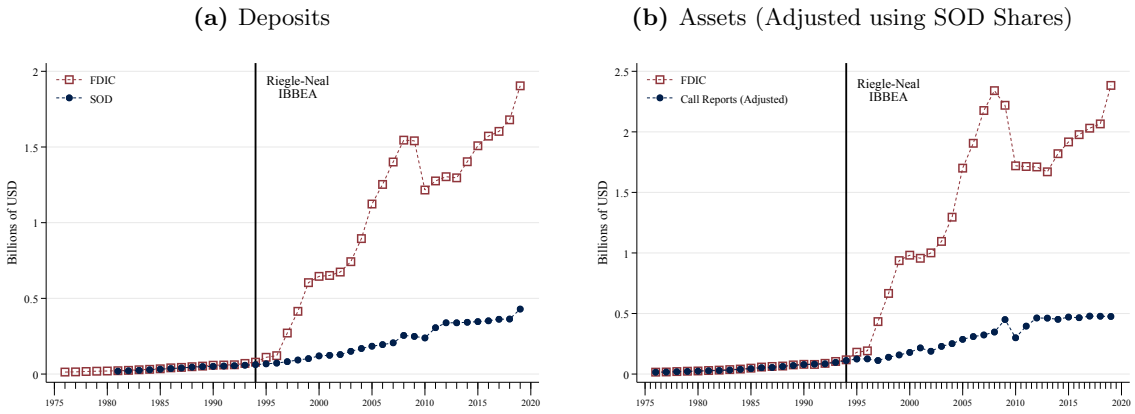
Next, we apply these shares to the bank-id-level Call Reports data on each balance sheet item. For example, we compute, $adjusted_assets_{b,s,t} = call_report_assets_{b,t} \times share_{b,s,t}$.[11] Finally, we aggregate back to the state-level by taking a simple summation across adjusted assets of all banks with branches within a given state. We apply this adjustment procedure to the balance sheet items Assets, Capital, Loans, Real Estate Loans, and Liabilities, from 1981 to 2021.

Using North Carolina as an example, we provide an illustration of our adjustment method in Figure D.7. Figure D.7a depicts the raw deposits data reported in the SOD, aggregated to the state level, and the deposits data as reported in FDIC's BankFindSuite. We observe that the Deposits series from SOD and FDIC almost perfectly overlap up until the establishment of IBBEA in 1994 and the relaxation on interstate branching, after which the series begin to diverge significantly. This coincides with the spreading out of deposits across states of Bank of America from 1995 onward. Figure D.7b depicts our adjusted assets figures against the assets data as reported in

[11] Note that while the headquarter state is reported within the Call Reports data, we do not use this in the adjustment, only the bank-id number. Instead, we geolocate each bank's branches using the SOD data. Consequently, $call_report_assets_{b,t}$ is not indexed by s.

FDIC's BankFindSuite. Similar to deposits, we observe a much lower level in the adjusted series compared to the FDIC data which assigns the assets of each bank to their headquarter state. These adjusted series serve as a proxy for localized financial activity, and provide the foundation for our analysis of local financial distress after the relaxation of interstate banking laws.

Figure D.7: Adjustment for Changes of Interstate Banking using SOD Deposit Shares for North Carolina



Notes: Figure (a) plots Total Deposits from the Summary of Deposits (SOD) in blue, and from the Federal Deposit Insurance Corporation (FDIC) in red. The SOD data is aggregated up to the state-level from the bank-level. The FDIC data is collected from BankFindSuite. Figure (b) plots Total Assets, with our adjusted figures from the Call Reports in blue, and from the FDIC in red. As detailed in the main text, in order to account for changes in interstate branching regulation, we adjust the Call Reports data from 1981 onwards using state-level Deposit Shares constructed from the SOD. Finally, we indicate a significant change in interstate branching regulation with a vertical line: the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994.

A note on modern deposit contractions Before the advent of deposit insurance, "traditional" bank runs–where depositors line up in front of banks in a panicked rush to withdraw their funds–were a common occurrence during periods of financial stress (e.g. Frydman, Hilt and Zhou, 2015). While connections between (major) institutions were important for the transmission of crises during certain periods, banks still predominantly relied on deposits as their funding source. With the rise of wholesale funding markets, the nature of runs also changed. While traditional bank runs still occurred during crises after the founding of the FDIC (see, e.g., Jamilov et al., 2024), runs by other bank creditors became increasingly important.

To accommodate this reality, our data comprise both deposit and wholesale liabilities. These allow us to proxy for the incidence of runs of different types, affecting either deposit or wholesale funding markets. We construct our wholesale liability series in the following manner: We begin by collating a series for interbank liabilities - from $1863 - 1960$, we collect "Liabilities to other

Banks" or the wholesale deposits due to other banks from the OCC Reports.[12] From 1966-2021 we collect federal funds purchased and securities sold under agreement to repurchase - 1966-1975 from the FDIC BankFindSuite API (`FREPP`) and $1976-2021$ from the Call Reports (`RCFD2800` up to 2000 and `RCONB993`+`RCFDB995` from 2001 onward). Accordingly, we construct wholesale liabilities from $1863-1960$ as interbank liabilities. For the modern period post-1960, we follow Acharya and Mora (2015) to define wholesale liabilities as, whenever available, the sum of interbank liabilities (as defined above), large time deposits (`RCON2604`), deposits booked in foreign offices (`RCFN2200`), subordinated debt and debentures (`RCFD3200` post-1976 and FDIC's `SUBND` from 1966-1975) and other borrowed money (`RCFD3190`). Given that the primary objects of our study pertain to year-on-year growth rates, we include each subcomponent whenever available and ratio-splice following the procedure outlined in Appendix D.4: from 1994-2019, as the sum of all five categories, from 1984-1993 as the sum of gross federal funds purchased, repos, large time deposits, deposits booked in foreign offices, subordinated debt and debentures (spliced on overlap year 1994), from 1976-1983 as the sum of gross federal funds purchased, repos, large time deposits and subordinated debt and debentures (spliced on overlap year 1984), and from 1870-1975 as the sum of gross federal funds purchased, repos, and subordinated debt and debentures (spliced on overlap year 1976).

D.4 Combining time series

To splice together the time series from different sources, we use the following process. First, from 1981 onwards, we report data from the Call Reports (after adjusting using SOD shares).[13] Second, from 1961 to 1980, we ratio-splice the Call Reports data with the FDIC data in the following manner. For state i and year t, let the older series, in this case the FDIC data, be $y_{i,t}^{old}$ and the newer series, in this case the Call Reports, by $y_{i,t}^{new}$. The two series share the overlap year $\bar{t}$, in this case 1981. The break-adjusted series for the older source is then:

$$\hat{y}_{i,t}^{old} = y_{i,t}^{old} \times \theta_{i,\bar{t}}$$

where $\theta_{i,\bar{t}}$ is the splicing ratio calculated on the overlap year $\bar{t} : \theta_{i,\bar{t}} = \frac{y_{i,\bar{t}}^{new}}{y_{i,\bar{t}}^{old}}$

[12] Note that this is reported in the OCC Reports as "Due from Banks" from $1863-1935$, and from $1936-1960$ the sum of Demand deposits and Time deposits of other banks.

[13] Note that the SOD data is reported in June, and within the Call Reports, 98.4% of bank-year observations are reported in June. However, we are primarily interested in calendar years for consistency with our index of economic activity. Accordingly, we adjust for each series by taking the average of second quarter observations in adjacent years: $\hat{y}_t^{dec} = \frac{\hat{y}_t^{jun} + \hat{y}_{t+1}^{jun}}{2}$.

Third, and finally, from 1863 to 1960, we ratio-splice the Call Reports data with the OCC reports data using the overlapping year $\bar{t} = 1960$.

The resulting dataset has the following advantages over alternative approaches. It retains a consistent definition of banks and variables over the $1863 - 1960$ period based on our newly-digitized OCC dataset. From 1961 onwards, it is constructed directly from bank-level data, with the important adjustments due to the role of interstate branching as discussed above. The intermediate period is filled using the comprehensive data from the FDIC, which has the highest consistency with the bank-level Call Reports, given that the state-level aggregates are based on banks' reporting to the FDIC as well. Conceptually, we thus really only draw on a single ultimate source of "ground truth" for the state-level time series: the Call Reports as collected and aggregated first by the OCC, then the FDIC, and ultimately the FFIEC.

E State-Level Macroeconomic Time Series

To measure state-level economic conditions, we draw on the dataset and measures constructed in Hoon et al. (2025). We provide a high-level overview of these time series here and refer the interested reader to that paper for additional details.

The key innovation of the data from Hoon et al. (2025) is to construct harmonized, annual, state-level indicators of economic activity going back to the Civil War. Much of the data was newly digitized based on specialized publications and painstakingly combined using a variety of inputs. The result is the first annual long-run sub-national dataset for the United States.

What necessitates going through this process instead of simply using existing measures? Perhaps surprisingly, most macroeconomic time series are only available on the state-level since the 1960s (e.g., GDP) or even more recent decades. The only existing long-run state-level data on agricultural production and personal income–starting in the 1910s and 1920s, respectively–paint an incomplete picture of local economies. To improve on this paucity of knowledge about regional economic fluctuations, Hoon et al. (2025) collect a grand total of 60 time series capturing various aspects of economic activity, including variables on the labor market, real activity, housing, transportation, government, income and wealth, and other miscellaneous indicators.

The construction of this dataset required integrating information from diverse sources, including federal government publications, state-level records, historical compilations, and modern databases. For earlier periods (pre-1929), we relied heavily on the Census of Manufactures, Census of Agri-

culture, and Statistical Abstracts of the United States, supplemented by state-level publications such as agriculture department reports and labor bureau statistics. For the intermediate period (1929-1963), we incorporated Bureau of Economic Analysis (BEA) state personal income accounts and Bureau of Labor Statistics (BLS) employment records. The modern period (post-1963) draws primarily on standardized federal statistical series including BEA regional accounts, as well as BLS state and metropolitan employment data.

A key contribution in constructing this dataset is to propose harmonized, consistent time series by carefully recategorizing historical classifications to align with modern standards where possible. For example, manufacturing output measures shifted from "value of product" in early censuses to "value added" in later periods, requiring reconciliation through overlapping observations and adjusting for intermediate input shares. The raw data is also often reported at mixed frequencies, which required a careful implementation of temporal disaggregation methods that distribute changes between benchmark observations according to patterns observed in related high-frequency indicators.

To analyze the economic consequences of financial crises consistently across states and time periods, we need reliable measures of local economic activity spanning our entire sample period. However, comprehensive state-level GDP data are only available from the Bureau of Economic Analysis starting in 1963, creating a substantial data gap for earlier periods. To address this limitation, we use the index of state-level economic activity covering all 48 contiguous states from 1870 to 2022 developed in Hoon et al. (2025). In particular, they use a mixed-frequency dynamic factor model in the tradition of Stock and Watson (1989) and Stock and Watson (2016). This methodology extracts common movement across multiple economic indicators while allowing for variables with different frequencies and start dates. The approach assumes that a single latent factor–economic activity–drives the comovement of observable indicators, which we can estimate even as the specific variables that are available change over time.

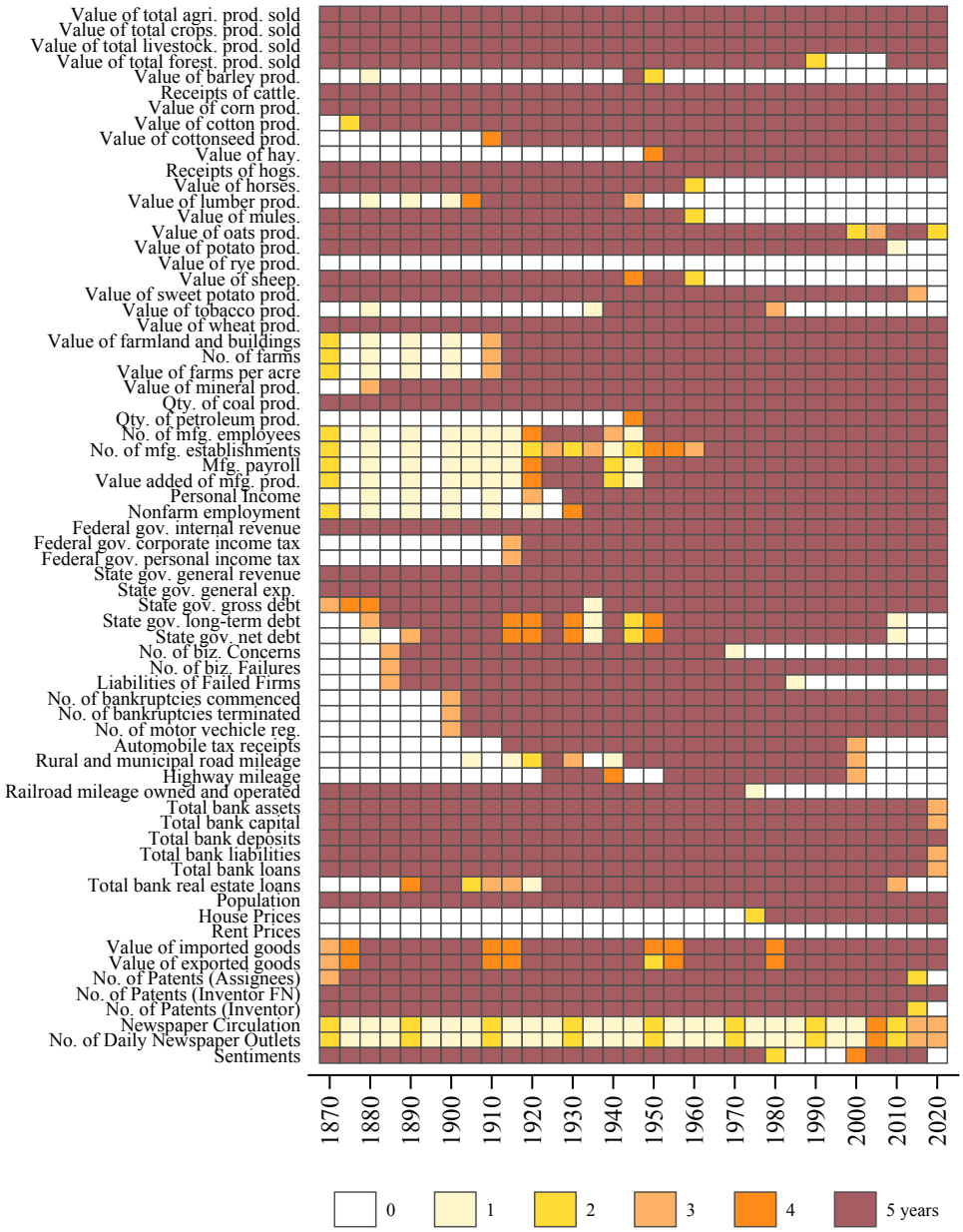
More precisely, the implementation adapts the framework of Baumeister, Leiva-León and Sims (2024) to accommodate the historical nature of our data using a two-step estimation procedure. First, Hoon et al. estimate the factor loadings using all available indicators for each state. Second, they anchor the resulting index to match the growth rate of state-level GDP during the period of overlap (1963-2022), ensuring the measure aligns with modern official statistics while extending much further back in time. Figure E.9 provides some validation of this approach by showing the estimated economic activity index is highly correlated with established measures during the periods

they overlap. Figure E.9a shows the relationship between the index and real GDP growth rates during 1963-2022, revealing a strong correlation (R^2 of 0.42) and a coefficient close to one (1.06), indicating the index closely tracks the official GDP measure. Figure E.9b demonstrates an even stronger relationship with real personal income growth (R^2 of 0.63), confirming that the index captures meaningful variation in state-level economic conditions.

The resulting economic activity index provides several advantages over previously available measures. First, it offers consistent measurement across a much longer timeframe than official statistics, allowing us to analyze state-level economic dynamics during historical crisis episodes like the Panics of 1873, 1893, and 1907. Second, it maintains methodological consistency across states and time periods, facilitating direct comparisons that would be complicated by changing definitions or coverage in the underlying source data. Third, the index's annual frequency allows us to precisely identify the timing of local economic contractions, even for distant historical periods. Previous research has typically relied on decennial census data (with limited temporal resolution), focused on specific sectors like manufacturing or agriculture (missing other dimensions of economic activity), and covered only selected states or regions (and thus limited cross-sectional variation).

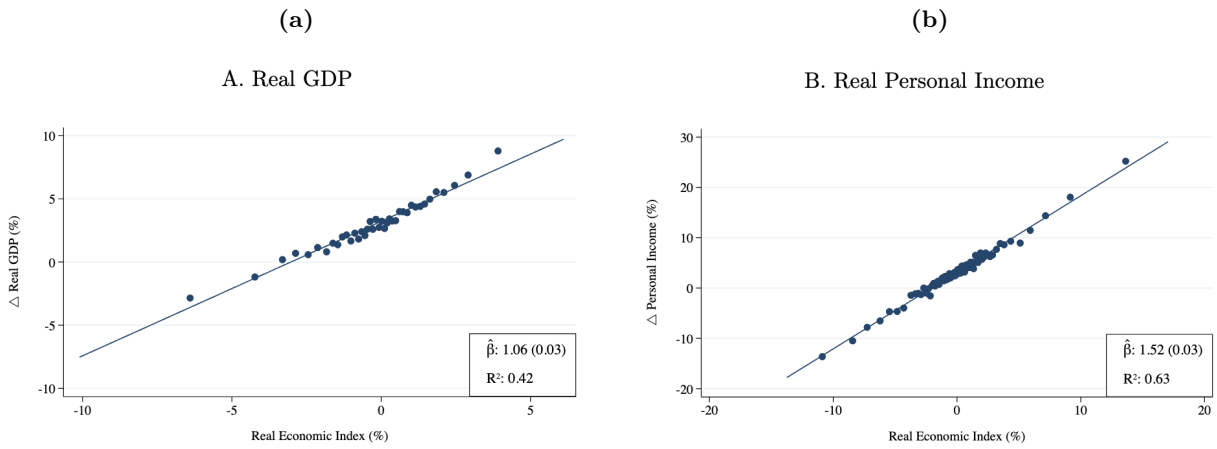
Figure E.8 illustrates the data availability for the case of Alabama. Many indicators such as various measures of agricultural production, state government revenues, patenting, or trade are available annually since 1870s. Manufacturing data become more comprehensive after 1899, when the Census of Manufactures adopted more standardized methodologies. Labor market indicators show the most significant gaps for pre-1939 periods, though we have constructed reasonable proxies using manufacturing employment and payroll information from censuses and state labor bureaus. In general, geographic coverage is most complete for northeastern and midwestern states, which typically have longer historical records and more developed statistical agencies during the 19th century. Western states generally enter the dataset later, coinciding with their admission to the Union and the development of state-level record-keeping institutions.

Figure E.8: Availability of Historical State-Level Data – Alabama Example



Notes: This figure visualizes the availability of each variable within our Hoon et al. (2025) dataset for Alabama, from 1870 to 2020. Each box represents a 5-year interval, with colors indicating the number of years for which data are available within that interval. The colors correspond to the following availability: 0, 1, 2, 3, 4, and 5 for data available in 1, 2, 3, 4, and 5 years within the interval, respectively. For more details, please refer to our companion paper Hoon et al. (2025).

Figure E.9: Validation of State-Level Economic Activity Index



Notes: This figure presents binscatter plots of the estimated economic activity indices against alternative measures of state-level economic conditions. The number of bins is chosen using the rule-of-thumb bin selector of Cattaneo et al. (2024). Annual growth rates of state-level GDP (1964–2019) and personal income (1929–2019) are calculated as log differences. GDP and personal income data are from the BEA. For more details, please refer to our companion paper Hoon et al. (2025).

Table E.6: State-Level Variables of Economic Activity

Categories	**# of Variables**	**Examples**
Labor Market	3	non-farm employment, manufacturing payroll
Real Activity	34	agricultural receipts, manufacturing value added, mining value, exports value
Housing	2	house sales price index, rent price index
Transportation	4	railroad mileage, motor vehicle registration
Government	9	federal govt revenue, state general revenue, state general expenditure, state debt
Wealth	4	personal income, value of farm land, # of bankruptcies
Others	4	# of patents, news-based sentiment index, newspaper circulation
Total	**60**	

Notes: This table summarizes the 60 variables reported in Hoon et al. (2025), grouping them into eight broad categories. We also provide examples of the variables within each category. For more details, please refer to our companion paper (Hoon et al., 2025).

Table E.7: Data Sources for State-Level Economic Activity

Source (Variable)	**Start**	**End**	**Frequency**
Panel A: Examples of Digitized Sources (84 in total)			
Statistical Abstract (Value of Imports of Merchandise, # Business Failures, Various)	1860	2018	Annual
Census Compendium (Non-farm Employment, Crop Receipts, Various)	1870	2021	Decennial
Livestock on Farms (Sheep Value)	1869	1935	Annual
Biennial Report of the Territorial Treasurer to the Governor of the Territory of Arizona (State Govt. Rev.)	1886	1911	Annual
Panel B: Examples of Existing Sources (29 in total)			
BEA (Personal Income)	1929	2021	Annual
BEA (GDP)	1963	2021	Annual
USDA (Crop Receipts)	1924	2021	Annual
Van Binsbergen et al. (2024) (Sentiments)	1850	2019	Annual

Notes: This table provides examples of the sources we use to construct the Hoon et al. (2025) dataset, along with the period and frequency covered by the sources. We provide examples of newly digitized Sources in Panel A, and of existing sources in Panel B. Note that we digitize data from the Census Compendium from $1870 - 1930$, and use existing Census data after. For more details, please refer to our companion paper (Hoon et al., 2025).